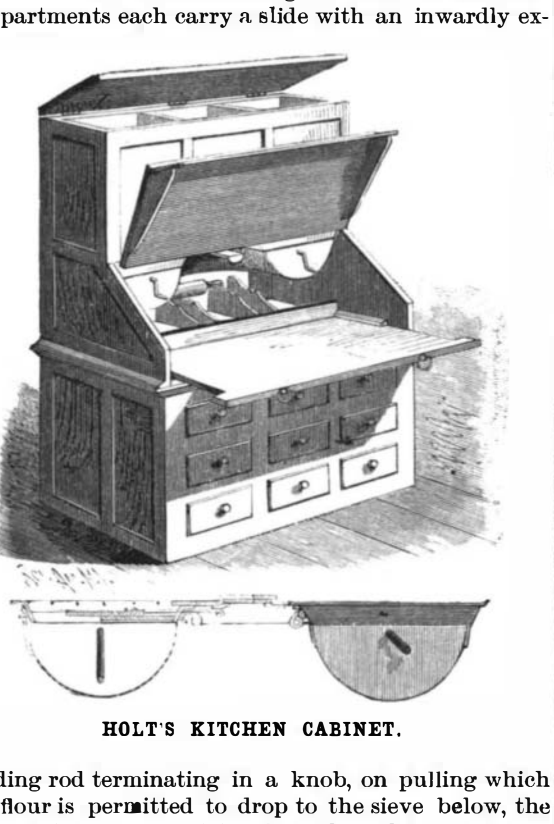
Iron-Aluminum Alloys.

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.

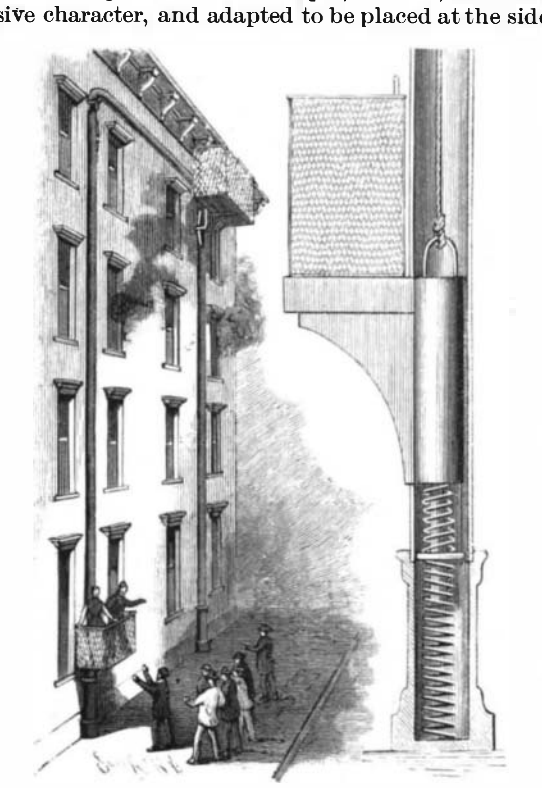
The cabinet shown in the illustration is adapted to contain nearly or quite all the articles commonly used in cooking, so arranged as to be protected from dust, and all within easy reach. For this improvement a patent has been allowed Mr. Charles Holt, of Walla Walla, Washington. The lower or base portion 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 extending 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.



HOLT'S KITCHEN CABINET.

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 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.



SCHWANNECKE'S FIRE ESCAPE.

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:

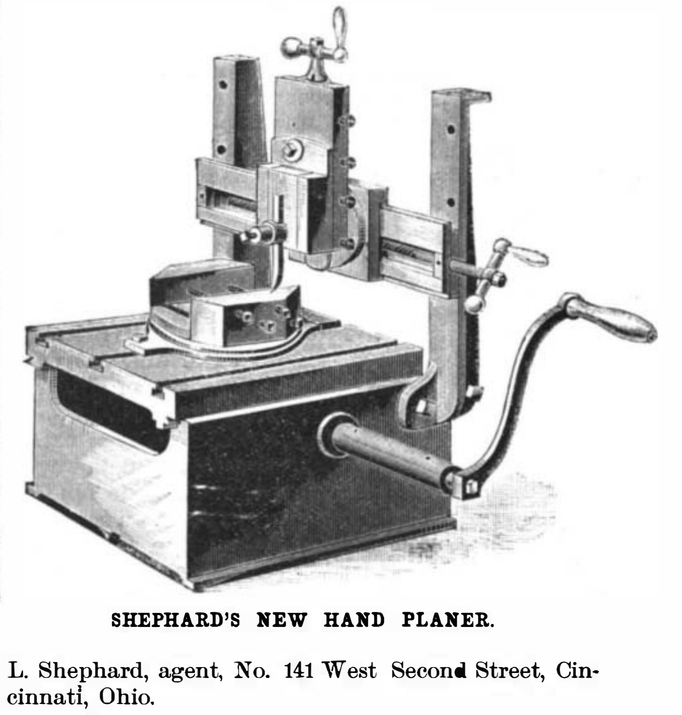
The expedition sent to Peru in 1889 under the direction of Mr. S. I. Bailey, having successfully completed the observations with the meridian photometer, returned to Cambridge with that instrument, which has been remounted here and will be used for a revision of the Harvard Photometry and for other photometric 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. L. Shephard, agent, No. 141 West Second Street, Cincinnati, Ohio.



SHEPHARD'S NEW HAND PLANER.

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.