treasury on account of the Patent Office fund, all of which was paid in by inventors. In the same report the Commissioner dwells at considerable length and with much eloquence upon the immense benefits conferred upon the country by patentees. Among other things, he says:

"There is no class or condition of men in the whole country which has not felt the blessings of American inventive genius, fostered into its fullest flower by wise and kindly patent laws."

As coincident with these generous sentiments we hope the Commissioner will do something practical by way of relief for the belated inventors. The effect of his recent ruling has been to drive them from the doors of the Patent Office, without remedy.

By a few strokes of his pen and without detriment to others, he can make a new and kindly rule that will assist them.

It is not asked nor to be expected that the Commissioner will personally remain at his office until 12 o'clock at night to receive fees; but it seems not an unreasonable request for inventors to make that he will authorize the expenditure of five hundred or a thousand dollars a year for the employment of a clerk whose special duty shall be to be present at the door of the Patent Office from 4 P. M. (the usual closing hour) until 12 o'clock P. M., for the express purpose of saving cases that must otherwise be forfeited. If this is not desirable, then some other way surely ought to be provided to receive the anxious applicants' money, if presented even so late as the fraction of a second before the limit of time specified in the law.

EXCLUSION OF PHOTOGRAPHS FROM THE INTERNATIONAL POSTAL EXCHANGE.

Mr. Herbert Spencer, during his last visit to this country, felt called upon to speak to us some pessimistic yet wholesome words of caution relative to our intense love for the least permanent but most showy advances in social government. Yet, quick to see the good in us, he spoke most hopefully of that phase of our life which both enabled and impelled the man in the middle walks to surround himself with those literary, musical, and art luxuries which still remain far out of the reach of most Europeans. In his trip through the United States, during last year, the Earl of Rosse gave it as his opinion that the most observable manner in which the American citizen was differentiated from the subjects of European powers was in the way in which he was able to live; the appearance of solid comfort, even luxury, with which it was possible for the artisan, for example, to surround himself. As the chief cause contributing to this condition, beyond that of the boundless wealth of our territory, he recognized the great inventive and resourceful qualities of "the Yankee mind"—qualities that keep busy a small army of experts and their clerical forces examining, classifying, and passing upon a multitude of improvements in mechanisms and processes such as no other country can show.

To electricity, with its glittering triumphs over time and space, and to steam, with its boundless energy, are usually given the dual honors of first mention when this century's advance in material prosperity is under consideration. The more regular and far more constant progress made in the graphic arts is generally overlooked in this discussion; yet in no way are we today further removed from the life of the early part of this century than in our improved facilities for enjoying, in our own homes, the reproductions of the earth's chief art treasures, or of nature's beauty and grandeur. The wonders of the Yellowstone, the dread gloom of the trackless African forests, the terrors of the Alaskan avalanche, the untrodden sublimities of the upper Himalayas, are brought to our library tables, and we commune with the powers of nature, thus shown forth with almost the same sense of mental elevation which our actual presence among them would produce. To-day we may, if we will, become more familiar with the racial characteristics of face and form of the man of the Kilima-Njaro mountains, or the Patagonian wildernesses, than were our grandfathers with those of civilized Europe. To the camera and all that troop of following processes which have so improved and, at the same time, cheapened the reproductive graphic arts, are we mainly indebted for these enrichments of our library tables, our book shelves, and our walls.

Anything which is calculated to take from the public the immediate benefits accruing from such progress, a progress in which America has borne a prominent part, or any governmental action or restriction which shall add to the difficulty or cost of enjoying the educative results thereby brought about, is an unmixed evil. So when Mr. Secretary Foster, of our Treasury Department, promulgated his recent order excluding photographs from the mail exchange, a blow was aimed at one of the sources of public culture.

This ruling of the secretary is based on the provisions agreed upon by the Universal Postal Union Convention, as quoted in the *General Regulations under the Customs and Navigation Laws of the United States*, 1884. Article 308, which reads as follows:

"The sending by mail of letters or packets containing gold or silver substances, pieces of money, jewelry, or precious articles, or any packets whatever containing articles liable to customs duty is prohibited."

Article 310 of these regulations provides for the admission of books "to the International Mail Exchange, and imported through the mail under the act of March 3, 1879," but only books are therein specified. The secretary's contention is that the previous admission of such articles, now so long permitted, has been illegal, and he has instructed his assistants at the various ports of entry that only "on payment of a fine equal to and in lieu of the duty which would have accrued thereon had importation been legal" can such a package be delivered. If Secretary Foster be right, and the respectable line of his predecessors have permitted an infringement of law in the past, then the time is ripe for bringing the matter before the present Congress. A slight amendment of the law, to wit, the insertion of two words, "and photographs," after the word "books," would be greatly to the advantage of the people.

The Production of Aluminum.

Taking into account the development made by the factories of aluminum in recent years, it may well be believed that the production almost equals the demand, although new uses for this light but ductile metal are being daily discovered.

The *Bulletin de Musée Commercial*, in a recent number, reviews the productive capacity of the principal aluminum factories now in operation. Since the closing of a large number of European works, by reason of the difficulty they experienced in competing with the electrolytic process, the manufacture of aluminum is at present confined to four large factories. The most important is the Aluminum Industrie Actien-Gesellschaft, at Neuhausen on the Rhine, the daily production of which is about 1,000 lb. of metal. Then comes the Pittsburg Reduction Company, with a daily production of 600 lb.; the Metal Reduction Syndicate, Limited (English branch of the Pittsburg manufacture), with 300 lb. daily; and finally, the Cowles Company, which has a daily production of from 600 lb. to 700 lb., but of which the greater part consists of alloys of aluminum. It is thus seen that the present production of aluminum in the world only amounts to about 2,600 lb. daily.

Hitherto the largest quantity of commercially pure aluminum seen at one time consisted of a stock of about 19 tons, to be found recently in the warehouses of the Pittsburg Reduction Company. Then may be mentioned, in order of importance, the Paris Aluminum Company, which ceased its operations at the commencement of 1890 with a stock of 10 tons; the Alliance Aluminum Company, of Newcastle, and the Aluminum Company, Limited, of Birmingham, which possessed, at the time of the closing of their works, stocks of 8 and 6 tons respectively.

Toward the middle of last year American aluminum was quoted at the rate of $2 per lb.; some few months later the price was reduced to $1 per lb. The present prices of the Pittsburg Reduction Company are: For No. 1 quality, 90 cents per lb. in small quantities and 75 cents per lb. for orders of at least one ton; for No. 2 quality, of a purity of from 94 to 97 per cent, 65 cents per lb. for quantities of not less than a ton.

On the other hand, it is stated that a French company has just erected an establishment at St. Michel (Savoy) for the manufacture of aluminum by the Minet process. This process is based on the electrolytic treatment.

The Real Inventor of Telegraphy.

According to a writer in the *Popular Science Monthly* for February, Weber was the first who established a permanent workable telegraph line, and thereby demonstrated the practical value of the electric telegraph. Weber's house in the city was connected with the astronomical and magnetic observatories by a line between three and four kilometers (over two miles) in length. The signals were made by the deviations of the needle of a galvanometer to the right and left, and were interpreted according to a conventional alphabet. The use of interrupted or reversed currents did not permit the transmission of more than one or two words a minute, but the speed was increased to seven or eight words by the use of induced currents. The following first notice of this telegraphic connection was published in one of the numbers of the *Gottingen Gelehrten Anzeigen* (or Gottingen Scientific Notes) for 1834: "We cannot omit to mention an important and, in its way, unique feature in close connection with the arrangements we have described [of the Physical Observatory], which we owe to our Professor Weber. He last year stretched a double connecting wire from the cabinet of physics over the houses of the city to the observatory; in this a grand galvanic chain is established, in which the current is carried through about nine thousand feet of wire. The wire of the chain is chiefly copper wire, known in the trade as No. 3. The certainty and exactness with which one can control, by means of the commutator, the direction of the current and the movement of the needle depending upon it were demonstrated last year by successful application to telegraphic signalizing of whole words and short phrases. There is no doubt that it will be possible to establish immediate telegraphic communication between two stations at considerable distances from one another."

Electrical Tanning.

The London *Boot and Shoe Trades Journal* describes the results of two experiments in tanning by aid of electricity, by "Groth's system," carried out at the tannery of George Hauenstein, at Verviers, Belgium:

The apparatus used in these experiments consisted of a rectangular wooden vat, 6 feet 6 inches long, 4 feet 10 inches wide, and 5 feet 3 inches high, with two electrodes, framework and shafting, the cost of which was £30 7s. 6d., together with a dynamo, ampere meter, volt meter and shafting, costing £24; or, altogether, £54 7s. 6d. This electric installation is capable of supplying electricity to six vats or pits.

Forty ox and cow hides from the Brussels abattoir were experimented upon, weighing, without the horns, 1,380 kilogrammes. These hides, after having been put in lime, unhaired and fleshed, were swelled and colored. The forty butts derived from these hides were hung up in the vat on the 12th of October and taken out on the 16th of November; they were subjected to the action of electricity during four weeks, or twenty-four days, from six to seven hours per day, and the weight yielded, when finished and dry, was 379 kilos.

The offal, bellies, throats and heads, hung up in the vat on the 16th of November, were taken out on the 7th of December. The parts were, therefore, subject to the action of electricity during three weeks, or eighteen days, from six to seven hours per day, and the weight yielded, when finished and dry, was 344 kilos.

The forty hides, therefore, with a green weight of 1,380 kilos., gave a total weight of finished leather of 723 kilos., or 52·4 per cent.

The tanning material employed to swell, color, and tan these forty hides was as follows: 880 kilos., of oak bark, costing 15 francs per 100 kilos., equal to £5 5s. 6d.; 85 kilos. of mimosa bark, at 40 francs per 100 kilos., equal to £1 7s.; 400 kilos. of oak extract, at 40 francs per 100 kilos., equal to £6 8s. This makes a total of £13 6d. for tanning 723 kilos. of leather, equal to 45·2 centimes per kilo., or 2¼d. per pound of leather.

The *Journal* adds:

At the Crystal Palace Electrical Exhibition there is much to be seen of great interest, but to us and our readers nothing of more interest than attaches to L. A. Groth's exhibit of various kinds of leather tanned by the aid of electricity. Mr. Groth's interesting exhibit consists of diagram of "complete tannage" in fourteen days of "green hides," each averaging 77 pounds weight, showing their daily absorption of tannin from the liquor, ascertained by analyses made on samples taken from the hides and liquors every two hours during the whole time of the tannage, and showing that as soon as the hide has been tanned, no more tannin can be absorbed by it, even if kept in the liquor for ever so long.

Another diagram shows the comparative tannages, viz., with and without the aid of electricity, and demonstrates not only that electricity bears an important part upon the hastening of the tanning process, but also distinctly shows to what degree the electricity so acts.

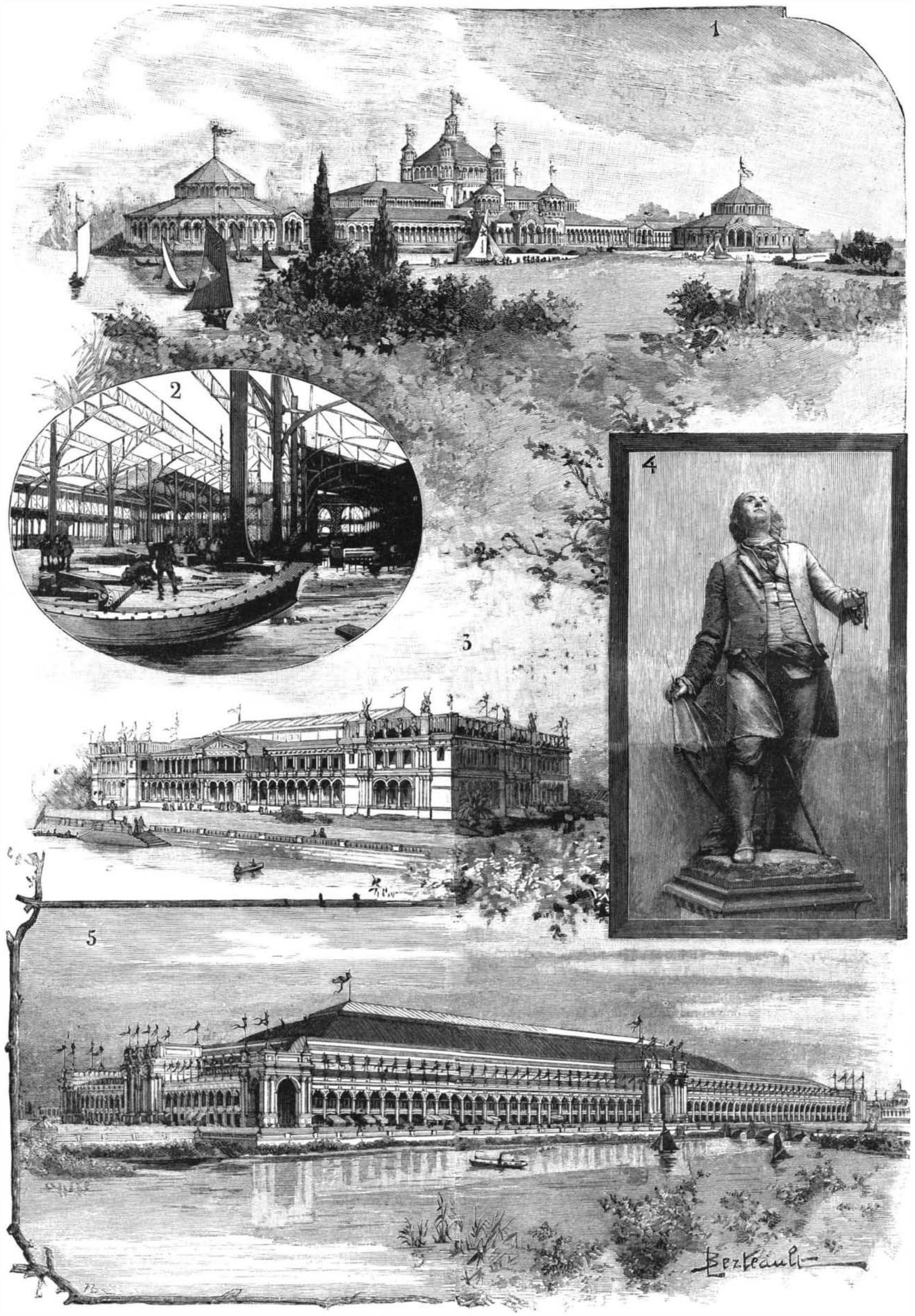
As to the products exhibited by Mr. Groth, there are several "sole butts" tanned by him in four weeks. The color is good, the leather firm, and the finish very clear. To further show the quality of this leather, several pairs of boots made from the same are exhibited. An old pair of boots is also exhibited, with the right sole made from Groth's one month's tannage and the left from leather tanned in eight months by the old process, and constantly worn for six months by a person said to weigh 12 stone, in order to show the small wear of Groth's leather, as compared with first-class leather—the wear being equal in both.

There are some calfskins tanned in fourteen days.

The belting made from Groth's leather, tanned in four weeks, seems also to be of first class, and the very samples tested by Professor W. C. Unwin, F.R.S., of the Central Institution, London, are also exhibited, in order to demonstrate their peculiar breakage, being in a straight line, whereas the ordinary belting generally breaks raggedly, which says a good deal for the uniform tannage of Groth's leather. Professor Unwin also says, in his report: "The leather generally is quite up to the strength of good leather intended for belting," and "the tenacity in this per inch of width of Groth's belting, as compared with English, is as follows:

	English.	Groth's.
Maximum	1,272	1,318
Minimum	616	848
Mean	964	1,002

We would advise our readers to have a look at Mr. Groth's exhibit, which will doubtless prove not only interesting, but instructive and valuable from a trade standpoint.



THE WORLD'S COLUMBIAN EXPOSITION.—ENGRAVINGS FROM "L'ILLUSTRATION."

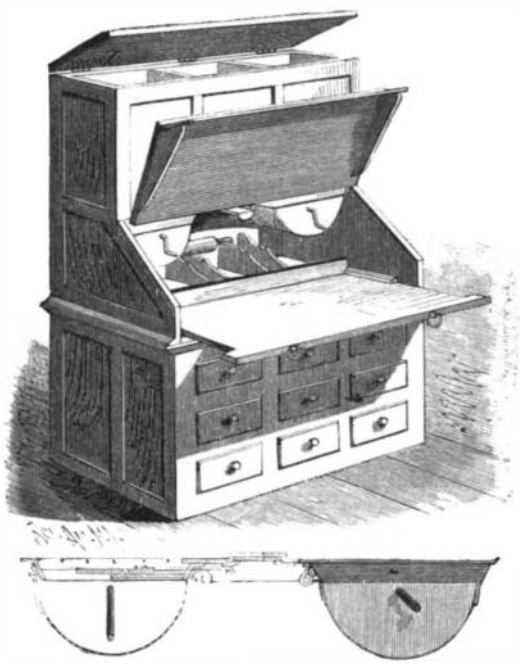
1. The Pavilion of Fisheries. 2. Erection of the Electrical Building. 3. The Woman's Pavilion. 4. Statue of Franklin. 5. Palace of Manufactures and Industrial Arts.

Iron-Aluminum Alloys.

The advantages of an addition of aluminum to fluid iron are important. With moderate care absolutely pure and solid castings can be obtained capable of receiving a high polish. An addition of aluminum is especially to be recommended for the manufacture of steam cylinders, engine castings, press cylinders, and generally for castings which are to be subjected to a high pressure. A few hints will serve to show how aluminum is best alloyed with iron. As aluminum only lends itself with difficulty to combination with iron, it is not immediately to be introduced in the ladle which is to be poured into the mould; a smaller ladle is selected, in which is placed the heated aluminum; somewhat fluid iron is brought from the furnace, poured in the ladle, and stirred until the aluminum-iron compound begins to stiffen. The iron intended to be cast is now let out of the furnace into the ladle intended for it; the aluminum-iron mixture is poured in, the lot being intimately mixed. The molten metal should not be poured into the mould too quickly, as it does not solidify so rapidly as ordinary iron. Aluminum-iron in the fluid condition is very active; small globules are formed, which gradually extend to the edge of the ladle, where they disappear. At first the iron is of a milk white color; then it becomes orange yellow, and forms a thin film on the top. When this moment has arrived, the film is removed and casting is proceeded with, care being taken that the mould is always kept full. For 100 kilogrammes the proportion of aluminum recommended is 200 grammes. Cost can be no drawback in view of the present cheapness of aluminum, particularly when it is considered with how much greater certainty clean castings can be obtained. Aluminum improves cast iron as phosphorus improves tombac and brass; the thin fluidity is increased and the oxide separated.—*Metallarbeiter.*

A CONVENIENT KITCHEN CABINET.

The cabinet shown in the illustration is adapted to contain nearly or quite all the articles commonly used in cooking, so arranged as to be protected from dust, and all within easy reach. For this improvement a patent has been allowed Mr. Charles Holt, of Walla Walla, Washington. The lower or base portion of the cabinet has a large number of drawers suitable to hold various articles or utensils, and this base carries on its top a sliding kneading board, readily pulled out for use and pushed inward when not needed. The top part of the cabinet is entirely removable, having recesses in its bottom portion which fit upon corresponding lugs on the top of the base, while a swinging lid closes down over the kneading board. The top part is divided by vertical partitions into compartments, preferably three in number, the two end compartments for different qualities of flour and the center one for sugar. Immediately below the compartments is a hollow framework with depending flanges supporting a sieve under each flour compartment, as shown in the sectional view. Plates serving as floors to the flour compartments each carry a slide with an inwardly ex-

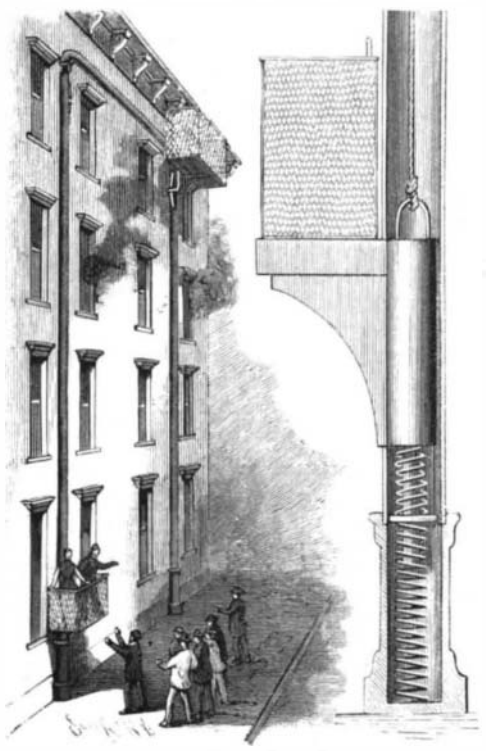


HOLT'S KITCHEN CABINET.

tending rod terminating in a knob, on pulling which the flour is permitted to drop to the sieve below, the sieves being so secured in place that they may be removed from the frame by pulling downward upon a spring catch. Within each sieve is a swinging wire rod loop, the rod extending through the front of the sieve, where it is formed into a crank, by turning which the flour will be passed through the sieve. Centrally between the sieves is a cross plate forming the floor of the sugar compartment, and in this plate is a slideway in which is a hole adapted to register with a hole in a slide, by moving which the sugar is allowed to flow through. Beneath the central compartment is a bin to receive the sugar, and on each side are smaller bins for baking powder, spices, etc., there being larger bins near the ends for the flour. A rolling pin, when not in use, may be kept on top of the bins. The entire sifting and regulating mechanism may be easily removed to be repaired or cleaned.

AN IMPROVED FIRE ESCAPE.

The construction shown in the accompanying illustration is designed to be of a simple, durable, and inexpensive character, and adapted to be placed at the side



SCHWANNECKE'S FIRE ESCAPE.

of a building without detracting from its appearance. It forms the subject of a patent which has been issued to Dr. Henry Schwannecke, of No. 1280 Fulton Avenue, New York City. The improvement consists essentially of two chairs or balconies, so connected that when one descends the other will ascend, the descent of the balconies being stopped at the bottom by spring cushions, so that the occupants will experience no shock. Two tubular standards are located at any desired point upon the building, connected at the top by a transverse tubular slideway, and each standard has a hollow base in which is located a coil spring, as shown in the sectional view. Each standard has in its front face a vertical groove extending from the base to the top, and a bar sliding in the standard has a flange or projection extending out through the groove, to which the chair or balcony is securely attached in any approved manner. The bars carrying the chairs have reduced lower ends, around which are springs carrying disks adapted to enter the hollow base of the standard, this arrangement preventing any rebound, while forming a thoroughly effective cushion for the chair in its descent. The chairs or balconies are connected by a cable, the ends of which are attached to the upper ends of the bars, the cable passing through the standards and over pulleys through the upper slideway. Each balcony has a brake, whose handle extends up within convenient reach, the shoes of the brake being normally held against the standards by a spring, and near the top of each standard is a keeper, adapted to engage and lock the brake shoe when the chair is in its most elevated position. Upon persons entering the upper chair, and disengaging the brake from the keeper, the chair descends by gravity, the other chair at the same time ascending to receive others desiring to descend.

The Harvard Astronomical Station in Peru.

Dr. Edward C. Pickering, director of the Astronomical Observatory, Harvard College, in his last annual report, gives the following interesting information:

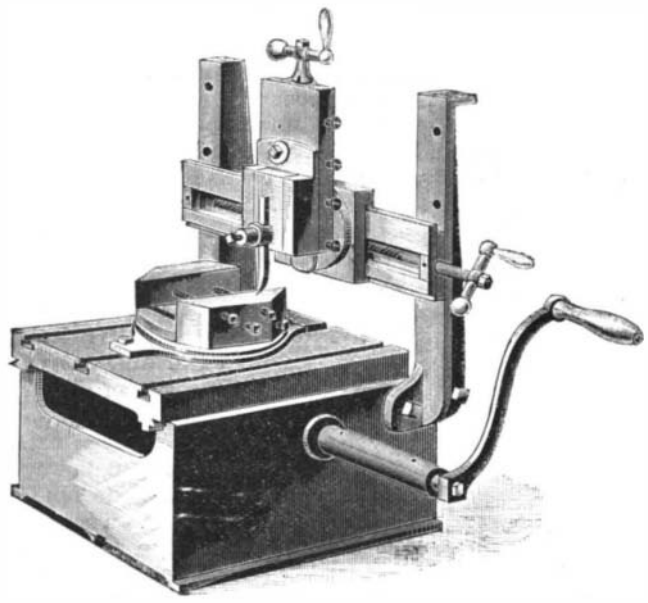
The expedition sent to Peru in 1889 under the direction of Mr. S. I. Bailey, having successfully completed the observations with the meridian photometer, returned to Cambridge with that instrument, which has been remounted here and will be used for a revision of the Harvard Photometry and for other photometric work. During the two years ending May 1, 1891, Mr. Bailey took 217 series of observations and made 98,756 photometric comparisons of about eight thousand southern stars. These include all the stars of the sixth magnitude and brighter south of —30° and all known catalogue stars in a series of zones 20′ wide at intervals of 5° in declination from —25° to —80°; also all known stars south of —80° and a miscellaneous list of variables, stars having peculiar spectra, etc. The reduction of these observations is nearly completed and their publication will be begun shortly. A large part of the work assigned to the Bache telescope has also been completed, and the instrument has been remounted at Arequipa, where its work will be continued.

An expedition under the direction of Professor William H. Pickering left Cambridge in December, 1890, and established a station about three miles northwest of Arequipa, where the thirteen-inch equatorial has been mounted. This station has an elevation of a little over 8,000 feet and has a nearly cloudless sky during a large part of the year. The air is remarkably steady, the images of the stars are small and round and the diffraction rings, seldom seen with large instruments, are clearly visible. Even with high powers the fluctuation of the images is very slight. In fact, at this station the limit to observation will probably be the size of the instrument instead of, as at other observatories, the condition of the air. Although the aperture of this instrument is only thirteen inches, it appears to be the largest refracting telescope in use in the southern hemisphere, while about thirty larger telescopes are mounted in the northern hemisphere. Since all of these instruments are north of +35°, nearly one quarter of the entire sky, and that containing many objects of the greatest interest, has never been studied by a refractor of the highest grade. For both these reasons an excellent opportunity is afforded to add to astronomical discovery by the erection of a telescope of a large size at this station. It is hoped that patrons of astronomy will consider the advantages of erecting a large telescope where it will be kept constantly at work, where the sky is clear a large part of the year, where the condition of the air is probably more favorable than at any other existing observatory, and where a large part of the sky could be examined for the first time under such satisfactory conditions.

Photographs have not yet been obtained with the thirteen-inch telescope, but it is hoped that its advantages for this kind of work will be as great as for visual observations. The expense of establishing this station was much greater than had been anticipated, since it was necessary to erect a stone dwelling house for the observers. A considerable advance from the future income of the fund has accordingly been required. Important aid was rendered to the expedition by many residents in Peru. Mr. MacCord, superintendent of the Mollendo Railway, should be especially mentioned for his hospitality to the observers, who resided with him while the new house was in process of erection. Without his aid the establishment of the station would have been extremely difficult. Two interesting expeditions have been made in Peru. One of them by the courtesy of Mr. Anderson, American Minister to Bolivia, was to Tiahuanuco and the sacred islands of the Incas on Lake Titicaca, and led to results of much archæological interest. The other was to the summit of El Misti, a nearly extinct volcano about nineteen thousand feet high.

AN IMPROVED HAND PLANER.

The accompanying illustration represents a compact, well made machine, designed to do exact work rapidly. It planes 12 inches long, 9 inches wide and 8 inches high, and has a universal planer chuck. A second size is made to plane 24 inches long, 12 inches wide and 12 high. This machine, with a general line of foot and power lathes and drill presses, is manufactured by H.



SHEPHARD'S NEW HAND PLANER.

L. Shephard, agent, No. 141 West Second Street, Cincinnati, Ohio.

Magnesium Flash Signals.

In 1889 some interesting experiments were made by Mr. W. P. Gerrish on distributing time accurately by flashes of magnesium powder. Signals were thus sent from a station on Blue Hill, Mass., twelve miles distant. They were readily visible, and the exact time to within a fraction of a second could be taken from them. These flashes were also seen from Princeton and Mount Wachusett, forty-four miles distant, and from numerous nearer points.