

ANNUAL REPORT
OF THE
COMMISSIONER OF PATENTS.

UNITED STATES PATENT OFFICE, January 31, 1862.

SIR:—In conformity with the requirements of the 14th section of the act of March 3, 1837, entitled "An act in addition to the act to promote the progress of science and useful arts," I most respectfully submit the following report:—

In the section of the act above referred to it is declared to be the duty of the Commissioner of Patents "to lay before Congress, in the month of January, annually, a detailed statement of the expenditures and payments by him made from said (patent) fund. And it shall also be his duty to lay before Congress, in the month of January, annually, a list of all patents which shall have been granted during the preceding year, designated under proper heads, the subjects of such patents, and furnishing an alphabetical list of the patentees, with their places of residence; and he shall also furnish a list of all patents which shall have become public property during the same period, together with such other information of the state and condition of the Patent Office as may be useful to Congress or to the public."

The first provision of the above instructions to the Commissioner requires "a detailed statement of the expenditures and payments by him made." For a more complete and intelligible exposition of the affairs of the office, I beg leave to submit the following statement:—

No. 1.

Number of applications received during the year.....	4,643
Number of patents granted, including designs, re-issues and additional improvements.....	3,340
Number of caveats filed.....	700
Number of applications for extension of patents.....	16
Number of patents extended.....	21
Number of patents expired December 31, 1861.....	546

No. 2.

STATEMENT OF MONEYS RECEIVED DURING THE YEAR.	
On applications for patents, re-issues, designs, additional improvements, extensions, caveats, disclaimers and appeals.....	\$125,601 00
For copies and for recording assignments.....	11,753 44
Total.....	\$137,354 44

No. 3.

STATEMENT OF EXPENDITURES FROM THE PATENT FUND DURING THE YEAR.	
For salaries.....	\$92,868 92
For contingent expenses.....	59,502 36
For temporary clerks.....	43,791 31
For withdrawals.....	23,173 32
For refunding money paid by mistake.....	1,306 00
For judges in appeal cases.....	850 00
Total.....	\$221,491 91

No. 4.

STATEMENT OF THE CONDITION OF THE PATENT FUND.	
Amount to credit of patent fund on January 1, 1861.....	\$89,554 07
Amount paid in during the year.....	137,354 44
Total.....	\$226,908 51
From which deduct expenditures during the year.....	221,491 91
Which leaves to the credit of the patent fund Jan. 1, 1862.....	\$5,416 60

No. 5.

QUARTERLY STATEMENT OF EXPENDITURES FOR 1861.	
First quarter.....	\$61,050 23
Second quarter.....	62,439 25
Third quarter.....	52,104 53
Fourth quarter.....	45,897 85
Total expenditure.....	\$221,491 91

No. 6.

TABLE EXHIBITING THE BUSINESS OF THE OFFICE FOR TWENTY-FIVE YEARS, ENDING DECEMBER 31, 1861.						
Years.	Applications filed.	Caveats filed.	Patents issued.	Cash received.	Cash expended.	Balance.
1837.....	435	435	292	\$29,292 08	\$33,506 98	\$4,214 90
1838.....	520	520	423	42,123 54	37,402 19	4,721 35
1839.....	425	425	372	37,260 00	34,543 51	2,716 49
1840.....	765	765	473	38,066 51	39,020 87	(954 36)
1841.....	847	847	495	40,413 01	52,666 87	(12,253 86)
1842.....	761	761	517	36,505 68	31,211 48	5,294 20
1843.....	819	819	531	35,515 81	30,756 96	4,758 85
1844.....	1,045	1,045	502	42,509 26	36,344 73	6,164 53
1845.....	1,246	1,246	502	51,076 14	39,395 66	11,680 48
1846.....	1,272	1,272	619	50,264 16	46,158 71	4,105 45
1847.....	1,531	1,531	572	63,111 19	41,878 35	21,232 84
1848.....	1,628	1,628	660	67,576 69	58,995 84	8,580 85
1849.....	1,955	1,955	1,070	80,752 78	77,716 44	3,036 34
1850.....	2,193	2,193	995	86,927 05	80,190 95	6,736 10
1851.....	2,258	2,258	869	95,738 61	86,916 93	8,821 68
1852.....	2,639	2,639	1,020	112,056 34	95,916 91	16,139 43
1853.....	2,673	2,673	958	121,527 45	132,869 83	(11,342 38)
1854.....	3,324	3,324	1,002	163,789 84	167,146 32	6,643 52
1855.....	4,435	4,435	1,024	216,459 35	179,540 33	36,919 02
1856.....	4,960	4,960	2,502	192,548 02	199,931 02	(7,382 99)
1857.....	4,771	4,771	2,910	196,132 91	211,582 09	(15,449 18)
1858.....	5,364	5,364	3,710	203,716 16	193,193 74	10,522 42
1859.....	6,225	6,225	4,538	245,942 15	210,278 41	35,663 74
1860.....	7,653	7,653	4,819	256,352 59	252,820 90	3,531 69
1861.....	4,643	4,643	3,340	137,354 44	221,491 91	(84,137 47)

While the aggregate receipts of the office have amounted to \$221,491 91.

By the act of March 2, 1861, the expenses of the office were largely increased, as follows:—
Salaries of examiners in chief..... \$6,437 53
Salaries of commissioner and chief clerk..... 1,500 00
Printing..... 17,854 37
Total..... \$25,791 90

The receipts of the past year have fallen \$118,998 15 below those of the previous year; and the expenditures, omitting the above \$25,791 90 as extra, have been \$51,220 79 less than those of 1860. The cause of this great falling off of receipts must be apparent to every reader. The great inventive mind of the country has been attracted in another direction by the startling scenes of rebellion

which have transpired. A state of civil war has deprived this office of the patronage of most of the slave-holding States; the enterprise of the loyal States has, to a great degree, been paralyzed, and the sale of patent rights, as an article of traffic, has, in a great measure, been abandoned.

To provide for this state of affairs I have been compelled to resort to a most rigid economy. To bring the expenditures as nearly as possible within the ability of the office to meet them, by way of retrenchment I dismissed five principal examiners, five assistant examiners, and five second-assistant examiners. The compensation fixed by law of the principal examiners is \$2,500; the assistants, \$1,800; the second assistants, \$1,600. The business required that seven of each of these classes should be retained; but a still further reduction of expenditure being necessary, I dismissed the principal examiners and appointed them assistant examiners, and they are now receiving but \$1,800 per year; the assistant examiners were dismissed and appointed second-assistant examiners, at a salary of \$1,600; the second assistants were dismissed and appointed clerks, at an annual salary of \$1,400. These officers, however, have all been performing the duties pertaining to their original positions. A large reduction was also made in the salaries of the clerks. The temporary clerks, who formerly received ten cents per hundred words for copying are now paid but eight cents. This was regarded as a legitimate reduction, as the office receives for such work, by law, the same compensation formerly paid the clerks, while the expense of superintending clerks, stationary, &c., exceeded \$5,000 per annum. A large number of laborers, watchmen and attendants have been dismissed, and their places are now vacant. The reduction of the salaries of the examiners and clerks has been very onerous to them. The expenses of living in this city are largely increased by the centering here of a large army, and the attraction of thousands of civilians, who largely consume the necessaries of life, which, at all times, are less abundant here than in many other portions of the country. The military necessity, which required the closing of the communication between the farmers of Virginia, from whom a greater part of the usual supplies come, and the market of this city has contributed much to the expense of living in Washington. For these reasons I respectfully submit to Congress the justice and propriety of conferring upon the Commissioner of Patents authority to refund the difference in the salaries of the examiners and clerks, between the amount allowed by law and that now received by them, whenever, in his opinion, the funds of the office will justify it.

The 14th section of the act approved March 2, 1861, provides "that the Commissioner of Patents be, and is hereby authorized to print, or, in his discretion, to cause to be printed, ten copies of the description and claims of all patents which may hereafter be granted, and ten copies of all drawings of the same, when drawings shall accompany the patents; provided, the cost of printing the text of said descriptions and claims shall not exceed, exclusive of stationary, the sum of two cents per hundred words for each of said copies, and the cost of the drawing shall not exceed fifty cents per copy; one copy of the above number shall be printed on parchment, to be affixed to the Letters Patent; the work shall be under the direction, and subject to the approval, of the Commissioner of Patents, and the expense of the said copies shall be paid for out of the patent fund.

In accordance with this provision of the law, and with the approval of the Secretary of the Interior, I contracted with a responsible party for the execution of the work. The issues from the 2d of March to the 1st of November, 1861, were printed in a superior style, and the drawing executed in the most satisfactory manner by the photographic art.

This feature of the law has given eminent satisfaction to the inventors of this country, and has commanded the admiration of inventors and the superintendents of patent departments in many other countries. The imperative necessity which required it to be suspended was and is greatly to be deplored; but I earnestly hope that Congress will take the necessary steps to resume it at as early a day as practicable.

The importance of furnishing to the public the most complete practicable information in relation to every patented invention is obvious. Each patent as the name implies, should be open to the perusal of all, and as it has the effect of a law should be published at the public expense, as all other laws. The people of the country should have full information as to all patented inventions, firstly, that by a knowledge of the full extent of the exclusive privilege claimed by the holder of a patent they may not be exposed to damages for infringing upon it; secondly, that they may not be induced to believe that the holder of a patent has exclusive privilege for more than is described and claimed in his specification; thirdly, that they may be informed as to the actual progress of the useful arts and avail themselves of the most useful inventions; and fourthly, that the whole inventive genius of the country may be stimulated by the examples and suggestions furnished by descriptions and representations of each year's inventions.

Congress has evinced its appreciation of the importance of furnishing such information by the large appropriations which it has heretofore authorized for the publication of the mechanical reports of this office. I have been furnished by the Superintendent of Public Printing with a statement of the cost of printing, paper, binding, &c., of the mechanical reports of this office for each of the last three years, which is as follows:—

1858, 3 volumes, 32,950 copies, cost.....	\$85,659 08
1859, 2 volumes, 68,550 copies, cost.....	138,700 32
1860, 2 volumes, 66,550 copies, cost.....	118,992 09

These reports contain merely brief abstracts of the specifications made originally by examiners in the office, and latterly furnished by individuals out of the office by contract, and consequently prepared with the least possible expenditure of labor and expense, with the claims generally unintelligible, without the full description contained in the specifications. Meager and unsatisfactory as these abstracts are, the reports have been most eagerly sought for by the public. The publication of these reports will, I think, prove to have been most wisely suspended, if the substitute can be provided which was intended to be secured by the late law.

In making provision for this great public want Congress should not be unmindful of the examples of other nations most advanced in the mechanical arts. In Great Britain

France, Sardinia and Belgium, the specifications are published in full, and in such a form that printed copies may be furnished to all who may apply for them at cost price, while the entire publications are extensively distributed for the free use of the public. In Prussia, Saxony and Bavaria, official journals are published containing full abstracts and lists of the specifications of patents. The publications of specifications made by the French government consist of 91 volumes, quarto, of the old law, and 35 volumes, quarto, of the law of 1844. All which have been presented to the library of this office.

In Great Britain the publications of the specification and drawings of patents has been made upon a scale of magnificence which entitles it to be regarded as one of her great national works. The great seal patent office has published the complete specifications and drawings of patents granted by that office since 1623, in two series, the old law series from 1623 to 1852, and the new series from October 1852 to the present time. The old law series, comprising 12,977 patents in number, are contained in about 900 volumes, 450 folio volumes of drawings, and the like number of imperial octavo volumes of letter-press. The indices form seven imperial octavo volumes. The cost of these works in 1859 amounted to £92,000. The expense of printing for 1859 was estimated by the Commissioner of Patents at £17,500.

The publications of the great seal office consist of the specifications and drawings of patents granted, (the drawings are not photographic,) a subject-matter index of patents, an alphabetical index of patentees, a chronological index of patents, commissioners' of patents journals, (published semi-weekly,) assignments of specifications of various classes of patents, of which twenty volumes have been published, and all are in course of publication.

The publications are distributed among one hundred and seven libraries and offices in Great Britain, twenty-six libraries in the British colonies, and twenty-two in foreign countries. Of these last, six are in the United States; the cost of which has been upwards of £10,000. The cost of the continuation is at least £1,500 weekly. For these costly works our government has been able to make no return except the meager abstracts heretofore published by us.

No attempt has been made in the publications ordered by me, under the provisions of the late law, to imitate the costly works published by the great seal office; but the publications, though not wanting in taste and finish, are believed to be of equal practical value. Many advantages have already been presented by a brief trial of this system in this office, among which may be mentioned the readiness of inventors to furnish more artistic and detailed drawings, at a greatly increased expense, with the view of exhibiting these inventions to the best advantage; a change which would greatly facilitate the examinations of the office as well as aid inventors in making inquiries as to the patentability of their inventions. Through the improvement in the drawings, thus effected, and by the adoption of the photographic system of illustration, it is believed that the publications, if continued, would surpass in practical value those of Great Britain.

The depressed condition of the financial affairs of this office, incident to the state of the country, has alone induced me to abandon the wise provision of Congress, requiring the printing in full of the specifications and drawings of the patents issued from this office. From a careful examination of the matter, I am induced to believe that if Congress were to appropriate a sum sufficient to defray the expense heretofore incurred in the printing of the specifications and drawings of the patents, and which will not exceed one-half the sum heretofore expended from the general fund of the government, the office will be able hereafter to meet the expense thus to be incurred. This will enable those who desire copies to secure them at a small cost comparatively with what they now have to pay for manuscript copies. I am induced to believe that an appropriation of fifty thousand dollars for the present year would enable the office to carry out this most salutary provision of the law of the last Congress. An abandonment of the publication of the mechanical reports, rendered unnecessary by the printing of the specifications and drawings, under the law of March 2d, 1861, would save to the government, after making the appropriation above requested, the sum of \$

The restoration to the Patent Office fund of the amount withdrawn from it in conformity with the provision of the law of March 2, 1861, would be an act of simple justice to the inventors of the country, by whom this fund has been contributed. It would seem to be inequitable for them to bear the expense of introducing a new system of publication, the benefits of which are not for themselves but the general public. It is believed that this charge would not have been imposed by Congress upon the patent fund, if the diminution of then existing surplus fund, in consequence of the financial difficulties of the country, had been anticipated. The inventors have already been heavily taxed for the erection of the Patent Office building. There has been contributed by the patent fund for this purpose:

By act of July 4, 1836.....	\$108,000
By act of March 3, 1849.....	50,000
By act of May 15, 1850.....	90,000
By act of September 30, 1850, appropriating \$110,000, if so much remained in the patent fund.....	71,000
Making the whole amount contributed.....	\$319,000

The appropriation of this fund is justified only by the consideration that the inventors derive the most immediate benefit from the use of the Patent Office building. It cannot be doubted that the whole patent fund should be preserved for the use of those who contributed it, and certainly that the efficiency of the office for whose support this fund is primarily intended should not be impaired by the diversion of any part of it for secondary purposes. Congress has heretofore recognized the propriety of reimbursing the patent fund for all sums withdrawn for the benefit of the general public. Appropriations had from year to year been made of sums to be paid out of the patent fund for the collection of agricultural statistics and the purchase of seeds. By the act of March 3, 1855, the sum of forty thousand and seventy-eight dollars and seventy-eight cents was appropriated by Congress, to be paid out of any money in the treasury not otherwise appropriated, for the reimbursement to the patent fund of the whole amount thus withdrawn from the fund for the purposes above mentioned.

It is important to be observed that it is indispensable

that the printing of these publications should be done under the immediate supervision and control of the office. The specifications and drawings should not be removed from the office, as they are in constant demand for reference, and the inventors demand that there should not be a day's delay in issuing the patents after their date, which will be always liable to happen if the work should be done with other public printing. The type should be set up within the office, directly from the specifications. By doing this the cost of copy for the printer and the cost of recording the specifications will be saved, both of which are necessary when the setting of the type is done out of the office. The saving in these two items are the most important elements of the practicability of continuing the printing at the expense of the office.

As these publications, if continued, will be intended to supply the place of the former Patent Office Reports, and the gratuitous distribution to individuals will, of course, be dispensed with, some provision should be made to place them before the public. A sufficient number might be purchased by Congress at the same rate that may be charged to individuals, to place them in the most important libraries in each State, and to make exchanges demanded by national courtesy with foreign governments. A thousand copies, it is believed, will be sufficient to communicate the information as to the inventions of this office as effectually as has been done by the gratuitous distribution to individuals of the former reports.

PROPOSED AMENDMENTS.

By the law of March 2, 1861, it is provided that on filing each original application for a patent, except for a design, fifteen dollars shall be paid, and on issuing each original patent, twenty dollars. Practically, this postponement of the payment of the final fee operates disadvantageously to the office. The evidence of the truth of this statement is found in the fact that more than four hundred patents which have been ordered to be issued are now in the office awaiting the payment of the twenty dollars. Thus the office is deprived of more than eight thousand dollars, for which it rendered its time and labor. If this provision should remain as it now is the number will largely increase, and, of course, will prove a great loss to the fund, and may prove the source of endless litigation. It may be further observed that, until the additional fees are paid on these applications, each operates as a caveat which may be perpetual without the yearly renewal and fee required in other cases for perpetuating caveats, the public deriving no benefit from the publication of the patent, and other inventors being excluded from obtaining patents for the inventions. I would respectfully suggest that the law be amended, either by restoring the former provision, that the whole fee be paid on making the application, twenty dollars to be repaid to the applicant when the application is finally rejected and withdrawn; or that the application fee, intended to cover the expense of examination, should be increased to twenty-five dollars, and that ten dollars should be required on the issuing of the patent.

The avowed object of the second section of the act of the 2d of March, 1861, is "securing greater uniformity of action in the grant and refusal of Letters Patent." This is attempted to be effected by the creation of three examiners-in-chief, whose duty it is made to "revise and determine upon the validity of decisions made by examiners when adverse to the grant of Letters Patent, and in interference cases." It was expected by this means to relieve the Commissioner of a portion of the labor of the duties of office imposed upon him, but it has utterly failed to secure this last-named object.

As now constituted under the law, the examiners-in-chief form a tribunal independent of the Commissioner in all cases of rejection or interference decided by the examiner. An appeal lies from the examiner to them, from them to the Commissioner, and from him to one of the judges of the Circuit Court of the District of Columbia.

The chief justice has decided that an appellant must go through each tribunal before the judge of the Circuit Court can take jurisdiction of his case.

This state of the law and practice is far from beneficial to the public, and does not tend to secure greater uniformity of action in the grant or refusal of Letters Patent, and does certainly greatly augment the labor of the Commissioner. The act, in my opinion, should be so amended as to render the duties of the examiner-in-chief advisory only, so that an appeal, as formerly, may be taken from the examiner or from the Commissioner to the Circuit Court. All appeals should be taken from the decision of the examiner directly to the Commissioner, who could then refer it to the examiners-in-chief, or, if his time permitted, hear it in person.

The disturbed condition of the country has brought to view a deficiency in the patent laws with respect to the protection of the rights of assignees of inventions, which demands the attention of Congress. In many cases patents cannot be awarded to applicants except upon amendment of their specifications and claims. After an application has been once examined and rejected, the law requires a renewal of the oath of invention, by the inventor, before the amended specification can be re-examined. Cases have lately arisen where an inventor having filed his application for a patent, and assigned his whole interest in the invention, has disappeared or is *non inventus*, after the first examination and rejection; although in such case the defects in the specification might be cured by amendment, the inventor cannot be found to renew the oath required by law, and the assignee, the actual holder of the invention, is without remedy. In case of the death of an inventor before a patent shall have been granted for his invention, the right of applying for and obtaining a patent therefor devolves, by law, upon his executor or administrator. I would recommend that provision be made, by law, that when the inventor after making his application and assigning his invention may not be found, the right of renewing the oath of invention and amending the specification shall devolve upon the assignee.

It is difficult to conceive of any substantial reason for the provision contained in the 7th section of the law of 1836, which requires that an applicant for a patent, before making any alteration in his specification, "shall be required to make oath or affirmation anew." It is certain that no protection to the public is secured by this provision, while the requirement is a matter of great inconvenience to the applicant and the office. The inconvenience of this requirement has been particularly apparent since the number of foreign applications has been greatly

increased, in consequence of the reduction of fees made by the law of 1861. Applications from Europe and California have often been delayed for months for the renewal of the oath required, before the slightest amendment could be made. I would recommend that the laws be so amended as to dispense wholly with the renewal of the oath of invention.

COPYRIGHT.

The duties connected with the custody of all books, maps and other publications deposited in the Department of the Interior, according to the laws regulating copyrights, having been imposed upon this bureau, for the execution of which duty a yearly appropriation is now required, I beg leave to recommend a reform which will not only save this expenditure, but secure other important advantages to the public.

By the act of Congress approved May 31, 1790, it was required of every person desiring to secure a copyright, to deliver a copy of the work to the Secretary of State within six months of its publication, "to be preserved in his office." This requirement continued in force under the amendment to the act approved April 29, 1802, and by the "act amending the several acts protecting copyrights," approved February 3, 1831, it was required that a copy of the work should, within three months of its publication, be delivered to the clerk of the district court of the United States of the district wherein the author or proprietor should reside, and that it should be the duty of the clerk once at least in every year to transmit all copies of works thus received to the Secretary of State, "to be preserved in his office." By an act approved February 5, 1859, the Secretary of the Interior was substituted for the Secretary of State, and all works and records heretofore received were ordered to be transmitted by the latter to the former, no change in any other provision of the copyright law being made.

It appears, therefore, that for a period of seventy years, from 1790 to 1860, one copy of every work claiming security of copyright has been required by law to be deposited in an executive department of the federal government for a period of forty years by the author directly, and for thirty subsequent years through the agency of clerks of the United States district courts. The result contemplated by this requirement was a collection of copyright matter at the national capital in the lapse of years, as valuable as it would be interesting, and it is to be regretted that circumstances should have tended in any degree to defeat this end.

The earliest record of the receipt of a copyright by the Secretary of State bears date January 19, 1796, although copies of two works, one dated 1794 and the other 1795, are found in the library, of the receipt of which no record exists. From 1796 to 1831, during which period copyrights were required to be transmitted directly to the Secretary of State by the author or proprietor, the record of certificates of receipt is unbroken; and during the eleven years from 1831 to 1841, both inclusive, the register of works received at the Department of State from United States district courts under the act of the former years, seems equally perfect. But here ceases all record or register at the Department of State of copyrights received, and for a period of twenty years, from 1841 to 1860, when a register was commenced at this office, whether the service had been transferred, the only source available from which could now be compiled a complete catalogue of all the copyrights entered during that period in the United States, are the lists and records, more or less perfect, transmitted more or less regularly by the clerks of the United States district courts, in accordance with the act.

From 1796 to 1831 the whole number of copyright works actually received at the Department of State was 2,212, while the whole number for the same period received from the Department of State in 1859 at the Patent Office was but 929, or less than one half. The whole number of copyrights received at the State Department from 1831 to 1841, both inclusive, was 10,073, while the whole number received at the Patent Office in 1859 was 6,017. The whole number received at the State Department from 1841 to 1859, both inclusive, is estimated in round numbers at 40,000, while the whole number received for the same period at the Patent Office did not exceed 30,000.

Out of some 50,000 copyright works, therefore, deposited in accordance with law, to be preserved, from 1790 to 1859, less than 40,000 are now to be found. It appears, also, from careful comparison of the records of applications for copyright with the list of works received for a series of years, that not more than two-thirds of all the works for which a copyright is requested are ever deposited with the clerks of the district courts of the United States, as is required by the act of 1831, or, if so deposited, are ever transmitted by the clerks to this city, as is also required.

The evil resulting from the continuance of such a state of things is too obvious to demand comment. It is easy to suppose a case in which the absence of copyright work from the place where the law requires it to be found, when called for as a legal voucher, might prove extremely detrimental to the interests of its proprietor, especially when it is considered that judicial decisions hold that proof of the fulfillment of the act in the minutest particular is indispensable to the security of the right.

The copyright works now received at this office are carefully registered and preserved, and this done at an annual expense of more than \$1,600. That this service may be rendered self-sustaining, like the Patent Office, can be readily demonstrated, and thus a saving of the above-named amount be made to the treasury.

At the Stationers' Hall, in London, all applications for copyrights in England are made; from thence all certificates on the subject are issued, and there all works are received for preservation. The same service could be performed at the Patent Office for the United States, and be sustained by the same amount of fees now allowed clerks of the United States district courts by the act of 1831.

Under the existing law, the perfecting of a copyright is made dependent on the performance of certain duties by district clerks of the United States, no penalty being prescribed for neglect of those duties. These officials are not subject by any law to the directions of the department or office charged with the superintendence of the service. Hence, with perfect impunity, a clerk in one of the districts has for eight years refused to transmit either records or copyrights to this office, in obedience to the law, on plea of insufficiency of compensation. Other clerks are equally negligent of their duties. The present system has

utterly failed to secure the object contemplated by the original enactment, and so valuable to those authors who desire protection for their works. Had the plan now suggested been carried out with the same fidelity as has been the Patent Office, we would now have a copy of almost every book, pamphlet, map, chart and musical composition ever published in this country. I need not enlarge upon the value of such a collection.

It is a subject of congratulation, to which I am happy to refer in closing this report, that notwithstanding the occupation of the public mind with the paramount thought of defending the government, and the apparent diversion of so much activity from peaceful to military pursuits, the business of this office, so sensitive to any financial or industrial change, shows a vitality in the industrial arts of the country not to have been expected in time of war. Of the applications for patents made during the month of December last, arranged according to the classification of the office, there were, in the classes of

Agricultural implements.....	63
Calorifics and photics.....	45
Chemical processes.....	40
Land conveyance and engineering.....	59
Fibrous and textile manufactures.....	9
Fine arts.....	24
Household furniture.....	31
Leather, harness, and wearing apparel.....	42
Lumber, stone and clay.....	19
Philosophical and surgical instruments.....	22
Navigation.....	8
Steam and air engines, hydraulics and pneumatics.....	35
Metallurgical manufactures.....	23
Firearms and implements of war.....	58

It appears by this statement that 420 were for inventions in the peaceful arts, and 58 only in implements of war. Although some of the former are adapted for military use, it would be safe to say that five-sixths are inventions connected with productive industry—a proof that the productive interests of the loyal States have not been materially disturbed by the national convulsion.

As the power to maintain war depends upon the productive labor of the country, and the capacity of production is increased by new inventions, it is hoped that Congress will regard the encouragement of an institution which stimulates and protects the inventive resources of the country as not simply a duty, but a national necessity.

D. P. HOLLOWAY,
Commissioner of Patents.

HON. GALUSHA A. GROW,
Speaker of the House of Representatives.

Bronze Guns.

At the Rogers locomotive works, in Paterson, N. J., experiments are being made in a peculiar mode of casting bronze guns; and we are glad to find them likely to prove successful. Mr. Morris from Pittsburgh, who has had large experience in the casting of the celebrated iron Columbiads for heavy fortification guns, is superintending the experiments. He is now turning his attention to applying the principle to the casting of bronze guns. These have hitherto been cast solid and the entire amount of metal of whatever caliber bored out afterward, thereby not only making much waste, but taking a vast amount of labor; and what is worse producing a gun, which on account of its softness, is very soon destroyed, more especially, if rifled and using a winged or conical projectile.

Those guns cast for Mr. Morris, are cast hollow, with what is known as the "circulating water core." This consists of a double tube, one within the other the outer one being coated with some kind of loam and sand in the usual manner of making cores; and the inner one, being smaller, leaves a space between its exterior surface and the interior surface of the outer one. The inner tube does not quite reach to the bottom of the other, but leaves a space for a return passage. Water is conveyed during the casting and cooling of the gun into the mouth of the outer tube which forces its way toward the bottom, and returning rises and escapes in a hot condition. Some twenty-five feet head is used for this injection water.

The mold is also different from the ordinary loam or the dry sand mold. It is composed of a mixture of Kaolin, clay, quartz and mica, the whole, when in combination, forming a perfectly fire-proof, and, at the same time, a very porous mold, leaving a free egress for the pent-up gases. This is, of itself, a desideratum in good casting.

The result of all this is a homogeneousness in the metal and therefore a greater capacity to bear strain—a harder surface for the abrading action of the cone shot, and a greater strength in proportion to its weight.—*Paterson (N. J.) Guardian.*

RAILROADS IN OHIO.—The first railroad charter in Ohio was passed in 1832, and the second in 1836; but nothing worthy of note was done in the way of building roads until after 1840—and it was not until after 1848 that the Ohio river and Lake Erie were connected by rail. Now there are 2,024 miles of road in operation which cost for roads and equipments, \$153,000,000. This is the work of twenty years. The progress that has been made in this branch of improvements is an indication of the progress made by the State in wealth and industry.

Improved Revolving Refrigerator.

A refrigerator affords all the benefits of an icehouse upon a limited scale, and is a very important household article. A simple and convenient refrigerator that will preserve the ice is, therefore, one of the most useful apparatuses about a house during the summer months. As its office is to maintain articles of food, which are liable to decay, in a fresh and natural condition, the atmosphere should be kept at a very low temperature. It is important that a refrigerator should embrace such adaptations as to render the chambers accessible, and a complete separation of meats, fish, fruits, milk, &c., so that the savor of one may not be injured by absorbing that of the other. The invention herein illustrated possesses these desirable qualities.

Fig. 1 is a perspective view. Fig. 2 is a top view in section, showing the interior arrangements, and Fig. 3 is a section of the lower portion. The exterior cylindrical shell may be formed of wood, or wood and metal combined, the interior cylindrical shell being made of sheet zinc. These two shells, as shown in Fig. 2, are arranged so as to provide a suitable air space between them. The interior of the refrigerator is divided into chambers, A B and C C. The former are distinct and close, and are formed by bending sheet zinc in the cellular form represented.

The two latter communicate with one another, but are separated by the ice pan in the middle, which is furnished with zinc rods, *r r*, against which the ice is placed. Each chamber is fitted with shelves and a separate door. The entire case, embracing the chambers, revolves upon an axis, secured in its bottom, and it is also supported upon a series of rollers or casters, which are sustained on the sole plate. The ice is placed in the pan through the aperture shown on the cover.

This refrigerator is easily revolved, so as to bring each chamber successively in front, thus affording convenient access to its contents. Fresh meats, which are so liable to rapid decay, are hung up on hooks against the rods of the ice pan, to be kept in the coldest part of the refrigerator. And, for the benefit of our lady readers, we will here state that cut meats should never be laid down flat, because when so laid they are more liable to decomposition, as may be observed by their rapid decolorization. The ice is placed high up in the refrigerator, so as to produce that circulation of air which is necessary for each chamber. Fruits, and articles of delicate savor, are placed in the chambers, A B.

This refrigerator was patented January 7, 1862. For more information address the inventor, James P. Ellicott, Washington, D. C.

Metallic Packing for Engine Pistons.

The piston of a steam engine requires to be packed in such a manner that it may be moved freely up and down, bearing steam tight against the inner surface of the cylinder without producing an undue amount of friction. To obtain such results the piston must be packed with some yielding substance that will remain in close contact with the cylinder. The pistons of the old engines were packed with gasket (braided

emp) which formed a yielding steam-tight band, but it was very liable to get out of order and it required frequent renewal. The adoption of a set of jointed metallic rings, as a substitute for gasket packing, was a great improvement, so far as it relates to durability and this packing has been long in use. As applied ordinarily, however, it is liable to leak at the upper and lower ring after a little wear, and the rings become loose and work up and down against the follower and piston flanges.

and fair practical test of its qualities. It has been applied to the steamboats *John Marshall*, *Anna*, *Sylvan Grove* and *Sylvan Shore*. We have examined certificates of the engineers of the first three boats, in which it is stated in substance that it is the best packing they have used; that the pistons run smoother and with one-third less tallow than with other common packing; and a considerable saving of coal has been effected by its use in the last-named boat.

No part of a steam engine is of greater importance than the packing of the piston. If it leaks the action of the steam is vitiated in the cylinder; and if it works too tight it cuts the cylinder, and is a constant source of trouble and expense.

The inventor and patentee is Mr. Hanford Horton, engineer of the *Sylvan Shore* steamboat, from whom more information may be obtained by letters addressed to the care of Hamilton Morton, Esq., 41 Wall street, or North River Iron Works, foot of Vestry street, this city.

Improvements Wanted in Iron.

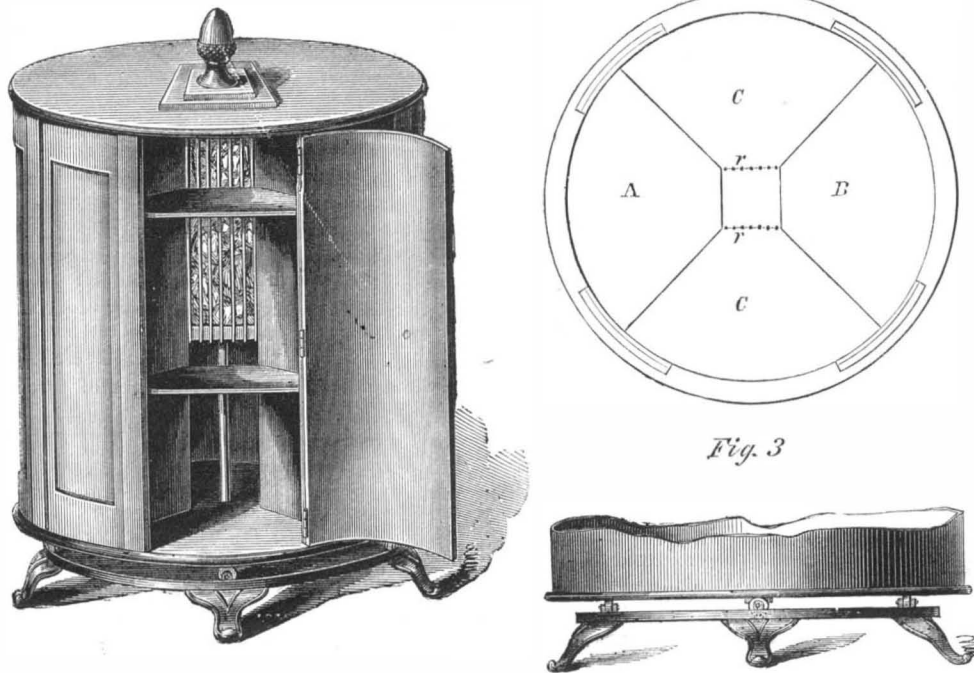
The *Railroad Journal* calls attention to the fact that no sheet iron yet made equals that of Russia, and no crude iron flows so freely as the Scotch pig. Unless these foreign irons can be imitated in quality, we shall always have to import them from abroad. Good smooth iron casting, cannot be made from American iron without mixing a portion of Scotch therewith; and certainly no sheet iron can compare with that of semi-barbarous Russia. If the peculiar quality of the Scotch pig was due to an ore found exclusively in Scotland, then perhaps we never could rival it; but this is not the case. The same kind of iron ore is found in various parts of the United States, and with the same agencies similar pig iron can surely be made here. With regard to the ore from which Russian sheet iron is made we are not so well enlightened. It

is said by some to be peculiar to Russia, and by others to be a common magnetic ore, and that the superior quality of the sheets made from it is due to the process employed in their manufacture. We know that various attempts have been made to rival them, and some American sheet iron has the appearance of the Russian, when new, but the same quality of sheet metal has not yet been produced in America. The field for obtaining such iron is still open to the experiments of American inventors. Wealth

always flows into those districts where iron manufactures are conducted upon an extensive scale.

WROUGHT-IRON SHOT FOR THE "MONITOR."—On page 114 we stated that 400 eleven-inch wrought-iron solid shot had been furnished for this vessel. We understand that she was provided with only 50 of these when she left on her eventful and gratifying mission to Fortress Monroe. Several of our cotemporaries have made a mistake in giving the weight of these shot at 284 instead of 184 lbs.

The average consumption of saltpeter at present in the United States is 8,000 bags per month. The stock on hand just now is very small, but 13,664 bags are on their way from Calcutta.

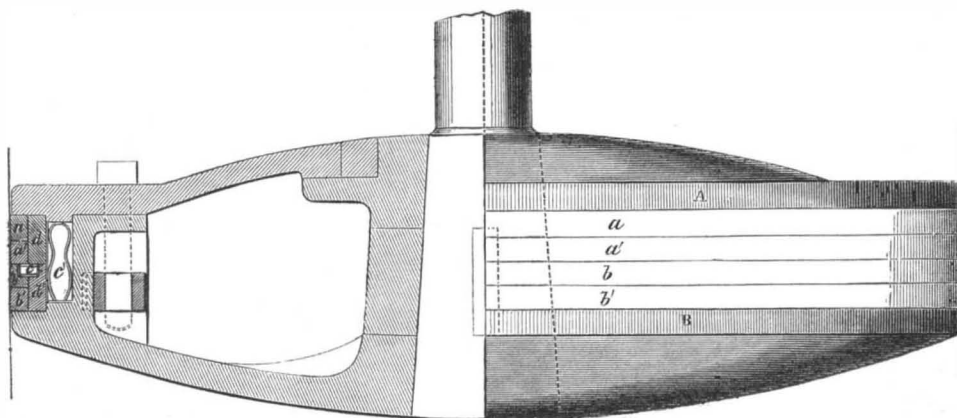


ELLICOTT'S REVOLVING REFRIGERATOR.

The accompanying engraving represents a piston—half in section—which embraces an improvement to obviate this evil. A is the follower flange, and B, the usual piston flange. Between these two are placed two sets of metallic packing rings, *a a'* and *b b'*.

They extend around the piston and are arranged above one another so as to break joints. Between these two sets of rings is a recess formed as shown in the sectional part of the figure in which are placed a series of figure, 8, springs *c*. The elastic pressure of these springs is exerted upward and

downward on the two sets of packing rings, *a a'*, *b b'*, and they are thus kept in place and prevented from working loose. Behind these four outer packing rings are two others, *d d'*, which are also arranged to break joints, and behind these is also a circumferential recess in which are placed cylinder springs, *c*, the pressure of which is outwardly, according to the common mode of ring packing, thus making the outer rings work steam tight against the surface of the cylinder. By this combination of springs and rings, the outer packing rings, *a a'*, *b b'* have a spring pressure exerted upon them in three directions, by which they are maintained in their proper position, and the piston works perfectly steam tight in the cylinder. This improved system of metallic packing, which was patented Oct. 5, 1858, has now had a long



HORTON'S METALLIC PACKING FOR ENGINE PISTONS.

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