U. S. DEPARTMENT OF LABOR
JAMES J. DAVIS, SECRETARY
WOMEN'S BUREAU
MARY ANDERSON, Director

BULLETIN OF THE WOMEN'S BUREAU, NO. 28

WOMEN'S CONTRIBUTIONS IN THE FIELD OF INVENTION

A Study of the Records of the United States Patent Office

WASHINGTON
GOVERNMENT PRINTING OFFICE
1923

[PUBLIC—No. 259—66TH CONGRESS.]

[H. R. 13229.]

An Act To establish in the Department of Labor a bureau to be known as the Women's Bureau.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That there shall be established in the Department of Labor a bureau to be known as the Women's Bureau.

SEC. 2. That the said bureau shall be in charge of a director, a woman, to be appointed by the President, by and with the advice and consent of the Senate, who shall receive an annual compensation of $5,000. It shall be the duty of said bureau to formulate standards and policies which shall promote the welfare of wage-earning women, improve their working conditions, increase their efficiency, and advance their opportunities for profitable employment. The said bureau shall have authority to investigate and report to the said department upon all matters pertaining to the welfare of women in industry. The director of said bureau may from time to time publish the results of these investigations in such a manner and to such extent as the Secretary of Labor may prescribe.

SEC. 3. That there shall be in said bureau an assistant director, to be appointed by the Secretary of Labor, who shall receive an annual compensation of $3,500 and shall perform such duties as shall be prescribed by the director and approved by the Secretary of Labor.

SEC. 4. That there is hereby authorized to be employed by said bureau a chief clerk and such special agents, assistants, clerks, and other employees at such rates of compensation and in such numbers as Congress may from time to time provide by appropriations.

SEC. 5. That the Secretary of Labor is hereby directed to furnish sufficient quarters, office furniture, and equipment for the work of this bureau.

SEC. 6. That this act shall take effect and be in force from and after its passage.

Approved, June 5, 1920.

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UNITED STATES DEPARTMENT OF LABOR,
WOMEN'S BUREAU,
Washington, November 27, 1922.

SIR: Submitted herewith is a report on women's contributions in the field of invention as shown by a study of the records of the United States Patent Office.

Many requests have come to the Women's Bureau for information in regard to what has been done by women in the field of creative labor and in response to these requests this study was made.

Respectfully submitted,

MARY ANDERSON, *Director.*

Hon. JAMES J. DAVIS,
Secretary of Labor.

WOMEN'S CONTRIBUTIONS IN THE FIELD OF INVENTION.

A Study of the Records of the United States Patent Office.

PART I

INTRODUCTION.

Have women made material contributions to the sum total of creative achievements? Have they designed, devised, discovered, and invented to reduce labor, to forestall danger, disease, and death, to embellish life with creative comforts, and to enrich humanity with new stores of knowledge?

Measured by the relative opportunities and facilities for experiment and research and by the relative popular encouragement accorded women, are these contributions comparable with men's contributions in the same fields? Finally, and more important for the future, what progress or retrogression in comparative opportunities and achievement have marked the decades that stretch from the early eighteen hundreds to the current year?

To find a convincing answer to these questions is the main purpose of this report. A further purpose is to throw light on the extent and nature of any handicaps under which women may labor, and by so doing to open the way to the development of practical suggestions for the reduction of such handicaps as exist. The accomplishment of this object will not only expand opportunities for women of creative abilities; it will enlarge the measure of creative service rendered the Nation.

Source of information.

The most obvious sources of information on the subject are the records of the United States Patent Office. This is not to say that the distinctions between the words "creative" and "inventive" are ignored in this discussion. Creative activity goes on ceaselessly in art, science, and literature, and in the less illustrious walks of life, achieving important results that are not described as inventions but are clearly within the field of creative thought. Schools of art, of philosophy; systems of education; scientific theories—some underlying momentous discoveries of practical value—are all creative, though not properly described as inventions. Furthermore, much creative activity that is clearly inventive is not reflected in the patent records. Discoveries in the practice of medicine and surgery, new ideas in baby care and child play, simplifications in

home and business management, have made conspicuous progress in the last century; yet they are but faintly reflected, if at all, in the patent records. Because such forms of creative activity are not recorded they are not definitely measureable and can serve only indirectly, therefore, in assessing the relative contributions of women to the sum of creative achievement. There is, however, enough synonymic quality in the word "inventive" as used by the United States Patent Office and the word "creative" as used in its broader sense to render the records a valuable index to the range and quality of women's originative tendencies.

The spectacular successes of a few women as inventors of new mechanisms or discoverers of new processes and substances have not effected a change in the prevailing disbelief in the creative abilities of women as a whole. In the mind of the public these spectacular cases have stood rather as the brilliant exceptions. The purpose of this search is not, therefore, to give further attention to the few well known cases of successful women inventors and discoverers but to measure the number and analyze the quality of all the inventions of women recorded within given periods.

For this measure one must turn first to the Patent Office to discover whether the bare figures furnish any warrant for a detailed study of women's creative achievements.

The flow of inventions through the United States Patent Office is of such torrential volume and pressure that the contribution of women thereto entirely escapes observation. Indeed, so submerged are the patents issued to women in the flood of patents running annually to men that the first untested conclusion following a cursory reading of the lists is that these records confirm the general unbelief in women's inventive and creative abilities. But a closer scrutiny of the records from decade to decade forces a revision of such conclusion. Thin streams of water trickling here and there into a strong, steady current can be overlooked when all told they constitute less than 2 per cent of the volume of water, unless a survey up and down stream reveals the fact that these trickles are not an evenly distributed contribution of insignificant volume to the flowing waters, but have grown from almost infinitesimal beginnings and are showing a rate of increase which makes a perceptible swelling of the stream a matter of easy mathematical calculation. Then such tributaries are worthy of study.

A careful scrutiny of the patent records reveals a fair analogy in the growing contributions made by women to the flood of inventions pouring through the United States Patent Office.

The 5,000 patents granted women during the 10 years chosen for this study constitute less than 2 per cent of the total number of patents issued during that period, but they are more than the total

number of patents granted women during a span of over 105 years ended in 1895. They represent an average annual issuance 1,250 times the annual issuance to women for the 45 years ended in 1836, the beginning of the present serial number listing of patents. Although the rate of increase—based on beginnings of only one patent in two and one-half years—has fluctuated, it has shown a marked increase throughout the decades, and has, with two exceptions, exceeded the rate of increase in the number of patents granted to men during corresponding periods. In the last decade for which figures were published, the rate of increase in women's patents over the preceding decade was about three times the rate of increase in those of men. Manifestly these facts must be considered in measuring the significance of the annual average of 501 patents granted to women during the ten years selected for this study and the annual average of 34,837 patents granted to men during the same period.

It is this rate of increase which furnished the warrant for a detailed study of the patents issued to women in 10 years selected from the 27 years which have elapsed since the publication by the United States Patent Office of the latest bulletin containing a list of patents issued to women.[1] Time and funds available for this study did not permit a detailed analysis of women's patented inventions for the entire 27 years. It was not even possible to scrutinize the range and quality of the published lists of inventions granted women during the approximate hundred years ended March, 1895. The most that could be done was to use these early lists to find the true arithmetical perspective for the records of inventions patented by women during the 10 years selected for this study.

The first conspicuous fact revealed by the summary of the patents issued to women during various decades (see Table I) is that the last two groups show approximately the same rate of increase in average number annually over the group immediately preceding. Furthermore, a brief inspection of the figures for the 10 selected years (see Table II) will show that the average for the last five years is over 35 per cent higher than the average for the first five years, whereas the increase for men during the last five years was less than 17 per cent higher than for the first five of the 10 selected years. Unquestionably, then, the accelerating rate of increase shown in the nineteenth century has continued through the two decades of the twentieth century and adds further interest to a careful analysis of the range and quality of inventions patented by

[1] U. S. Patent Office. Women inventors to whom patents have been granted by the United States Government October 1, 1892, to March 1, 1895. Appendix No. 2. Washington, Govt. Print. Off. 28 p. 1895. The regular patent lists issued by the Patent Office do not show men and women patentees separately, but there have been three publications which together brought the lists of women inventors up to March, 1895. These lists were published chronologically, and for the last three years were arranged by classes also. In none of the bulletins were the issuances treated textually.

women as furnishing a fair indication of their potential capabilities in fields of creative labor.

Factors to be considered in the analysis.

In searching these records the limitations of the material as a safe guide to sound conclusions were not overlooked. Making adequate allowance for such limitations in itself affords reasonable protection against serious error. Indeed, no satisfactory analysis of the records is possible unless the nature of these limitations is understood clearly and is kept in mind throughout the discussion, because such limitations must be measured with comparable conditions surrounding the inventive achievements of men.

Before proceeding to the more intangible, though more important, of such limitations confronting women inventors, attention should be called to a probable defect in the figures presented in this report. The patentee lists issued by the United States Patent Office do not carry the title Mr., Mrs., or Miss. It was necessary, therefore, to include among women inventors only those whose given names left no doubt of their sex. As some women's given names are family names, or names also borne by men, unquestionably some women inventors are not included in the figures presented in this report. To get the women with names of doubtful gender would have necessitated a search of the patent correspondence in each case, a process which was not possible even had the resources underlying this report permitted so expensive a procedure. Judging from the small proportion of women who bear names of doubtful gender, however, it is not probable that the names omitted would have made any material difference in the results, and it is certain that if there had been any difference it would have served only to accentuate the trend shown by the figures presented in the following pages.

But behind and beneath the patent records are conditions and influences which have an intangible but far-reaching influence upon the official figures showing women's contributions to the sum of inventions.

One of these influences is best reflected, perhaps, by the interesting fact that the very first patent granted an American was issued by the British Government to "Thomas Masters, planter, of Pennsylvania," for a new "inventoon" for cleaning and curing Indian corn "found out by Sybille, his wife." Whether or not British law would have permitted Sybille Masters to take out her own patent matters not so much as the fact that it was conspicuously against custom in those days for women to do so bold a thing. No actual restrictions attach to women under the American constitutional and Federal laws providing for the issuance of patents, but the momentum of public thought expressed in the British Government's first grant of

patent for an American invention has carried a general assumption of women's disability for creative labor even to the present day. The latest issue of an encyclopedia commenting on American patent law says: "Minors and women and even convicts may apply for patents under our law." [2]

That the assumption of women's disability is or is not warranted is beside the mark at present. The phase of the matter pertinent to this discussion is the well recognized fact that the creative spirit flourishes in an atmosphere of friendly faith and languishes when environed by indifference, unbelief, or hostility. "Lack of public appreciation," "failure to accord fostering conditions of growth," "want of active encouragement" are commonly assigned, and without challenge, as reasons why men have not made satisfactory progress in this or that branch of creative work. If a lack of popular interest in achievement along specific lines of creative research retards the advancement of men to whom custom opens all research facilities, it is not to be expected that women will be uninfluenced by the traditional and prevailing lack of faith in women's creative abilities. Such a lack of faith not only discourages and retards creative effort in women as it does in men but it also creates in women a timidity about applying at all for patents on such inventions and discoveries as they do achieve, and fosters a tendency to pass the creative suggestions on to their male relatives, who, with the greater self-confidence born of freedom from restricting customs, perfect the inventions or complete the discoveries and secure the patents.

To what extent this psychological factor has counted in the final results there is, of course, no way of determining. But it must be kept in mind in analyzing the record, not only because it indicates the direction in which the patent records fall short in measuring women's creative achievements, but because the rapid wearing down of customs restricting women must be taken into account in judging the significance of the relative rate of increase in the numbers of patents granted to women from decade to decade.

A logical consequence of this traditional and widespread unbelief in women's inventive abilities is the limitation on women's opportunities and facilities for the research and experiment essential to achievement in fields of scientific invention and discovery. The scientific laboratories of the great State universities are not closed formally or expressly to women. To some of the great privately endowed institutions of science women are nominally eligible as they are nominally eligible to compete for some of the important scientific research fellowships. But as there is no widespread belief in women's

[2] Encyclopedia Americana, vol. 21, p. 383.

inventive abilities and in their powers of creative research, so also is there general absence of active encouragement of women to lay claim to the existing opportunities and facilities for research and experiment. This fact manifestly has direct bearing upon the relative number, range, and quality of scientific inventions and discoveries patented by women. Furthermore, these circumstances establish a vicious circle—limited opportunities for scientific research, limited scientific achievement; limited faith, finding justification for itself in the relatively meager achievement of women along lines of research, which can not be followed for lack of research opportunities and facilities.

However, the restricted opportunities for scientific research affect only a segment of the circle of inventive activity, for a striking feature of the information revealed by correspondence incidental to this survey was the abundant evidence that the inventive spirit raises no educational bars against its search for human expression. It flares out in response to the calls of emergency, necessity, or inconvenience. Unquestionably the educated are better equipped to go through the processes of patenting inventions, and therefore there may be more educated than uneducated patentees on the records. But the impulse to devise and discover new ways to meet old wants stirs human beings in all walks of life. The washerwoman invents and secures a patent on a washboard that protects the hands and lightens the labor of rubbing. The nurse creates a device to facilitate the care of the bedridden. The woman who travels invents safety signals on railroads, life guards for sea voyages, and so on through the whole range of human interests and activities, in a large part of which opportunities and facilities for scientific research are not prerequisites for successful invention.

But there runs throughout the entire range of inventive activity a condition which does act as a handicap on women inventors when it comes to putting their creations and discoveries into patentable form. This condition results from the normal division of the world's labor between men and women; woman's work keeps her in the home, or, even if she is a "woman in industry," she has not the freedom of movement in the world of business that is accorded a man. As a result, materials and facilities for making or securing models and sketches essential in patenting inventions are not so accessible to women as to men. For example, thousands of housewives, doubtless, have felt the need of some wooden or metal lifter with which to raise the lid from a pot of boiling water or to hold it firmly in place while drawing off the liquid without getting arms and hands within scalding range of the escaping steam; but how many women engaged in the daily round of cooking and other household duties

have as easy access to the materials, the tools, and the makers of sketches and models as the man in the factory or mill who feels the need of, and conceives the idea for, a machine guard, gauge, or other device? The same question applies in large measure to the man in trade or profession. He is a part of the world of manufacture and barter, of technical and professional service. Of this world, drafting, model making, filing applications and claims, are recognized activities. Even though a man may not be working directly with the materials involved in his invention, his daily life outside the home and his greater freedom in the world of industry and commerce bring him within easy reach of draftsmen, model makers, and patent attorneys, and render the steps essential to recording and protecting his idea as obvious and familiar to him as they are unfamiliar and obscure to the average housewife or even the average woman engaged outside the home in a closely confining occupation. Furthermore, women do not have the opportunities for studying conditions required to meet the demands of outside activity, such as railroading or mining, that a man has for studying conditions and equipment essential to efficient discharge of household duties. This is not a question of the psychology of custom but a question of comparative ease of access to facilities essential to the patenting of inventions. That men have always had, and still have, a long advantage in this particular will not be denied.

Closely akin to these handicaps in conditions fostering inventive achievements among women is their greater lack of funds and facilities for marketing the invention when patented. The difficulties and disappointments incident to "putting an invention on the market" have discouraged many a man from going to the trouble and expense of securing a record patent. The public, ever grumbling over inconveniences, sighing for escape from irksome burdens, resenting risks to life and limb, is still astonishingly indifferent or deaf to new things devised for its convenience, new guards for its life and goods. Manufacturers and tradesmen, dependent upon the public's responsiveness, are skeptical until they see unmistakable signs of approval. There are cases, too, where an invention or discovery would make serious inroads on an established business.

Again, the average manufacturer or tradesman is usually well occupied with turning over the goods on hand. Neither has time to study the yearly avalanche of inventions for such as affect his business. The average inventor is too poor to search until a responsive manufacturer or tradesman is found. These circumstances have wrecked the dreams of wealth of thousands of inventors, both men and women.

Letters of inquiry, some of which were sent to men inventors, concerning the circumstances and market success of patented creations, awoke many a mournful note of wondering complaint because an invention, though winning a patent from the United States Government, was still on the hands of its unenriched and unknown inventor. Letters from disappointed women inventors revealed a quicker loss of faith in the invention, because faith in their own creative abilities is not rooted more deeply in women than in the general public.

It is not possible to present in tabular form the degree of financial success which attended the inventions patented by women during the 10 years selected for study. In the first place, "success" is a relative and unstable term. Some inventions have met with such marked success and some are still such financial dead weights on the inventors' hands as to admit of classification, but the majority are not capable of clear demarcations, the temperament of the inventors themselves obscuring the actual progress made in marketing. The letters received in answer to personal inquiry can not, of course, be discussed individually, but the theme running through them, not barring those reflecting marked degrees of successful promotion, is the difficulty and cost of patenting and marketing inventions. A number of writers were plainly of the opinion that successful market exploitation was beyond the reach of women because of their comparative isolation and lack of familiarity with the business world. Still others, some of whom had secured patents on really ingenious devices, took the fact that the inventions were still dormant as proof of uselessness. Not a few asked if there was not some institute or agency through which women's inventions might be brought to the notice of appropriate parties. Practically all of them, barring those who had assigned their patents to corporations, cried out for better marketing facilities. None of those retaining faith in their own creations seemed resigned to accept unresistingly the proverbial fate of inventors—to enrich life though they themselves live and die in poverty.

At this point it is well to guard against the natural assumption that immediate and widespread use of an invention or discovery is the only reliable indication of the value of the achievement. A little reflection will serve to disprove the validity of any such assumption. Five hundred years passed over the grave of the chemist who discovered ether before surgeons used the anæsthetic to annul the shock of pain from the operating knife. The death of Alexander Graham Bell brought to the public's interested attention the long years of his early struggle to get serious consideration for his first telephone instruments. Indeed, the pages of recent and remote history are

so full of incidents of deferred recognition of inventions and discoveries that they compel the rejection of lack of immediate market success as a reliable criterion of the value of such achievements.

Inventions and discoveries ignored to-day may be in general use a decade or a score of years hence. The reverse may be true of other inventions. The only criterion for purposes of such a discussion as this is the standard of patentability set up by the United States patent law for an invention or discovery. To win letters patent from the United States Government the invention must be "new and useful." In other words, for the purpose of this report the records of the United States Patent Office have been accepted at their face value. Whatever fault there is in the standard affects men and women equally, so no bias results from accepting the standard in analyzing the achievements of women with those of men.

In this report women's inventions and discoveries for which, as "new and useful," letters patent have been granted by the United States Government have been grouped according to the spheres of human concerns which these inventions and discoveries serve. The conspicuous fact uncovered by this classification, as a glance at the detailed tabulation in the following pages will show, is the remarkable range of human activity covered by these "new and useful" inventions and discoveries patented by women. It might be expected that an ample majority of the patents would be on household devices and articles of personal wear and use. But while these two classifications form the largest single groups, they do not, even together, constitute the major part of the inventions and discoveries. To be sure, the numbers of patents granted to women for such things as railroad bed and rolling stock equipment and internal-combustion engines are not many, but the remarkable thing is that there are any inventions of this sort credited to women, in view of the limiting circumstances heretofore discussed.

A scrutiny of the tables and tabulations in this report will show that the creative thought of women has ventured with success not only into the realm of transportation but into agriculture, manufacturing, mining, quarrying, smelting, building and construction, chemical and other scientific processes, and a score or more of other lines sharply diverging from the accustomed activities of the majority of women.

SUMMARY.

The results of this survey may be summed up thus:

First. The actual number of patents granted to women inventors is still small, but the rate of increase shown from decade to decade is conspicuously high.

Second. The range of women's increasing activity in the field of invention extends from the home into most of the important branches of industry, commerce, and science.

Third. The inventions are not confined to the minor accessories in each field of activity, but in many cases are contributions to basic processes and substances.

CONCLUSIONS.

First. In view of the handicaps under which women inventors have always labored, the rate of increase in the number of inventions patented by women and the range and quality of their inventive achievements furnish an argument for expanding women's opportunities for research and experiment and securing to women easier access to facilities essential in patent procedure.

Second. Women inventors, even more than men, are in need of facilities for marketing or promoting their patented creations, because women are generally more restricted in funds and less informed concerning the methods of profitable patent disposal.

Third. The Patent Office records, on the whole, furnish a reasonable guaranty that with a reduction in the excessive discouragements due to frequent failures to realize money quickly on patents, with an expansion of opportunities for research, and with easier access to the facilities essential to patent procedure, the Nation will be rewarded by the increased measure of inventive service from women of creative abilities; and capable women will find constantly enlarging opportunities in this branch of the field of creative labor.

PART II.

PATENTS FOR NEW AND USEFUL INVENTIONS GRANTED TO WOMEN BY THE UNITED STATES PATENT OFFICE.

The Constitution of the United States in its first article, section 8, provides that "Congress shall have power to promote the progress of science and useful arts by securing for limited times to authors and inventors the exclusive rights of their respective writings and discoveries."

Neither the constitutional provision nor any law enacted thereunder bars women from its benefits or discriminates against them in any way. The basic legal requirements covering successful application for letters patent always have been in the main those set forth in the United States Patent Office Bulletins on "Rules of Practice". These read:

> A patent may be obtained by any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement thereof, not known or used by others in this country before his invention or discovery thereof, and not patented or described in any printed publication in this or any foreign country before his invention or discovery thereof, or more than two years prior to his application and not patented in a country foreign to the United States on an application filed by him or his legal representatives or assigns more than twelve months before his application, and not in public use or on sale in the United States for more than two years prior to his application, unless the same is proved to have been abandoned, upon payment of the fees required by law and other due proceedings had.[3]

Plainly the constitutional provision and the several laws based thereon were framed for the promotion of activities in which woman had little or no part in those days and from which, except in most humble services, tradition effectively debarred her for many subsequent years. For 19 years after the enactment of the patent law in 1790 not a single one of the 10,000 patents issued was granted to a woman. The first successful application from a woman was recorded in 1809 and was for a method of weaving straw with silk or thread. Even for a quarter of a century afterwards there were less than a score of patents granted to women.

The Patent Office records of patents granted to men are not kept separate from those granted to women. Since the enactment of the statute of 1836, patented inventions have been serially numbered and are arranged also in the published documents by general classes. The Patent Office has issued, however, three bulletins setting down chronologically the patents granted to women during a period of a little over a century—from the time of the enactment of the first patent law in 1790 to March, 1895. Except for the last three years

[3] Revised Statutes of the United States, secs. 4886–4887.

there is no classification of the patents, and for these three years the groupings are not constructed for the purpose of showing the spheres of human interests concerned in the several inventions. With the time and funds available for this study it was not possible to make a detailed study of the patents granted women during the 105 years covered by the bulletins of the Patent Office, nor to make an analysis of the patents which have been issued to women during all of the 27 years which have elapsed since any record of women's patented inventions has been published. Instead, the method followed has been to make a numerical summary of the published records for 105 years and to make a detailed analysis of the patents which have been issued to women during 10 selected years since 1905. The selections were made with a view to getting the level of achievements for as long a period as possible and yet not going so far back that correspondence with the patentees would be practically out of the question, and also with a view to bringing out most recent figures and to show the effect of the war. The decade following 1895—the last year covered by the Patent Office's published list of women inventors—was omitted as too far back to initiate such correspondence. However, the statistical summaries of all the decades preceding and of the 10 selected years furnish a fair basis of presumption concerning the omitted decade.

The table following, therefore, affords a bird's-eye view of the number of patents granted to women and the number granted to men since 1790. It shows that though the number granted to women is small, the rate of increase is conspicuously high, greatly exceeding, except for the first two periods, the rate of increase in patents granted to men.

TABLE I.—*Number of patents issued to women and to men and the per cent increase in such issuance in each decade or period since 1790.*

Periods following enactment of patent law, 1790.	Patents issued to—			
	Women.		Men.	
	Average number annually.	Per cent increase over previous period.	Average number annually.	Per cent increase over previous period.
Forty-five years prior to commencement of present series of numbers of letters patent (1836)	0.4	.....	220.9	.....
Nine and one-half years ending 1845	.7	85.0	456.9	106.8
Decade ending 1855	1.3	75.7	964.8	111.2
Decade ending 1865	10.1	676.9	3,767.4	290.5
Decade ending 1875	67.3	566.3	11,918.4	216.4
Decade ending 1885	106.0	57.5	16,079.3	34.9
Nine years ending 1894[1]	229.8	116.8	21,784.0	35.5
Ten selected years from 1905 to 1921[2]	501.6	118.3	34,836.9	59.9

[1] The last published report on women inventors to whom patents had been granted did not give complete figures for 1895; consequently this year was omitted from the figures.
[2] See Table II.

An interesting fact, which is not clearly revealed by the foregoing table because the figures are given in 10-year periods counting from 1836 (date of the present series of numbers of letters patent), is that the Civil War marked a conspicuous increase in the number of patents granted to women. Previous to the outbreak of the Civil War the patents granted women numbered less than half a dozen in a year. During the war and the years immediately following the numbers, while fluctuating, rose at times to over a hundred. It is too early to judge yet of the permanent effect of the World War, but the yearly average for 1918, 1919, 1920, and 1921, which constitute 4 of the 10 years chosen for this survey, is nearly 34 per cent higher than the yearly average for the 6 selected pre-war years. This fact is revealed in Table II, showing the number of patents granted women during each of the 10 selected years.

TABLE II.—*Number and per cent of patents issued to women in the 10 selected years: 1905, 1906, 1910, 1911, 1913, 1914, 1918, 1919, 1920, and 1921.*

Year.	Total patents issued.	Patents issued to women.		Year.	Total patents issued.	Patents issued to women.	
		Number.	Per cent.			Number.	Per cent.
Total	353,426	5,016	1.4	1913	33,941	501	1.5
				1914	39,945	522	1.3
1905	29,784	328	1.1	1918	38,569	666	1.7
1906	31,181	400	1.3	1919	36,872	494	1.3
1910	35,168	488	1.4	1920	37,164	638	1.7
1911	32,917	413	1.3	1921	37,885	566	1.5

PURPOSES SERVED BY WOMEN'S INVENTIONS.

Far more important than the foregoing statistical summaries are the facts developed by a careful analysis and grouping of the inventions patented by women during the 10 years selected for this study. If the steady increase in the numbers of patents granted women is accounted for merely by the increase in the number of patented hairpins, hair curlers, and such trifles in feminine equipment, it is without large significance either to civilization or as an indication of women's inventive abilities. The following classification, based upon a careful scrutiny of the character and purpose of the inventions granted women, shows at a glance how far from the truth any such assumption is. There is not an important sphere of industry, commerce, or the sciences unrepresented in these classifications.

A fact which adds significance to the industrial, commercial, and scientific representations in the groupings of patents granted to women is that all inventions for trifles of personal wear and sundry unimportant conveniences are counted even though they were for the same purpose. To illustrate, there were over 40 skirt gauges—all new and useful but all for the same purpose. So with the curlers and hairpins. But each counted in the sum total of the group and

weighed as one against the invention of an internal-combustion engine or a block-signal system. Nevertheless, the proportion of inventions concerned with important industries and professions is not submerged by the inventions concerned with trifles of personal adornment or minor conveniences.

TABLE III.—*Number and per cent of patents issued to women in the 10 selected years, classified according to the purposes served.*

Purpose served by patent issued.	Number.	Per cent.
All patents	5,016	100.0
I. Agriculture, forestry, and animal husbandry	221	4.4
A. Poultry raising supplies and equipment	34	15.4
B. Dairy supplies and equipment	35	15.8
C. Stock raising equipment	18	8.2
D. Planting, tilling, and harvesting machinery and equipment	71	32.1
E. Farm buildings, fence materials, and water and drainage equipment	28	12.7
F. Plant enemy exterminators	8	3.6
G. Garden tools and equipment	27	12.2
II. Mining, quarrying, and metal smelting equipment and materials	14	0.3
III. Manufacture	223	4.4
A. Chemical products and processes and apparatus for making such products	35	15.7
B. Food product and beverage processes, and apparatus for making same	40	17.9
C. Foundry materials and apparatus, machine-shop and other metal-working tools and devices	30	13.5
D. Leather and shoe making processes, machines and tools	13	5.8
E. Power machinery and apparatus other than electric	18	8.1
F. Textile products, processes and apparatus for making products	34	15.2
G. Miscellaneous products, processes, machines, and tools used in manufacture	53	23.8
IV. Structural equipment and materials	208	4.2
A. Road, conduit, and masonry construction and materials	8	3.8
B. House building parts, materials, and tools	22	10.6
C. Door and window fixtures	90	43.3
D. Heating equipment and appurtenances	62	29.8
E. Lighting equipment and appurtenances	26	12.5
V. Transportation	345	6.9
A. Automobile bodies and parts	69	20.0
B. Automobile tires and tire attachments	39	11.3
C. Automobile accessories	44	12.8
D. Bicycles, motorcycles and parts, and air-pressure operated vehicles	10	2.9
E. Horse drawn vehicles ,and equipment for vehicles and horses	44	12.8
F. Steam and street railways: Rail and road bed equipment	31	9.0
G. Steam and street railways: Rolling stock and equipment	50	14.5
H. Traffic signals and indicators	25	7.2
I. Boats and ship equipment	14	4.1
J. Aircraft and equipment	19	5.4
VI. Trade	71	1.4
A. Store equipment and furnishings	36	50.7
B. Advertising devices and equipment	14	19.7
C. Measuring and dispensing devices	21	29.6
VII. Hotel and restaurant equipment	10	0.2
VIII. Steam laundry and dyeing and cleaning establishment equipment	6	0.1
IX. Dressmaker's and milliner's supplies	118	2.4
X. Office supplies and equipment	71	1.4
A. Office machines and attachments	22	31.0
B. Stationery and miscellaneous equipment	41	57.7
C. Furniture	8	11.3
XI. Fishing	9	0.2
XII. Household	1,385	27.6
A. Kitchen equipment	440	31.8
B. Ash, garbage, and trash receptacles	31	2.2
C. Laundry equipment	165	11.9
D. House-cleaning devices	81	5.8

TABLE III.—*Number and per cent of patents issued to women in the 10 selected years, classified according to the purposes served*—Continued.

Purpose served by patent issued.	Number.	Per cent.
XII. Household—Continued.		
E. Dining-room equipment	44	3.2
F. Bedroom equipment	127	9.2
G. Nursery equipment and vehicles	47	3.4
H. Bathroom equipment and conveniences	27	1.9
I. Furniture and parts	81	5.8
J. Furnishings	46	3.3
K. Hangers, brackets, and other household hardware	97	7.0
L. Clothes closet conveniences and garment containers	52	3.8
M. Insect and rodent catchers	28	2.0
N. Sewing and knitting containers and conveniences	119	8.6
XIII. Supplies for use in industry, agriculture, commerce, and the home	378	7.5
A. Cutlery, tools, and hardware	37	9.8
B. Electrical equipment, apparatus, and supplies	45	11.9
C. Glass and earthenware containers and tops therefor	51	13.5
D. Sewing and embroidery machines and parts	61	16.1
E. Stationery supplies and equipment	71	18.8
F. Telephone equipment and telegraph code	26	6.9
G. Wrapping, packing, carrying, or mailing devices	87	23.0
XIV. Scientific instruments (other than surgical), laboratory equipment, meters, scales, watches, optical and photographic goods, apparatus and supplies	76	1.5
XV. Ordnance, firearms, and ammunition	22	0.4
XVI. Personal wear and use	1,090	21.7
A. Undergarments	154	14.1
B. Outer garments	139	12.8
C. Headwear	115	10.6
D. Handwear	12	1.1
E. Footwear	47	4.3
F. Garment appurtenances	378	34.6
G. Baby garments and appurtenances	43	3.9
H. Jewelry	21	1.9
I. Toilet articles	113	10.4
J. Purses, umbrellas, trunks, and other miscellaneous personal furnishings	68	6.3
XVII. Beauty parlor and barber supplies	46	0.9
XVIII. Medical, surgical, and dental equipment	227	4.5
A. Instruments and apparatus	48	21.1
B. Sick-room equipment	73	32.2
C. Bandages, dressings, belts, and supports	59	26.0
D. Stretchers and invalid carriers	10	4.4
E. Defective foot and limb correctives and aids	21	9.3
F. Manipulating and flesh reducing mechanism and equipment	9	3.9
G. Dental equipment	7	3.1
XIX. Safety and sanitation	129	2.6
A. Life and limb protection devices	45	34.9
B. Property protection devices	26	20.2
C. Sanitary equipment	58	44.9
XX. Education	75	1.5
A. Mechanical aids to teaching	40	53.3
B. School furniture and equipment	13	17.3
C. Musical instruction aids	22	29.3
XXI. Arts and crafts	67	1.3
A. Musical instruments and parts and musical mechanical aids	23	34.3
B. Artist's and sculptor's devices and equipment	11	16.4
C. Equipment and devices for fabric and other craft work	16	23.9
D. Theater apparatus	10	14.9
E. Miscellaneous ornamentation devices	7	10.4
XXII. Amusement	211	4.2
A. Children's playthings	170	80.6
B. Apparatus for adult amusement	17	8.1
C. Athletic equipment	9	4.2
D. Camping equipment	15	7.1
XXIII. Miscellaneous	14	0.3
A. Election and registration conveniences	6	(1)
B. Church equipment	1	(1)
C. Burial equipment	7	(1)

[1] Per cents of no statistical significance.

Although the foregoing tabulation shows to a striking extent the many fields which are served by the inventive contributions of women, they give little idea of the almost infinite variety and significance of the individual inventions. Of the 221 inventions for agriculture it appears that 71 were for planting, tilling, and harvesting machinery; of 1,385 inventions for the household, 440 were kitchen equipment; of the 227 devices for medical, surgical, or dental equipment, 73 were for sick-room equipment. Such figures as these show how women's thought and interest and imagination have tended to emphasize one or another type of need; but the variety and the tangible result of this thought and interest and imagination can be indicated only by a more definite listing of the objects invented. With such a listing as a background the picture is readily evoked of the many women with unusual needs or quicker imaginations who were trying to improve conditions or help themselves financially by meeting what they had found to be real problems.

In some cases it has been possible to elicit definite information as to the circumstances which led to certain inventions. Even where this information is not forthcoming, however, the perceptive reader will find between the lines of the lists themselves stirring and thought-provoking pictures of women in all walks of life, faced with many different conditions, possessing the imagination and technical ability to invent "new and useful" devices, and in addition having enough determination and faith to take the next step and secure letters patent for their inventions. The story of these women is told in the following lists, which show only the different types of inventions.

For example, there are not 40 entries for 40 skirt gauges. These inventions in the tabulations are represented with the single listing "skirt gauge," unless any one of them serves a wider purpose. In that case the wider purpose is represented by a separate listing.

I. Inventions facilitating agriculture, forestry, and animal husbandry.

Of the 5,000 patents issued to women during the 10 years selected for this study, 221, or 4.4 per cent, are concerned with some phase of farm work. Any assumption that such creations are confined to chicken raising, dairying, and round-the-house choring will not be verified by the records. Of course, the work of caring for the poultry and cows and other stock has stirred the ingenuity of women farmers, but the types of inventions facilitating such work are outnumbered by the types of patents granted to women for planting, tilling, and harvesting machinery and equipment. Bearing in mind that to win letters patent an invention must be new and useful as to either process or product or both, it is interesting that, as the detailed tabulation will show, the list of such inventions includes devices for facilitating

the principal labor involved in raising some of the Nation's most important and longest cultivated crops—corn, cotton, sugar cane and beets, tobacco, and grains.

Further inspection of the list of inventions in this group will show that they cover the entire range of farm work on the entire range of farms, from the dry to the irrigated sections of the country. The inventions reveal the fact that farm women have given creative thought, and with success, to farm buildings and fences, to drainage and irrigation, and to the embellishments of farm life, in addition to stock and crop raising.

That these farm inventions are by farm women is evidenced by the addresses of the patentees and more conclusively by the correspondence initiated with some of them concerning the circumstances leading to their inventive achievement. A Florida woman who invented a device for distributing fertilizer answers the question, "What circumstances led you to invent a fertilizer distributor," thus:

> Yankee laziness, I reckon. I didn't like the idea of bending my back so much, hence the distributor.

A Texas woman who secured letters patent for a new and useful improvement on a cultivator tongue writes:

> Having been raised on a farm and seeing that there was needed improvement on cultivator tongues, I made up my mind to improve on the old style tongue * * *.

Another Texas woman writes about the circumstances surrounding the invention of a sugar-cane stripper:

> I was farming in 1916 and planted sugar cane to make molasses. When time came to strip cane I was short of help and I shirked the old tiresome way of stripping cane. I then studied out a new way. * * * After three trials I had what I needed. I had it to work perfect and I could do with it as much as four persons could do in the length of time in the old way and make a better job of the work of stripping, as it saved labor, prevented backache, sore hands, and the worn-out tired feeling * * *.

A Minnesota woman, inventor of a portable smokehouse, writes:

> As a farmer's wife my duty was to cure meats for summer use and smoked meat is very much favored in my family. I tried to make mine without expense and after I completed this device I used it successfully two years before I obtained a patent on it.

There were a few instances of agricultural inventions patented by women who were not farmers, but they were not only exceptions but easily explained exceptions. For example, an adjustable rake, handy in gardening, was invented by a golf teacher who had been sorely inconvenienced by golf balls getting lodged in places out of arm's reach or in streams. She devised the rake first simply to recover the errant balls. The wider usefulness of the device was so apparent as to win a correspondingly broader patent.

On the whole, the patents secured by women on inventions facilitating agriculture, forestry, and animal husbandry are in the main

achievements of women themselves confronted daily with the problems of farm life. Some of the correspondents plainly were educated women who were gripped by the spirit of modern scientific farming. Of this group a typical example was a Nebraska woman who had invented a feed rack because "conservation of foods as encouraged by the Government during the World War made it necessary to prevent all waste of grains and produce the greatest amount of food within the shortest time possible. This could be better accomplished by means of proper self-feeders or racks for live stock, which not only saved grain but also gave quicker returns in the marketing of live stock." Other women who were as obviously restricted in early training, looked only for a way to escape a particular and pressing burden, and ceased inventive effort when the way was found. The following list of inventions in the field of agriculture, forestry, and animal husbandry show the many different needs met by the inventions of women:

A. *Poultry raising supplies and equipment.*

Anti-vermin perch.
Brooder.
Brooder-coop.
Chicken feeder.
Device to prevent hens from setting.
Food compound to promote rapid growth of poultry.
Seed sprouter for chicken feed.
Egg case filler.
Hen's nest.
Housing device.
Incubator.
Incubator egg turning device.
Incubator heater attachment.
Incubator thermometer.
Incubator temperature regulator.
Incubator trap.
Poultry dip holder.
Poultry duster.
Poultry harness.
Poultry roost disinfector.

B. *Dairy supplies and equipment.*

Butter worker.
Churn and churn dasher.
Motor to operate churns.
Churn cover.
Combined churn and butter worker.
Cow milker.
Cow-tail holder.
Cow-udder protector.
Cream can.
Cream dipper.
Cream separator
Cream separating bottle.
Milk can.
Vacuum milk shipping can in which temperature will be maintained 24 hours.
Milk-carrying tank.
Milk cooler.
Milk pail.
Milk strainer.
Skimmer.
Apparatus for washing separators, skimmers, etc.

C. *Stock-raising equipment.*

Animal blanket.
Animal nose yoke.
Animal poke.
Cattle guard.
Cattle stanchion.
Corn-shield for horses' heads.
Device for applying insecticides to animals.
Automatic feeding hopper.
Feeding regulator.
Feeding rack.
Feeding trough.
Stock feeding device.
Hog waterer.
Tag for ears of animals.

D. *Planting, tilling, and harvesting machinery and equipment.*

Beet harvester.
Cane stripper
Cord holder for grain bundles
Corn planter.
Corn thinner.
Corn harvesting machine.
Corn-stalk cutter.
Seed corn stringer
Sod and corn-stalk cutter.
Cotton planter.
Cotton scraper.
Cotton-picking machine.
Cotton chopper.
Cotton ginner.
Gin saw filer.
Portable combined cotton picking, ginning, condensing, and compressing machine.
Cultivator.
Double-row cultivator.
Cultivator tongue.
Cultivator attachment.
Decorticating machine for fibrous plants.
Disk sharpener.
Draft yoke for oxen and cattle.
Fertilizer, insecticide.
Fertilizer distributor.
Fruit picker.
Grain cleaner for threshing.
Grain lifter attachment for harvesting machines.
Grain-picking machine.
Grain header and conveyor.
Gravity grain separator.
Harvester.
Hay baler.
Hay spear.
Irrigating device.
Irrigating system.
Portable irrigating stand.
Diffusion block for subsoil irrigation
Time-controlled dam gate.
Soil reclaiming means for water-current machines.
Machine for cutting chaff.
Marker for planters.
Peanut plow.
Plow.
Disk plow and subsoiler.
Reversible disk plow.
Plow attachment and jointer.
Motor-driven plow traction wheel.
Rotary plow share.
Rice hulling machine.
Seed planter.
Tobacco handling implement.
Tractor.
Tractor-hitch whereby farm machinery may be pushed by tractor.

E. *Farm buildings, fence materials, water and drainage equipment.*

Cistern.
Fabric fence.
Fence fabric.
Wire-fence fabric.
Fence structure
Flume gate.
Grain elevator.
Grain storage bin.
Grain storage house, ventilated.
Gate.
Gate latch.
Land marker.
Portable smokehouse.
Pumping apparatus.
Pump drain.
Silo door.
Tank.
Water bed fence.
Waterway stock fence.
Windmill.
Wire knot for use in fence making.

F. *Plant enemy exterminators.*

Animal trap.
Boll weevil exterminator.
Tree cancer remedy.
Tree nourishing device.
Tree protecting apparatus.
Weed exterminator.

G. Garden tools and equipment.

Adjustable rake.
Bee feeder.
Combined rake and hoe.
Hoe blade.
Rake attachment.
Lawn mower.
Shears.
Strawberry runner cutter.
Weeding tool.
Weed cutter.
Flower box; flower pot.
Gardener's wheel chair.
Half-spray sprinkler.
Hose coupling.
Plant support.
Propagation pot or can.
Sprinkling pot.
Transplanting box.

II. Inventions facilitating mining, quarrying, and metal smelting equipment and materials.

In view of the fact that mining, quarrying, and smelting constitute not only basic industries but industries whose modern methods of operation rest upon an imposing array of inventions and discoveries, the accompanying list of contributions thereto by women seems too inconsiderable for comment. Reference to two facts, however, may put the list in another light.

First. Inventions by women, like inventions by men, are, in the main, sparks of creative thought that fly from the friction of necessity, from the blows of emergency, or from the smolder of concentrated research. This, of course, involves close contact with the conditions concerned in the inventions. Although the mining industries engaged the thought and labor of over a million people, during the 10 years ended in 1920 less than one-third of 1 per cent of these were women and this proportion was more than double that for the decade ended in 1910. Manifestly the inconsiderable number of women active in this field of human concerns must be put by the side of the inconsiderable number of patents granted to women for inventions facilitating mining, quarrying, and smelting operations.

Second. The accompanying list of patents on inventions for mineral extraction or treatment is apparently the result in the main of laboratory research and reflects a measure of scientific training. The restricted number serves but to call attention to the widespread and well-known negative attitude toward women in the provision of facilities and opportunities of scientific research.

Amalgamator.
Apparatus for extracting copper.
Blasting barrel.
Composition of matter to be used in fluxing metals.
Electrolytic separation of metals.
Hardening and tempering copper.
Pad for carrying radioactive ores and means for increasing activity of such ores.
Process and apparatus for extracting ores.
Oil-well fishing tool.
Treating ores.
Treating ores of the precious metals.

III. Inventions facilitating manufacture.

None of the groups of inventions patented by women carries more significance than that revealed by the accompanying detailed tabulations of inventions facilitating manufacture. The range and character of the creations reveal in a startling manner the influence of factory mauufacture on women's inventive abilities as they reveal the growing influence of women on manufacturing industries. It must be kept in mind that this list of inventions covers the processes of manufacture, new products being included only when they are for use in further manufacture, as new dyes, or when they represent a combination of new processes and new products, such as new fuels and new foods requiring factory equipment. Every invention which gets into general use, of course, stimulates manufacture, but this list has not been arranged with reference to this influence. The invention of a new hook and eye, a new garment appurtenance, a new kitchen appliance or other household device, finds no place among these grants. Excluding all such articles, although they unquestionably stimulate productive activity, and confining the list strictly to the operating methods and materials of manufacturing industries, gives peculiar significance to this group of inventions patented by women. Not only do they range through 50 well-developed lines of industry but they are concerned with the basic processes of some of our most important and some highly technical industries, such as chemical manufacture and the construction of power machinery. New dyes and new dye bases; chemical treatment of oils for commercial purposes; artificial fuels; leather restoratives and preservatives; gas apparatus and manufacturing processes; apparatus for utilizing momentum; air compressors; hoisting apparatus for logging; reversible turbines; and scores of other devices involve a knowledge of, and a concentration of creative thought upon new uses of, nature's substances and forces in the production of the necessities and luxuries of civilized life. The great range of inventive thought brought to bear by women upon productive methods and materials is further reflected in the last subgroup of this general classification of inventions concerned with manufacture.[4] This list of miscellaneous products, processes, and tools used in manufacture is a revelation in itself, for both the range and the character of the inventions, but only a thoughtful reading of the detailed tabulation of the whole group, which constitutes 4.4 per cent of all inventions patented by women during the 10 selected years, will reveal the full significance of women's increasing contributions in this field.

[4] The subclassifications under the general classification of manufacture in the detailed tabulation include inventions that facilitate production frequently in more than one industry.

A. *Chemical products and processes and apparatus for making such products.*

Acid arsenate of lead.
Alkali salts of protallic acid as stable protective colloids.
Artificial fuel.
Binder for burning composition torch fuse lighter.
Burner for petroleum and other hydrocarbons.
Composition of matter to be used in painting.
Composition of matter to be used for removal of superfluous hairs.
Composition for process for revivifying and preserving leather.
Dyes:
  Dye base.
  Dye bath.
  Dye.
  Dyeing.
Gas:
  Apparatus for generating gas.
  Twyer-gate for individual gas producing kilns.
  Kiln and method of operating same.
Gunpowder.
Leather and leather substitute preservative.
Lubricator for elevator guides.
Method of securing natural or artificial hair from pulp.
Paint.
Pneumatic distributing system for fluids.
Propulsion of air and other gases or fluids.
Pyrotechnic novelty.
Shoe dressing.
Sublimate, preparation of.
Treatment of oils.
Treatment of seaweeds for extraction of their elements.
Treatment of sewage or contaminated foods.

B. *Food products and beverage processes and apparatus for making same.*

Apparatus for preparing food products.
Beverage producing material.
Bread raiser.
Cheese making.
Composition for use in making piecrust.
Composition for use in preservation of meat.
Composition of matter to facilitate whipping of cream.
Compound for preserving eggs.
Drying foods.
Dry shortening flour.
Food product, and method of making same.
Health food.
Macaroni or like food product.
Mixing machine.
Nut butter.
Nut shelling and separating machine.
Pie filling composition.
Preparing carrot flakes.
Preparing citrus fruit powder.
Preparing whole rice.
Preserving compound for eggs.
Purifying sugar juice.
Tool holding means for food machines.
Treatment of grain for beverages.
Vegetable-curing plant.
Wine clarifying.

C. *Foundry materials and apparatus, machine shop and other metal-working tools and devices.*

Device for shaping ends of hollow cores.
Mold for casting metals.
Molding machine.
Sand-molding machine.
Parting compound for molders' use.
Temporary binder.

Cutting torch tip.
Die.
Dust collector for small metal grinding machines.
Duplicating and swaging device.
Gauge attachment for shears.
Lubricating bearing.
Oiler for air compressor.
Reamer.
Skelp for making tubes.
Soldering iron.
Spindle bushing.
Standing valve construction for well pumps.
Valve construction.

Multiple wire drawing machine.
Wire splicing tool.
Wire twister.

Tubular armour making machine.

D. *Leather and shoe making processes, machines, and tools.*

Leather working machine.
Coloring leather and products therefor.
Appliance for inserting beading in boots and shoes.
Combined punch and bottom set tool.
Edge-trimming machine.
Follower or form for boots and shoes.
Heel plate and frame.
Laying and securing sole to uppers.
Machine for affixing heels to shoes.
Machine for boring and drilling wooden French heels.
Sole.
Wooden French shoe heel and method of making same.

E. *Power machinery and apparatus other than electric.*

Apparatus for utilizing momentum.
Air compressor.
Belt drive.
Flexible shaft coupling.
Hoisting apparatus for logging.
Internal combustion engine.
Reversible turbine.
Rotary engine.
Single acting steam engine.
Steam boiler.
Solar heating plant.
Water motor.
Water wheel.
Wave motor.

F. *Textile products, processes, and apparatus for making products.*

Embossed fabric for rugs.
Fabric and method of making same.
Imitation fur and making same.
Open mesh joint in fabric and manner of making same.
Metallic cloth.
Preparing background on pile fabric.
Preserved fabric display.
Preserved textile article.
Reinforced textile fabric.
Rendering ramie and other fabric water repellent and coloring same.
Fabric making machine.
Humidifier.
Looms:
  Automatic reshuttling apparatus.
  Braking device.
  Harness action.
  Filling detecting mechanism.
  Protector rod holder.
  Picker action.
  Shuttle.
  Thread-tensioning device for replenishing.
  Other attachment.
Machine for making reinforced sheeting.
Print-washing tank.
Rug machine.
Rug making implement.
Thread measuring machine.
Yarn reel, knockdown.
Yarn-spinning apparatus.

G. *Miscellaneous products, processes, machines, and tools used in manufacture.*

Artificial flower making process.
Box parts, machine for tonguing and grooving.
Joint assembling machine.
Tree-barking tool.

Brush blank boring machine.

Buttons, machine for drilling and shaping

Clay-turning machine.
Concrete block molding machine.
Continuous kiln.
Cord and rope making device.
Rope measuring machine.

Cushion stuffing machine.
Apparatus for making leather-covered cushioned seats for chairs.

Clothing ticket printing machine.
Glove finger turning device.
Device for arresting plaiting bobbins of plaiting machine.
Strip notching and slitting machine.

G. *Miscellaneous products, processes, machines, and tools used in manufacture*—Contd.

Necktie ironing board.
Pronged fastener setting machine.
Sack lining machine.

Glass grinding machine.
Circular glass cutter.
Guided glass cutter.
Grinding machine.
Hair curler forming machine.

Jeweler's pliers.
Jeweler's tool.
Finger ring expander.
Insignia structure.

Paper box corner protector.
Core for paper roll.
Process and apparatus for saturating paper rolls.
Paper vessel making machinery.
Carton.
Paper or similar cup and method of making same.
Book construction.
Composition for printing or the like.
Coating paper machine.
Printing apparatus.
Type clamp.

Seed grading and cleaning machine.
Soap making process.
Soap and process for making.

Cigarette tip and forming same.
Cigarette wrapper.
Tobacco stripping machine.
Tobacco ordering machine.
Tobacco wringer.
Wrapper-sealing machine.

IV. Inventions concerned with structural equipment and materials.

Acquaintance with the range and character of manufacturing inventions patented by women as revealed by the previous tabulations prepares one for what otherwise would be a surprise in the scope and grade of women's inventions facilitating construction of roads and buildings. Even with the preparation afforded by the list of manufacturing inventions, there are some contrivances in the following list that extend beyond assured expectation. Machines for forming subterraneous passages, metal conduit construction, molds for cement blocks and concrete posts, are surprising contributions from women to the sum of inventions. On the other hand, the list contains many inventions which would be expected if women showed inventive ability at all, since such inventions have to do with matters commonly under the observation of women, if not in their care. Eaves-trough protectors, paint sprays, seats, shelf construction, window and door fixtures, and other details of housing equipment and materials are among the usual concerns of the average woman householder. That this group constitutes over 4 per cent of the total number of inventions patented by women is explained by the large number of door and window fixtures and other minor housing appurtenances.

Intimate familiarity with the need for improvement in such matters was evidenced by some of the letters from women who had invented such appliances. One woman wrote that the window ventilator she had invented was the outcome of "two weeks ill in bed at home and three weeks in a hospital during a hot, rainy June and early July. I had started it before, but not until I had to lie in those hot, stuffy rooms did I realize how badly it was needed."

Heating and lighting devices are likewise concerned with a woman's everyday duties, but here inventive activity of wide scope requires more technical knowledge and usually a higher grade of creative skill. Gas igniters, hot-air furnaces and registers, liquid-fuel furnaces, thermostatic pressure valves, carbon for arc lights, and other inventions of like grade are among those which the United States Patent Office has marked "new and useful" and for which it has granted letters patent to women.

A. *Road, conduit, and masonry construction and materials.*

Cement block, mold for.
Concrete testing, mold for.
Concrete post, mold for.
Continuous fascine for filling ditches.
Gutter section.
Metal conduit construction.
Shut-off system for conduits.
Machine for forming subterraneous passages and lining same.

B. *House-building parts, materials, and tools.*

Drain valve.
Eaves—trough protector.
Flood support for buildings.
Post brace.
Sleeping porch.
Seat.
Shelf construction.
Carpenter's tool.
Knockdown and portable frame and hoist.
Soldered rope chain.
Combination white-wash brush.
Fountain brush.
Moistener or softener for wall paper, paint, etc.
Paint bucket.
Paint spray.
Wall paper hanger appliance.

C. *Door and window fixtures.*

Awning sash construction.
Bell.
Door.
Door check.
Door knob, illuminated.
Door lock and key.
Door lock-hook.
Door lock, circuit closer for.
Door operating mechanism.
Door stop.
Door weight.
Hinge.
Sash.
Sash fastener.
Sash lift and lock.
Sash, combined holder and locking device for.
Sash tightener.
Screen.
Screen, rolling, window.
Screen door.
Screen door brace.
Screen frame.
Shutter and fastener.
Ventilator.
Window construction.
Window box and supports.
Window frame and means for attaching.
Window frame, revolving.
Window fastener for ventilation.
Window grating, adjustable.
Window guard.
Window and screen attachment.
Window fixture.
Window glass holder.
Window grille.
Window kitchen.
Window lock.

D. *Heating equipment and appurtenances.*

Chimney cowl.
Coal chute.
Coal screen.
Combination furnace and cook stove.
Combination stove lining and grate assembly.
Crude oil burner.
Door for fuel openings of furnaces.
Draft equalizer.
Electric heater.
Fire-place flue.
Flue cleaner.
Flue stopper.
Furnace.
Gas attachment for heating furnaces.
Gas burner.
Gas heater.
Gas igniter.
Gate for draft chamber of furnaces.
Grate.
Heater attachment for stoves.
Heat-conserving composition.
Heat distributing attachment for stoves.
Heating device.
Hot-air furnace.
Hot-air register.
Hot-water heater.
Insulated pipe joint or coupling.
Liquid fuel furnace.
Oil burner.
Portable radiator heater.
Portable steam radiator.
Portable water heater.
Radiator attachment.
Radiator repair device.
Reflector for stoves.
Thermostatic pressure valve.
Water heater.

E. *Lighting equipment and appurtenances.*

Acetylene lamp.
Adjustable light shade and reflector.
Arc-light carbon.
Chimney support for oil lamp.
Deflector for oil burners.
Drawer lamp.
Electrolier.
Electric lamp bracket.
Electric lamp, portable.
Gas fixture attachment.
Gas mantle.
Holder for lamp and lantern burners.
Incandescent gas lamp.
Inverted incandescent gas lamp.
Incandescent electric lamp fixture.
Lamp.
Lamp body.
Lamp burner.
Lamp chimney and burner.
Lamp chimney protector.
Mounting for oil burner.
Supporter for electric globe shades.
Wind and bug shield for lamp chimneys.

V. Inventions facilitating transportation.

Women have for many years been but little behind men as users of transportation facilities. That all women have not traveled with eyes and thoughts closed to the problems involved in transporting people and property and that some have used their minds with success on the impediments of travel are evidenced by the subjoined tabulations of the different types of inventions designed to facilitate and guard persons and goods in transit. Indeed, the first conspicuous fact developed by the figures and tabulations is that, of the total number of inventions patented during the 10 selected years, this group of inventions constitutes a larger proportion than either agriculture or manufacture. This should cause but momentary surprise, if any, as travel is not confined to one class of people, though restricted means limit extensive travel to those enjoying liberal incomes or engaged in

actual transportation work. That the list of inventions is not so large as that covering household devices and articles of personal use and wear is in all probability due to the more limited opportunities for continuous study of factors entering into the various problems of transportation. In other words, while all classes of women—householders, professional women, and women in business—travel by horse-drawn vehicles, in motor cars, in steam or electric railway coaches and water-craft, comparatively few have the opportunity for that close, continuous contact with the conditions of travel from which spring inventive achievements. The list shows, however, that no form of travel is unrepresented, inventions facilitating air travel furnishing instances of gratifying achievements by women. Some of these aircraft inventions have been assigned to aircraft corporations. A search through the formal descriptions of these inventions reveals a high degree of technical knowledge and a comprehension of the unsolved problems of air travel. Small numerically as is the entire list of aircraft inventions, it nevertheless affords substantial argument for larger opportunities and freer access for women to facilities of research and experiment.

It is noteworthy that although water craft are the oldest form of transportation they have called out from women the least inventive activity. With one or two exceptions, in this regard the list consists of more or less minor parts and appurtenances.

Steam and street railway traffic has had a far larger share of attention from women inventors. The list is not confined to devices for enhancing the comfort of travel—easier chairs, wider berths, more effective screens and curtains; the inventions range over road bed and rails through rolling stock equipment to traffic signals and block systems.

The number of inventions concerned with motor traffic constituting almost one-half of the transportation patents granted to women, together with the wide scope of inventive activity indicated by the list, serves to reflect clearly the increasing share taken by women in the operation of motor cars. The correspondence gives evidence that this actual driving and care of cars, furnishing as it does greater opportunity for observing the conditions of efficient and deficient operation of the mechanism, is an important influence in swelling the total of women's inventive achievements.

One woman wrote in answer to the question, "What circumstances led you to invent a cleaning device and windshield cleaner?"

While driving my automobile the rain came down in sheets which caused me to drive up to the curb and wait for the rain to subside. The thought came to me that something could be devised to clean the windshield and permit driving in wind and snow. Then while riding on a trolley behind a glass covered with sleet I saw the same thing would apply, and so I worked out my device to avoid this danger.

Another woman invented a combined license-plate holder and danger signal because she was—

Impressed with the fact, that must be obvious to anyone, that at present it is practically impossible to read the rear number of a moving automobile at night. It is, of course, of the highest importance that it should be made possible for police officers and for citizens to be able to make out the rear number of an automobile that is speeding away at night.

In inventing equipment for horses, again it was the need discovered as a result of personal experience which stimulated the formulation of the device. A woman from Montana who had invented an adjustable horse collar, answered:

Having personal experience with horses I found it was very difficult to fit a small collar on a large horse when the adjustment could only be made at the top of the collar. Another reason—most people are not careful when removing or putting on a collar. The result is nine-tenths of the collars are broken at the bottom while the rest of the collar is perfectly good.

Unfortunately this woman's experience which had enabled her to invent a "new and useful" device did not seem likely to be of real service to her or to others who were meeting with similar difficulties, for her collar was not on the market, she said, "because I am familiar with collars but not with selling them."

A. *Automobile bodies and parts.*

Axle, flexible.
Bed, automobile.
Body, convertible.
Brake for trucks.
Brake control, arm operated.
Brake, emergency.
Brake lever.
Brake shoe, self-adjusting.
Bumper.
Carburetor.
Clutch mechanism.
Cylinder cock.
Driving mechanism.
Door.
Electric engine starter.
Exhaust muffler.
Fender.
Frame, side.
Gear lock.
Grease cup.
Inflating valve.
Jack.
Motor vehicle.
Piston and packing ring.
Piston pump.
Piston ring.
Piston ring groove.
Piston rod.
Priming mechanism for explosive engines.
Protector for timers of automatic engines.
Pump, air.
Reproducer.
Rim for steering wheels.
Rim, wheel.
Rim, collapsible.
Rim, demountable.
Rim, dual construction.
Rim clamping device for demountable.
Roller bearings.
Seat construction.
Spark plug.
Spark plug and air compressor.
Spark plug and testing device.
Starting mechanism for explosive engines.
Steering apparatus.
Steering wheel and indicator combined.
Support for running board.
Transmission lock.
Truck.
Valve-controlling device.
Valve, reversible.
Wheel, construction.
Wheel, demountable.
Wheel, frictionless.
Wheel, guard.
Wheel, loose mount.
Wheel, spring.
Wind shield.

B. *Automobile tires and tire attachments.*

Antiskidding attachment.
Antiskid stud.
Armor for tire.
Combined tire and rim.
Deflation for pneumatic tire wheels.
Electric tire attaching means.
Fastening for skid chains.
Liner for tires.
Machine for making inner tubes.
Machine for tire making.
Metal inner casing for auto tires to prevent inner tube punctures.
Pneumatic puncture proof tire.
Puncture healing composition.
Puncture proof tube protector.
Resilient tire.
Spring tire.
Tire.
Tire chain.
Tire filler.
Tire protector.
Tire rack.
Valve for inner tube valve stem.

C. *Automobile Accessories.*

Article to prevent accumulation of moisture on glass.
Automatic detector for identifying vehicles.
Carrying receptacle for automobiles.
Child-holding attachment.
Combination tail and auto license light.
Combination license plate holder and danger signal.
Cushion spring.
Dimmer for headlights.
Electric-lighting system.
Foot rest.
Gasoline indicator.
Glare shade.
Hand protection device for steering wheels.
Headlight-turning mechanism.
Indicating plate or device.
Light.
Lock.
Seat strap.
Speed indicator.
Speed regulator.
Stop signal.
Wheel clamp.
Wind shield cleaner.
Wind and rain shield.

D. *Bicycles, motor cycles, and parts, and air-pressure operated vehicles.*

Bicycle gearing.
Child's bicycle seat.
Guard.
Lantern attachment.
Spring wheel.
Support for bicycles.
Wheel attachment.
Carriage for hand luggage.
Chair-supporting rack.

E. *Horse-drawn vehicles and equipment for vehicles and horses.*

Nose bag.
Currycomb.
Clevis.
Harness lining and pad.
Holdback.
Horse collar.
Horse-releasing device.
Horse-shading attachment for vehicles.
Horseshoe.
Horse overshoe.
Horseshoe calk.
Horseshoeing device.
Horseshoeing rack.
Hub.
Neck-yoke pole attachment.
Rein guide.
Rein holder and whip socket.
Seat, extension for carriages.
Spring seat.
Sleigh brake.
Snaffle hook.
Swingtree.
Swingtree clip.
Tire, cushion.
Tool, calking.
Trace carrier.
Traveling wagon.
Two-wheeled vehicle.
Vehicle.
Wagon-dumping mechanism.
Wheels.
Whiffletree hook.
Whiffletree hook and ferule.

F. *Steam and street railways: Rail and road bed equipment.*

Adjustable wheel anchor.
Apparatus for removing snow and ice from rails.
Car replacer.
Rail bender.
Rail clamp and tie.
Rail crossing, shockless.
Rail fastener, metallic.
Railway gate.
Rail joint.
Rail joint and fish-clamping plate.
Railway rail support and rail fastening.
Railway tie and rail-securing means.
Railway composition tie to which rail can be secured without use of spikes.
Railway cross tie.
Railway tie plate.
Sectional railway rail.
Spike.
Switch.
Switch-operating apparatus.

G. *Steam and street railways: Rolling stock and equipment.*

Attachment for back of car seat.
Automatic train-stopping means.
Car brake.
Car coupling.
Car-door operating mechanism.
Car-door switch control.
Car fender.
Car seat, convertible.
Car step.
Car truck.
Cinder deflector.
Clothes retainer for railway-car sleeping apartments.
Coal-car cover.
Compartment box for smokers.
Draft connection.
Dust and smoke conveyor for cars.
Extension step for railway cars.
Flexible coupling.
Foldable stair for sleeping-car berths.
Grain-car door.
Guard for open railway cars.
Handrail column.
Operating appliance for angle cocks for air hose.
Passenger car.
Reflecting mirror for locomotives.
Rigid hand grip for cars.
Sand box for cars.
Sewerage system for railroad cars.
Spark arresters.
Storm curtain for open street cars.
Swinging car step.
Trolley retriever.
Uncoupling device.
Umbrella receptacle for cars.

H. *Traffic signals and indicators.*

Block-signal system.
Car-door safety signal.
Car-signal.
Direction indicator.
Direction signal.
Electric signal lamp.
Electric signal system.
Illuminated signal indicator.
Operating mechanism for signals.
Street indicator for cars.
Traffic signal.
Vehicle-signaling crane.

I. *Boats and ship equipment.*

Anchor-hold support.
Arrangement for closing ship leaks.
Apparatus for raising submerged objects.
Electrically propelled boat.
Folding gang plank.
Means of killing vegetable and animal life on boat hulls.
Oarlock.
Raft.
River boat sleeping equipment.
Self-leveling cot, bunk, or couch for use on ship board.
Ship construction.
Ship ladder.

J. Aircraft and equipment.

Airplane.
Aircraft.
Aircraft of lighter-than-air type.
Direction indicator for air and marine craft.
Dirigible airship.
Dirigible headlight.
Flying machine.
Landing brake.
Lift indicator for flying machine.
Liquid container for airplane.
Mechanism for steering plane vertically and horizontally without aid of human contact.
Parachute.
Propeller.
Safety alighting attachment.
Wire-reinforced fabric for wings.

VI, VII, VIII, and IX. Inventions concerned with trade; hotels and restaurants; steam laundry and dyeing establishments; and with dressmakers' and milliners' supplies.

The conspicuous fact revealed by the figures on, and detailed tabulations of, the four following lists of inventions concerned with trade, hotels and restaurants, steam laundry and dyeing establishments, and with dressmakers' and milliners' supplies, is the brevity of the lists. The patents for inventions in these four groups combined are fewer than those granted women for inventions facilitating agriculture or for those concerned with manufacture. In view of the fact that women are engaged in such large numbers in the four spheres of activity represented, the meagerness of numerical results causes some surprise. An analysis of each of the four lists, however, will suggest a satisfactory explanation. The inventions concerned with trade do not include the commodities that are objects of barter and sale. They include only devices designed to permit trading with ease and expedition. A little reflection will make clear that the sum total of such equipment in any trading establishment consists of fixtures, weighing and measuring facilities, bundle wrapping and cash handling devices, and advertising service. In actual count all these facilities together are not so many as to render insignificant women's inventive contributions thereto as shown in the attached list. The same thing is true of the lists of inventions concerned with hotels and restaurants, and with milliners' and dressmakers' supplies. It should be noted that sewing machines and parts are not included among dressmakers' supplies and equipment, because these machines belong to a much wider sphere of productive activity than is covered by the work of dressmakers.

The inventions concerned with steam laundry and cleaning establishments do not include the devices invented to facilitate laundry work and fabric cleaning in the home, where, in spite of the enormous volume of work sent to steam laundries, most of the nation's washing is done. A reading of the list of household inventions will show that women have centered inventive thought with marked success upon the business of removing soil from fabrics washed in the home.

VI. Trade.

A. *Store equipment and furnishings.*

Automatic delivery system.
Automatic stock counter.
Box and package elevating apparatus.
Bundling machine.
Collapsible foot-measuring device.
Collapsible rack.
Coin-receiving and delivering apparatus.
Combined ribbon holder and measuring mechanism.
Color comparing rod.
Combination packing and display case.
Display fixture.
Display rack for veils.
Picture display device.
Hat display stand.
Hat barrel.
Gambrel.
Holder.
Meat rail and hook.
Measuring apparatus for corsets.
Package binder.
Plate-glass structure.
Registering machine for coin-controlled apparatus.
Tag attaching device.
Twine holder.
Value printing and indicating device for scales.
Window display.

B. *Advertising devices and equipment.*

Advertising car construction.
Advertising machine.
Advertising material attached to horn.
Changeable letter sign.
Display card.
Electric sign.
Illuminated changeable sign.
Means for advertising quarters, lodgings, and like.
Novelty adapted for advertising.
Pictorial device.
Stamp and advertising book.
Writing tablet, advertising.

C. *Measuring and dispensing devices.*

Cake cone holder and dipper.
Candy doll, wrapped.
Candy package.
Ice cream dipper.
Liquid dispensing device.
Liquid vending machine.
Machine for applying labels.
Miscellaneous measuring and dispensing device.
Shoe shining machine.
Sign card.
Stamp and ticket vending machine.
Ticket holder.
Vending machine.
Vending machine, coin-operated device for.

VII. Hotel and restaurant equipment.

Automatic cut-off for water glasses.
Block pad.
Cleaning off machine.
Electrically heated tray.
Hot food table and cabinet.
Machine for drying and polishing glasses.
Slide rail holder.
Tray mechanism.
Suspension device for umbrellas and like.

VIII. Steam laundry and dyeing and cleaning establishment equipment.

Carrier for laundry.
Dyeing machine.
Folding machine for flat work.
Machine for folding fabric articles.
Shine or gloss remover and nap producer.
Tray for laundry marking pins.

IX. Dressmakers' and milliners' supplies.

Bias folder.
Device for coating threads.
Dress form.
Dress pattern.
Dress stiffener and tightener.
Garment weight.
Plaiter and plaiting machine.
Skirt marker and measure.
Tape measure and pin cushion.
Tailoring device.

Hat frame.
Milliner's work holder.
Hat block for hat renovating.
Trimming attaching device.
Stainless paste.
Steaming form for milliners.

X. Office supplies and equipment.

The list of inventions concerned with office supplies and equipment like the four lists immediately preceding, is relatively small, but it is long enough to show that women have been influenced by the larger opportunities for inventive ability afforded by the demands of office work. Not all of the inventions of this type, however, were made by women who were working in offices, or exclusively for use in offices. Correspondence revealed the fact that some of the devices were of more general application. The woman who had invented a telephone muffler answered the question as to the circumstances which led to her invention thus:

> While stopping at a hotel in New York two years ago I could hear all that a man in the next room said while using the telephone. I thought it out, worked it out, made a crude one and went to my patent attorney's office with my crude model and had him test it by using it.

A. *Office machines and attachments.*

Calculator.
Duplicating machine.
Duplicating machine, signature roll for.
Duplicating machine, alignment device for.
Typewriter machine.
Typewriter keyboard.
Typewriter line indicator.
Typewriter paper guide.
Typewriter ribbon spool.
Typewriter spacing and securing anchor.
Typewriter underscorer.
Typewriter attachment.

B. *Stationery and miscellaneous equipment.*

Bill book.
Check holder, manifold.
Copy holder.
Combined copyholder and notebook cover.
Desk receptacle.
Eraser and brush.
Eraser shield for typing.
File wrapper.
Impression paper.
Index, card.
Index system.
Index tab.
Paper clamp for typing.
Paper clip.
Pencil sharpener and attaching clip.
Pencil stamp.
Self-binding cover for papers.
Stamp or envelope moistener.
Stamp and label applying machine.

C. *Furniture.*

Chair, revolving.
Clothes tree and holder.
Desk.
File.
Noise reducing typewriter stand.

XI. Inventions concerned with fishing.

The small list in this classification of inventions patented by women requires no other comment than to call attention to the fact that the devices are not confined to fishing for sport. Some of the inventions are concerned with commercial fishing.

Bait.
Fish guard.
Fish stop.
Fish tool.
Hover.
Line and float.
Line casting machine.
Net apparatus for deep-water fishing.

XII. Inventions concerned with the business of housekeeping.

This list, which embraces the largest number of inventions patented by women, speaks for itself and it speaks ably. It constitutes nearly 28 per cent of the total number of inventions patented by women during the 10 selected years and is a convincing answer to the charge that "women have not contributed materially to the labor-saving devices in the home." There is not a phase of household labor which has not called out the inventive abilities of some woman with sufficient success to warrant the United States Government in granting letters patent for a "new and useful device." There is no need of reading the list into the text. Its bearing upon the widespread belief that women have failed in resourcefulness in their peculiar sphere of activity should secure a careful reading of the detailed tabulations. One fact of importance only will not be made sufficiently clear in the tables and tabulations without text discussion. The letters from individual women inventors reveal a great diversity of training and a sharp divergence of standards of efficiency in household management. Letters coming from obviously educated women inventors show inventive achievement to be the direct result of trying to reduce to an exact science cooking and preserving and canning and cleaning in the home. Other letters are from women scarcely able to write who have invented devices to lighten heavy burdens or make irksome duties less galling. Several types of answers are illustrated in the following excerpts from the letters which came from the women inventors.

One woman wrote that she invented a pie-pan cover because of "overflowing of juicy pies, the best of the pie being wasted, leaving the poorest part of pie in crust. Also, cleaning of oven after baking pies."

Another fellow sufferer from the exigencies of domestic mishaps was the woman who wrote that the circumstances which led to her invention of a reinforced wooden bowl was "a 6-inch split in the top of my bowl as I was working butter. It came in two, spilling the water and my bowl on the floor."

That this inventor had come up against the difficulties of business competition was indicated in a later part of her letter when she asked for advice because a company to whom she had gone did not want bowls reinforced "as it would last too long, and to them it was not attractive."

The need for a special contrivance which was not procurable was the circumstance which brought about the invention of a kitchen cabinet, according to the report of one woman inventor:

> I was teaching home economics. I was living in one room and taking my meals anywhere I wished. Many times I desired to get my own breakfasts and suppers in my room, as many persons do, in order to save time, to reduce living expenses, and to have a chance to eat some of my own cooking. I desired a piece of furniture in my one room which would give the service of an entire kitchen but at the same time be an attractive piece of furniture for a living or bed room. I designed such a cabinet, had it made and finished as a piece of mahogany furniture and found after using it that it answered my purpose perfectly. Knowing that thousands and thousands of women were similarly situated, I thought I would get my device manufactured and placed on the market.

This is an account which is like many others. A personal need felt and satisfied, a realization that this need must be common to many others, and the consequent patenting and marketing of the device. Every type of housewife is represented in the following detailed tabulations of household inventions for which patents have been granted to women during the 10 selected years of this study.

A. *Kitchen equipment.*

Alarm device for utensils.
Apparatus for boiling eggs.
Baking implement.
Biscuit and doughnut cutter.
Bottle and glassware cleaner.
Bread board.
Broiler.
Can and bottle opener.
Candy cooker, hot air.
Candy cutter.
Canning and preserving container.
Canning and preserving method and equipment.
Canning and preserving fruit jar holder.
Coating composition for cooking utensils.
Coffee pot, cocoa pot, tea pot.
Colander.
Cook book.
Cooking device.
Cook stove and attachments.
Cooking utensil and lid.
Cooking utensil support.
Cooler.
Culinary implement.
Device for cooking asparagus.
Dish drainer.
Dish drier.
Dish pan and appurtenances.
Dish tray.
Dishwashing machine.
Drip attachment for oil cans.
Egg tester and separator.
Egg washer and slicer.
False bottom for utensils.
Fireless cooker.
Food drier.
Fruit, meat, or vegetable grinder.
Fruit seeder and corer.
Funnel.
Grater or masher.
Griddle and greaser for same.
Guard for egg and whipped cream dish.
Hand rubber.
Handle for utensils.
Hot utensil holder.
Ice cream freezer.
Juice extractor.
Kettle polisher and scraper.

A. *Kitchen equipment*—Continued.

Kettle protector, adjustable.
Kitchen appliance.
Kitchen cabinet and attachments.
Kitchen table.
Knife rest.
Lamp stove.
Lid holder.
Measure.
Meat tenderer.
Milk-card holder.
Mixer, egg beater.
Oven and warming closet.
Pickling weight.
Portable kitchen.
Pot stirrer.
Protector for stoves.
Provision safe.
Refrigerator and attachments.
Sanitary cooking apparatus.
Sealing press.
Sieve-cleaning device.
Shield from oven heat.
Sifter, sieve, strainer.
Sink cover and shield.
Sink-drain disinfectant.
Skimmer.
Spoon holder for cooking utensils.
Spoon holder.
Stove implement.
Toaster.
Vegetable tapper.
Waffle iron.
Window kitchen.

B. *Ash, garbage, and trash receptacles.*

Ash can and holder.
Ash distributor.
Ash sieve and screen.
Chute for garbage.
Garbage receptacle.
Trash can and burner.

C. *Laundry equipment.*

Apparatus for washing.
Bucket clothes washer.
Clothes catcher and drainer.
Clothes line and fixtures.
Clothes pin.
Clothes pin bag.
Clothes pounder.
Clothes prop holder.
Clothes sprinkler.
Clothes stretcher.
Clothes wringer and attachments.
Curtain stretcher.
Drying frame and drying device.
Heater for washing machines.
Iron and attachments.
Iron attachment for stoves.
Ironer—sleeve, waist, cap.
Ironing table, ironing board, and cover attachments.
Ironing machine.
Iron support and holder.
Laundry basket and receptacle.
Laundry strainer.
Soap holder.
Sleeve ironing board.
Washing board.
Wash boiler and attachments.
Washing machine.
Washing machine attachment.
Wash tub and attachments.
Wax pad.
Spring hinge attachment for board and tubs.

D. *House-cleaning devices.*

Broom and broom rack.
Brush cleaner.
Bucket.
Carpet and portiére beater.
Carpet sweeper.
Cleaning compound.
Cleaning device.
Cutlery cleaner.
Device for holding material for cleaning wall paper.
Dust cloth, dust pan.
Floor scrubbing equipment.
Mop, brush.
Oil-absorbing device.
Step ladder.
Stovepipe cleaner.
Wall cleaner.
Window cleaner.

E. *Dining-room equipment.*

China, table.
Cloth and support, table.
Cutlery.
Dining room furniture.
Electric toaster.
Glassware and tray.
Napkin holder.
Napkin.
Spoon holder.
Table mat.
Tea cart and server.

F. *Bedroom equipment.*

Bedstead.
Bedstead attachment.
Bed clothes.
Bed drapery, fixtures.
Bed rest.
Bed-warming device.
Bed-airing device.
Bracing leg for beds.
Mattress and springs.
Mattress turner.
Wardrobe.

G. *Nursery equipment and vehicles.*

Cabinet.
Carriage.
Carrier.
Comforter, bed clothes.
Crib, bed.
Diaper cleaner.
Harness for children.
High chair and attachments.
Nursery seat.
Nursery toilet.
Milk warmer.
Play pen.
Swing.
Tub and support.
Walker and jumper.
Weighing device.

H. *Bathroom equipment and conveniences.*

Bathtub and fixtures.
Bathing apparatus.
Bath spray.
Controlling mechanism.
Lavatory and shampoo bowl.
Lavatory cabinet.
Portable shower-bath apparatus.
Rubber sponge.
Toilet.
Toilet appurtenance.
Toilet cleaning device.
Toilet paper holder.

I. *Furniture and parts.*

Bookstand and bookholder.
Cabinet.
Chair, couch.
Christmas-tree holder.
Footstool, foot rest.
Mirror and adjustor.
Piano stool and music cabinet.
Portable screen.
Rocking-chair fan, automatic.
Sectional furniture.
Table.
Miscellaneous furniture.

J. *Furnishings.*

Awning, canopy.
Bag holder.
Bird bath.
Bookholder.
Chair attachment.
Curtain.
Cuspidor.
Drying rail and foot rest for heat radiators.
Flower holder.
Hammock and canopy cover therefor.
Hanging basket.
Head rest.
Piano shield.
Pipe hanger.
Radiator cover.
Rug.
Screen.
Seat cover.
Shade.
Shelf.
Sundial.
Urn.

K. *Hangers, brackets, and other household hardware.*

Curtain bracket, fixtures.
Curtain weight.
Draperies hanger.
Drawer pull.
Furniture caster, glass.
Picture hanger.
Rug-fastening means.
Picture cover.
Shade fixture.
Shade guide.

L. *Clothes-closet conveniences and garment containers.*

Clothes container.
Clothes hook and box.
Collar and cuff bag.
Garment hanger.
Hat hanger and holder.
Rack and shelf.
Tree.
Umbrella holder.

M. *Insect and rodent catchers.*

Ant trap.
Fly guard.
Fly paper and holder.
Fly screen.
Insecticide.
Mosquito foil.
Trap, mouse.

N. *Sewing and knitting containers and conveniences.*

Bodkin.
Cloth-uniting means.
Darning last.
Embroidery equipment.
Eyelet.
Garment cast-off.
Inserting openwork in fabric.
Needle, carpet.
Needle, crochet.
Needle, knitting.
Needle, ripping.
Needle holder and threader.
Pin holder.
Quilting frame.
Scissors and cutting guide.
Sewing accessory.
Sewing bag.
Sewing table and stand.
Skein holder and winder.
Tatting shuttle and hook.
Thimble and finger protector.
Thread holder.

XIII. Inventions covering supplies for use in industry, agriculture, commerce, and the home.

The longest list of inventions, barring those concerned exclusively with the home and those covering articles of personal use and wear, is that which embraces objects used in many spheres of activity, such as tools and cutlery, electrical apparatus and supplies, glass and earthenware, sewing machines and parts, stationery equipment, telephone and telegraph appurtenances, and scores of other devices. These do not concern exclusively, or even chiefly, industry, commerce, profession, or the home. They facilitate activity and promote comfort or efficiency in all spheres. In other words, the following list of inventions patented by women, constituting 7.6 per cent of the total number of women's patents recorded in the 10 selected years, could with justification have been added to manufacture, trade, or household equipment as they are real contributions to the "new and useful" facilities in two or more of these spheres of activity. This was not done because such a procedure would have resulted in duplicate, and frequently in triplicate, listings of the same

inventions, thus obscuring the statistical feature of the report. In scanning the following detailed tabulations, however, it is important to keep in mind the multiple service which each type of invention may render.

A. *Cutlery, tools, and hardware.*

Barrel-tapping device.
Barrel-head releasing implement.
Can receiving and piercing device.
Clamp.
Combination tool.
Cotter-pin tool.
Cutlery handle.
Device for removing valves and their seats and cages.
Drill.
File.
Lantern.
Lock nut.
Lock nut and bolt.
Nail extractor.
Rivet.
Plug lifter.
Saw.
Sawbuck.
Saw sharpener.
Self-locking bolt.
Straight line wire clamp for stretching wire.
Tack.
Tool holder.
Wiggler.
Wrench.

B. *Electrical equipment, apparatus, and supplies.*

Air-cooling fan.
Attachment plug.
Automatic circuit controlling mechanism.
Automatic circuit breaker mechanism.
Battery plate and terminal connection and fastening device.
Burner.
Call service apparatus.
Casing for electric cells.
Circuit lock.
Circuit closer.
Conducting cord holder.
Contact device.
Control of electric motors and apparatus therefor.
Cross-arms for electrical construction.
Dry battery cell.
Electrical resistance.
Float operated circuit closer.
Housing for electrical apparatus.
Impulsion motor.
Incandescent lamp socket.
Insulator.
Magneto controlling device.
Motor control.
Portable motor.
Protective container for dry batteries.
Rheostat.
Safety transportation carrier for electric incandescent lamps.
Spark plug.
Socket-key extension.
Switch.
Switch box.
Testing device for ignition systems.
Vapor electric apparatus.

C. *Glass and earthenware containers and tops therefor.*

Bottle.
Bottle, nonrefillable.
Bottle, milk.
Bottle cap or stopper.
Milk bottle cap.
Bottle holder.
Milk bottle case.
Container, liquid.
Container for mucilage.
Container for blacking.
Cording seal.
Cover and brush holder for mucilage.
Dispensing container.
Closure for receptables.
Jar neck and closure.
Jar cap handler.
Milk can cover.
Lid for milk crocks.
Receptacle for liquids.
Stone crock or jar.
Thermos food container, hygienic.
Thermos bottle attachment.
Soap seal.
Tin shackle.

D. *Sewing and embroidery machines and parts.*

Connecting and disconnecting mechanism for embroidery machine.
Expanding frame for embroidery machine.
Plaiting machine.
Portable hand sewing machine.
Sewing machine.
Sewing machine attachments:
- Belt.
- Braid-applying attachment.
- Bobbin-unwinding attachment.
- Bobbin stripper.
- Cloth guide.
- Edge guide.
- Folding attachment.
- Footrest.
- Corded tuck attachment.
- Gauge.
- Guard.
- Head.
- Leaf.

Positive timer for lockstitch machine.

Sewing machine attachments—Contd.
- Presser foot.
- Lifter for presser foot.
- Ribbon guide for tucking blade.
- Ruffler.
- Spacing attachment.
- Spool holder and thread guide.
- Stocking holding band for darning purposes.
- Stopping device.
- Side guider for sewing on skirt braid.
- Tension mechanism.
- Threading attachment.
- Thread cutter.
- Thread cutter and holder.
- Thread cutter and hem creaser.
- Thread guide and holder.
- Tucking guide.
- Trimmer.
- Other attachment.

Folding receptacle for sewing machine.
Implement holder for sewing machine.

E. *Stationery supplies and equipment.*

Binder, loose-leaf.
Ring for loose-leaf binders.
Means for retaining book rings in position.
Handle attachment for loose-leaf binders or books.
Book cover protector.
Book hold.
Book marker.
Book strap.
Book support.
Calendar.
Calendar, perpetual.
Envelope.
Envelope sealer.
Envelope and letter sheet combined.
Fastener mounting.
Foldable blank book.
Ink, indelible.
Ink bottle.
Ink bottle holder.
Ink stand.
Model slip holder.
Paste holding and applying device.
Pen.
Pen or pencil, luminous.
Penholder.
Penholder, duplex.
Pen or pencil attachment.
Pen wiper.
Post card.
Postalcard or photograph album.
Rubber attachment for pencils.
Seal.
Stationery.
Turning sheet and pad.
Transfer or duplicating pad.

F. *Telephone equipment and telegraph code.*

Adjustable receiver holder.
Attachment for wall telephones.
Booth.
Call list and memorandum slip attachment.
Guard for telephone transmitters.
Holding device for telephone receivers.
Mouthpiece.
Sanitary mouthpiece covering.
Muffler.
Optiphone.
Party line ringing key.
Receiver.
Sterilizing and muffling shield for telephones.
Telephone set.
Telephone stand.
Other attachments.

Cable and telegraph code.

G. *Wrapping, packing, carrying, or mailing devices.*

Adjustable receptacle.
Bag.
Basket.
Basket, foldable.
Barrel, collapsible.
Barrel, closure.
Barrel stand.
Book carrier.
Box strap tightener.
Box wrapper.
Can, sanitary top for.
Can.
Coin envelope.
Drop end box.
Egg case.
Flexible knockdown container.
Folding receptacle.
Folding crate.
Garment receptacle.
Hat box.
Handle.
Holding and dispensing device for collapsible tubes.
Holder for packing boxes.
Other holder.
Ice cream packer.
Label holder.
Load binder for vehicles.
Lunch box.
Letter-packaging device.
Mail bag catcher.
Mail bag crane.
Mail bag holder.
Mail binder.
Mail box.
Mail box, coin container for.
Mailing case.
Mail catcher.
Mail-dumping device, automatic.
Mailing frame.
Mail-tying device.
Oil can.
Packing material.
Packing ring.
Package tie.
Pin package.
Portable holder.
Pull or handle.
Receptacle, collapsible.
Receptacle cover.
Sack holder.
Sheet-metal packing case.
Shipping bag.
Strap fastener.
Tank or container.

XIV. Scientific instruments (other than surgical), laboratory equipment, meters, scales, watches, optical and photographic goods, apparatus, and supplies.

Probably no list of inventions patented by women will arouse more interest than the list of those for use in the field of science. Some of the inventions involve only a slight technical knowledge, but others clearly reveal scientific qualities. Such inventions as "marine compasses," "instruments for indicating ship stability," and "sound recording and producing instruments" are not the creations of untrained minds.

The list is short, but it should be read also in the light of women's comparative opportunities, facilities, and encouragement for scientific research.

Apparatus for estimation of vapor pressure.
Bunsen burner.
Calipers.
Circuit controller for liquid gauges.
Course finder.
Gauge.
Gauge glass cleaner.
Holder for mercury preparations.
Instrument for indicating ship stability.
Light filter.
Marine compass.
Measuring funnel for liquids.
Relay sounder attachment.
Sound recording and producing instrument.

Adjustable measuring and ruling device.
Combined rule, trisquare, and calipers.
Combined rule and adjustable compass.
Drafting tool.
Electric light attachment for levels.
Exposure meter.
Measuring instrument.
Register meter.
Recording apparatus.
Sun dial and compass.
Scales.
Straight edge.
Temple measuring device.
Weighing device, automatic.

Device for improving eyesight.
Eye glass.
Eye glass mounting.
Optical apparatus.
Spectacle pliers

Alarm clock.
Alarm device for clocks.
Escapement adjustment for clocks.
Printing ribbon shifter for time clocks.
Watch roller remover for clocks.
Winding device.

Attachment for motion picture machines.
Automatic controller for camera shutters.
Box with removable slides for packing pictures.
Camera.
Camera attachment.
Cinematographic film.
Color photography.
Film carrying device.
Machine for treating moving-picture films.
Means for providing border on films.
Motion picture machine.
Motion picture making.
Photographic printing apparatus.
Profile recorder.
Shifting camera back.

XV. Ordnance, firearms, and ammunition.

During periods of war, women have always been engaged in the manufacture of arms and ammunition. It is not surprising, therefore, that women should have made material contributions to the weapons and agencies of warfare during the 10 years that spanned the greatest war in history. The significant thing about the attached list is the highly technical quality of some of the inventions.

Automatic pistol.
Bomb launching apparatus.
Cane-gun.
Cartridge tube filler.
Flashlight attachment for firearms.
Front sight for firearms.
Incendiary ball.
Loading device.
Ordnance.
Percussion and ignition fuse.
Primer.
Railway torpedo.
Rear sight for guns.
Resilient missile.
Single trigger mechanism.
Submarine mine.
Top for powder cans.
Torpedo guard.
Woven cartridge carrier.

XVI. Inventions concerned with articles of personal wear and use.

Next to inventions that facilitate the business of housekeeping, the inventions concerned with articles of personal wear and use are by far the largest group. They account for nearly 22 per cent of the entire number of patents granted to women in the 10 years selected for study. The list requires no explanation. It suggests, however, considerations which should not be ignored. As in the case of household activity, so in the matter of personal wear, women have been charged quite generally with lack of resourcefulness. The attached

list is an emphatic contradiction of the assumption. But it is more than that; it is an evidence that women's inventive abilities are having a material effect upon the production of adult's and children's ready-to-wear garments and garment appurtenances, and on the manufacture of articles of personal use. One woman said she had invented a hairpin after walking up the street one day and counting eighteen hairpins which had dropped on the sidewalk. Others had patented garments which they had found useful for themselves. Many of the inventions listed below have been assigned to large manufacturers; some are familiar articles in quite general use. Of course, some patents are still dormant and others may be dead because of superseding devices. Some inventions go through these vicissitudes whether patented by men or women. But that fact does not annul the significance of the long list of inventive contributions which enhance everyday comfort, protect and adorn the persons of young and old, and expand activity in manufacture and trade.

A. *Undergarments.*

Bracing garment.
Brassiere.
Corset and part of corset.
Corset, maternity.
Corset cover.
Invalid bed gown and commode.
Kimona.
Pajama; night robe.
Suspender waist.
Undergarment.

B. *Outer garments.*

Apron.
Child's dress.
Coat or suit.
Dress or waist.
Hood and cap combined.
Maternity garment.
Scarf or sweater.
Shirt.
Skirt.
Swimming suit.
Trousers and overalls.

C. *Headwear.*

Bonnet.
Bonnet, collapsible.
Bandeau.
Cap.
Dust cap.
Ear shield.
Fresh-air hood.
Hat.
Hat fastener.
Hat-pin guard.
Hat protector, waterproof.
Hat ventilator.
Hat trimming and lining.
Hood for airplane pilots.
Mosquito and fly protective head gear.
Nurse's headdress.
Veil.
Veil fastener.

D. *Handwear.*

Finger shield.
Glove.
Glove fastener.
Hand warmer.
Mitten.
Shield for gloves.

E. *Footwear.*

Hosiery.
Slipper.
Shoe or boot.
Sole for boots and shoes.
Sliding sole.
Metal protecting sole for footwear.
Detachable heel pad and fastener therefor.
Shoe lace and tip.
Shoe-lace holder.
Shoe string fastener.
Shoe fastener.
Shoe protector.
Flexible dress overshoe.
Fastening for overshoe.
Protective overshoe.
Boot or shoe tree or last.
Shoe cleaning equipment.
Swimming shoe.

F. *Garment appurtenances.*

Belt or girdle.
Button and buttonhole.
Buckle
Bustle.
Catamenial appliance.
Chafing shield.
Collar, collar fastener, support, and protector.
Corset stay tip protector.
Cuff and wrist band.
Device for holding ribbons and streamers.
Draw string.
Dress shield
Garment stay.
Handkerchief container, sanitary.
Hook and eye and snap.
Hose supporter and clasp.
Knee band for knickers.
Legging and legging clasp.
Necktie fastener.
Neck protector.
Pin.
Pocket, safety.
Reversible sash.
Skirt and waist and other garment supporter.
Sleeve protector.
Suspender.
Waist lengthener.
Watch pocket.

G. *Baby garments and appurtenances.*

Band.
Bib.
Cap.
Diaper and support.
Ear bandage.
Garment.
Night garment.
Bottle.
Bottle holder and cleaner.
Envelope
Feeder.
Mouth guard.
Nipple.
Protector for infant's hands.
Device for turning nipples.
Protective device.
Soother.

H. *Jewelry.*

Cuff link and stud.
Earring.
Finger ring.
Jewelry case.
Jewelry clasp.
Locket.
Pin.
Pin guard and ornament.
Tokens.
Vanity case.

I. *Toilet articles.*

Artificial eyelash.
Chin mask.
Compound for stopping perspiration.
Container for toilet articles.
Cosmetic.
Hairbrush.
Electric hairbrush.
Hairbrush with removable bristles.
Hair comb.
Hair-waving comb.
Comb for drying and straightening hair.

I. *Toilet articles*—Continued.

Combination comb and brush.
Comb cleaner.
Detergent.
Hair curler.
Hair waver.
Hair dressing attachment.
Hair foundation.
Hair drier and sun shade.
Hairpin.
Hair-retaining device.
Hair remover.
Fountain tonic applicator.
Hair tonic and dressing.
Manicuring instrument.
Massage device.
Pincushion.
Powder box and powder puff.
Razor strop.
Toilet article.
Tooth brush.
Rotary tooth brush.
Wash rag and soap bag.

J. *Purses, umbrellas, trunks, and other miscellaneous personal furnishings.*

Ash receptacle, pocket.
Cigar lighter.
Cigarette-paper holder.
Match box, safety.
Pipe.
Tobacco box fastenings.

Coin holder.
Eyeglass polisher and holder.
Fan.
Key ring.
Novelty.
Purse or hand bag, and safe fastening for same.
Purse, shoulder.
Traveling bag.
Trunk.
Trunk attachment.
Convertible trunk and cot.
Umbrella and umbrella parts.

XVII. Inventions concerned with beauty parlor and barber supplies.

Barber implement.
Electric needle.
Facial massage implement.
Facial support.
Wrinkle mask.
Appliance for removing facial defects.
Hair-dressing apparatus.
Hair drier.
Hair drying comb.
Hair drying and waving appliance.
Hair-waving implement.
Hair treatment.
Machine for making hair goods.
Shampoo cap.
Shampoo equipment.
Shampoo fountain comb.
Spraying device for hair and scalp.
Manicurist implement.

XVIII–XIX. Inventions facilitating the practice of medicine, surgery, and dentistry, and those promoting safety and sanitation.

These two groups of inventions patented by women during the 10 selected years reflect clearly the expanded and intensified activity of women in the field of health restoration and health preservation. Together they constitute, in number, a group of inventions as important as that concerned with manufacture, agriculture, or transportation. Measured in terms of service to humanity, they are more important. The lists will furnish interesting reading and require no comment other than to call attention again to the need of keeping in mind the comparative opportunities for scientific research when judging the comparative achievements in this field of science.

XVIII. Medical, surgical, and dental equipment.

A. *Instruments and apparatus.*

Anæsthetic frame.
Apparatus by means of which heat, light rays, and jets of water act upon the body.
Aseptic appliance.
Atomizer.
Breast evacuator.
Electrotherapeutic apparatus.
Electrothermal blanket.
Foreign body localizer for X-ray work.
Holder for instruments.
Holder for mercury preparation.
Infusion device.
Medical battery electrode.
Medical implement.
Nose shaper and surgical support.
Obstretrical appliance.
Sterilized rack.
Surgical appliance.
Surgical basin.
Surgical instrument.
Surgical chair.
Surgical table.
Syringe.
Syringe bidet.
Tongue depressor.
Vapor bath apparatus.
Veterinary medicine spoon.
Umbilical cord tie.

B. *Sick-room equipment.*

Bed, invalid.
Bed, mattress holder for.
Sanitary mattress.
Bed tub.
Bed attachment.
Pneumatic pillow.
Bedpan.
Cushioned bedpan.
Elastic bedpan.
Bed attachment for bedpan.
Cushion for invalids.
Disinfecting device.
Douche tip.
Heating pad.
Hot-water bottle.
Hot-water bottle heater.
Tube attachment for hot-water bottles.
Ice bag.
Invalid chair.
Invalid bed support and rest.
Limb rest.
Medicine dispenser.
Mercury vapor lamp.
Safety medicine bottle.
Sputum cup.
Sterilizer.

C. *Bandages, dressings, belts, and supports.*

Arm support.
Bandage.
Bandage and splint.
Bandage, ear.
Bandage, foot.
Bandage, hot water.
Bandage, strap for.
Artificial breast.
Dust protector for nose.
Knee cushion.
Surgical dressing.
Apparatus for folding gauze for surgical dressings.
Gauze roller.
Moistening apparatus for absorbent materials.
Wrapping for hydrotherapeutic purposes.

Abdominal support.
Animal truss.
Shoulder brace.
Gentleman's braces.
Pessary.
Supports.
Supporting belt.
Suspensory.
Truss pad.

D. *Stretchers and invalid carriers.*

Ambulance.
Field hospital.
Lifter and conveyor.

E. *Defective foot and limb correctives and aids.*

Arch support.
Artificial limb.
Corn shield.
Crutch.
Crutch attachment.
Elastic hose.
Heel protecting device.
Leg protector and support.
Orthopedic appliance for ankle treatment.
Dog's foot brace and support.

F. *Manipulating and flesh reducing mechanism and equipment.*

Exerciser.
Flesh-reducing garment.
Manipulating machine.
Portable adjustable table for chiropractic use.
Thigh reducer.

G. *Dental equipment.*

Crown.
Dental instrument.
Dental casting appliance.
Dentimeter.
Denture.
Filling material.
Tooth mold.

XIX. Safety and sanitation.

A. *Life and limb protection devices.*

Car-door safety device.
Safety bar.
Safety appliance for railroads.
Safety device for occupants of vehicles.
Hatchway guard.
Lifeboat, noncapsizing.
Life buoy.
Life preserver.
Life-saving raft.
Parachute garment for aviators.
Signal attachment for life preservers.
Ship, adjustable safety staircase for.
Ship protector.
Swimming belt.
Unsinkable ship.
Automatic elevator-door closer.
Safety device for elevators.
Safety equipment for elevator shafts.
Safety-door trap.
Fire escape.
Safety indicator and alarm.
Safety device for bathtubs.
Safety guard for gas stoves.
Safety appliance for high chairs.
Guard for printing presses.
Guard.
Heat screen for steam closets.
Portable balcony for window cleaners.
Safety control for power presses.
Ventilating apparatus for chemical desks.

B. *Property protection devices.*

Auto theft detector.
Bank-note tester.
Burglar alarm.
Door latch and lock, secret.
Lock.
Fire alarm.
Fire hydrant.
Fireproof wall.
Fireproof wire.
Fireproof material.
Protected conductor.
Making fireproof conductor.
Ring guard.
Safety device for valuables.
Smoke dispenser.
Thermostatic alarm.
Water-meter protecting box.

C. *Sanitary equipment.*

Antiseptic drinking cup.
Apparatus for purifying and filtering water.
Apparatus for sterilizing liquids.
Disinfecting device.
Filtering drinking cup.
Garbage incinerating plant.
Refuse disposal apparatus.

C. *Sanitary equipment*—Continued.

Sanitary container cap.
Sanitary cuspidor.
Sanitary toilet seat or cover therefor.
Snow plow.
Soap-dispensing device.
Spark and soot collector.
Sterilizer for milk and fruit cars.
Street sweeper.
Toilet receptacle.
Towel rack and dispenser.
Ventilating conduit for garbage closets.
Water-cooling device.

XX, XXI, XXII, and XXIII. Inventions concerned with education, arts and crafts, amusements, and miscellaneous activities.

The four remaining groups of inventions patented by women constitute only about 7 per cent of the total number, the largest of the four embracing inventions designed to enhance the amusement of young and old. In the list of patented devices constructed to facilitate play the activity of the mother interests is striking, over four-fifths of the inventions being concerned with child play. The activities of teachers also find no small representation among the inventions listed here. It was particularly interesting to find by correspondence the number of teaching devices which had been tried out and patented by women who were themselves engaged in the teaching profession. One teacher wrote:

> My work in school and the great need of interesting, profitable handwork for half of my little folks at their seats while I gave personal attention to the other half, and experiments I made with similar devices, led to my invention.

Another woman, a teacher of music, had invented a device for helping children to learn to read music. This device she was successfully using in her classes.

To what extent other devices have been contrived under similar circumstances, but not patented, it is impossible to estimate; but it seems likely that in this field particularly, much of women's inventive achievement has not been patented and therefore is not a matter of record.

XX. Education.

A. *Mechanical aids to teaching.*

Applicance or device to be used in teaching reading.
Collapsible globe for geography teaching.
Inflatable globe for geography teaching.
Counting apparatus.
Device for teaching fundamental operation with numbers.
Device for teaching number work.
Drill device for facilitating visual instruction of very young children.
Means of teaching the alphabet.
Means of aiding teaching of spelling.
Means for producing a correct writing habit.
Educational device.
Arithmetic card game.
Educational game.
Educational playing cards.
Educational toy.
Geographical game.
Kindergarten educational device.
Kindergarten loom.
Method and apparatus for teaching manuscript forms.

B. *School furniture and equipment.*

Adjustable holder for chalk.
Black board.
Educational board.
Combined book-rack and carrier.
Drawing appliance.
Map.
Other educational apparatus.
School desk.
School register.

C. *Musical instruction aids.*

Chart.
Rhythm chart.
Device for teaching value of musical charts.
Combined pitch gauge.
Device for teaching music.
Finger bar.
Individual finger developer.
Indicator for musical instruction.
Key guide.
Musical demonstration board.
Musical notation indicator.
Note reading device.
Staff and key symbol for musical notation.
Tone guide for singers.

XXI. Arts and crafts.

A. *Musical instruments and parts and musical mechanical aids.*

Cornet mute.
Hammer action for musical instruments.
Musical instrument.
Piano.
Piano pedal guard.
Stringed musical instrument.

Automatic violin player.
Automatic stop for victrolas.
Attachment for self-playing musical instruments.
Electric orchestration.
Illumination means for phonograph music.
Music roll for piano player.
Player piano and phonograph.
Tone clarifying attachment for sound reproducing and transmitting instruments.

Leaf turner.
Page marker and leaf turner.
Orchestral transposition chart.

B. *Artists' and sculptors' devices and equipment.*

Adjustable artist's desk and easel.
Artist's bottle.
Bas-relief design and making same.
Drawing table.
Etching apparatus.
Folding sketch pad.
Making models in plaster.
Molding device.
Picture and design made from dry earths.
Process of coloring intaglios or molds.
Reproducing outlines of a form.

C. *Equipment and devices for fabric and other craft work.*

Apparatus for hand weaving.
Hand loom.
Rug or carpet loom.
Tension for warp reels and hand looms.
Lace work.
Ornamental work similar to lace or drawn work.
Lace fastening device.
Lace making holder.
Teneriffe-lace wheel.
Teneriffe disk.

Stenciling device.
Ornamental leather work.
Device for decorating china.
Method of ornamenting china.

D. *Theater apparatus.*

Apparatus for producing illuminated motion effects as of rain, snow, fire, or smoke.
Cannon for acrobatic performance.
Device for producing stage rain.
Fire illusion apparatus.
Notation for indicating lighting effects to accompany musical sounds.
Producing color effects and apparatus therefor.
Production of lighting effect on stage by means of high-tension currents of high frequency.
Scenic mechanism.
Theater stage.
Theater-seat hat holder.

E. *Miscellaneous ornamentation devices.*

Flag display device.
Floral canopy.
Landscape made of birds, feathers, and down.
Plate-glass plant.
Preserving plants, leaves, flowers, and butterflies.
Means for preserving and exhibiting flowers.

XXII. Amusement.

A. *Children's playthings.*

Christmas tree, artificial.
Christmas tree decoration.
Coaster.
Doll.
Doll, paper.
Doll's head, ear, or eye.
Doll furniture and furnishings.
Game, musical.
Magnetic basket ball game.
Table football.
Game.
Hobby horse.
Holder for sparklers.
Hoop.
House, portable infant's.
Ice creeper.
Puzzle.
Toys:
Aerial.
Animal.
Buzz ball.
Building.
Camera.
Musical blocks.
Musical instruments.
Printing blocks.
Railway.
Savings bank.
Theater.
Other toys.
Sand box.
Sled.
Slide.
Swing.

B. *Apparatus for adult amusement.*

Card game.
Playing cards.
Card support for dummy hands.
Score register.
Checker board.
Fortune telling device.

C. *Athletic equipment.*

Exercising apparatus for children.
Physical culture appliance.
Punching bag apparatus.
Swimming device.
Support for golf bags.
Suspending ring.
Tennis net.

D. *Camping equipment.*

Bedding and bedding roll.
Canopy.
Cooking kit.
Folding camp outfit.
Folding table and lunch kit.
Stove and oven, portable.
Table.
Tent pole.
Trailer.

XXIII. Miscellaneous.

A. *Election and registration conveniences.*

Folding booth.
Voting booth.
Voting machine.
Pocket ballot.

B. *Church equipment.*

Silencer for communion cup racks.

C. *Burial equipment.*

Burial garment.
Burial receptacle.
Funeral car.
Hand grasp.
Monument.
Artificial monument.

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First Annual Report of the Director. (Out of print.)
Second Annual Report of the Director.
Third Annual Report of the Director.
Fourth Annual Report.