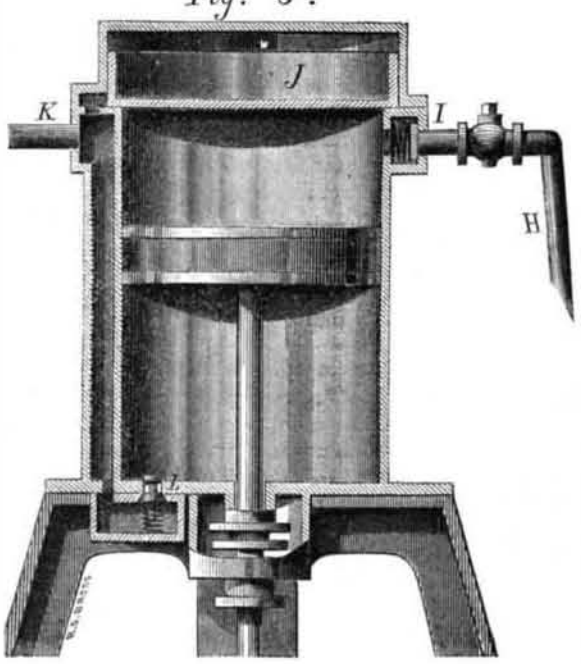
[*Continued from first page.*]

ton lift the valve, J, and allow the gas to pass out into the pipe and from thence to the condenser through K. As, however, the gases contained in the portion of the pipe between the pump cylinder and the check are compressed, but not forced out, if the piston should descend with this press-

Fig. 3.



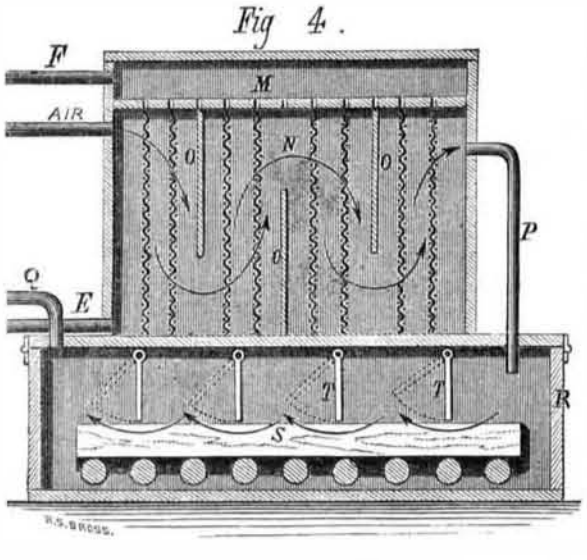
ure of gas retained here, it is obvious that the gas would expand, and, by partially filling the chamber, prevent the perfect exhaustion of the gas cylinder. To provide for this, the piston in its upward stroke passes the orifices of pipe, H, so that the compressed charge of gas is held in the confined space and is liberated beneath the piston, and upon its descent is driven out through the valve, L, at the bottom into a pipe that communicates with K. It will be observed that the face of the piston, in rising, strikes against the bottom of the cup valve and lifts it, and upon the reverse stroke the valve seats itself upon the flange of the cylinder, while the plain ground face of the piston departs from the plain ground bottom of the valve it produces as nearly a perfect vacuum as possible to attain in a pump, there being practically no cushion of gas left between the valve and piston.

As the gas is delivered to the condenser it is made to traverse coils and is cooled by the circulation of water of the normal temperature which passes through the condenser. As the gas is liquefied it passes into the receiver, where it accumulates and is fed from time to time back into the refrigerator cylinder.

As the non-congealable liquid in the coil of the refrigertor circulates, it passes out through the pipe, F, to the distribulating pan, M, Fig. 4, where its temperature is to be transferred to the air circulating in the subjacent case, N. The upper case is provided with a distributing pan, into which the cooled liquid is admitted. The bottom of the pan has perforations which are arranged in rows immediately above a series of vertical partitions of wire gauze, between which are arranged the vertical baffle plates.

As the cooled liquid drops through the perforations in the pan, it falls upon the wire partitions, and being retarded in its descent, trickles slowly down, while the current of air driven through the case by the blower is made to pass through and penetrate all parts by reason of the baffle plates, and in so doing takes on the temperature of the non-congealable liquid, which is below the freezing point of water,

Fig 4.



and passes into the congealing case at and through pipe, P, and then traverses the pans in the congealing case to freeze the water therein contained, and after having done its duty passes up through the blower and pipe, Q, to be reduced in temperature again.

The congealing case has doors, R R, at each end, and is provided with supporting rollers upon which the pans, S, are fed in at one end and removed at the other.

The apparatus may be made applicable to cooling liquids, as beer, etc. When applied to such purpose, the liquid is allowed to trickle down over the coiled pipes seen at the left of Fig. 1. In a large brewery, where a contract required 560 barrels of water to be cooled from 60° to 38° Fah. in 24 hours, which is equal to the production of 8½ tons of ice from water at 80°, the actual yield of this machine consisted in the cooling of 1,010 barrels of water, which is equal to the production of 16 tons of ice per diem. For this yield the machine required an average of 24 horse power. The apparatus, as shown in Fig. 1, was taken from one in actual use in a large brewery in Philadelphia. It requires but the attention of a single attendant.

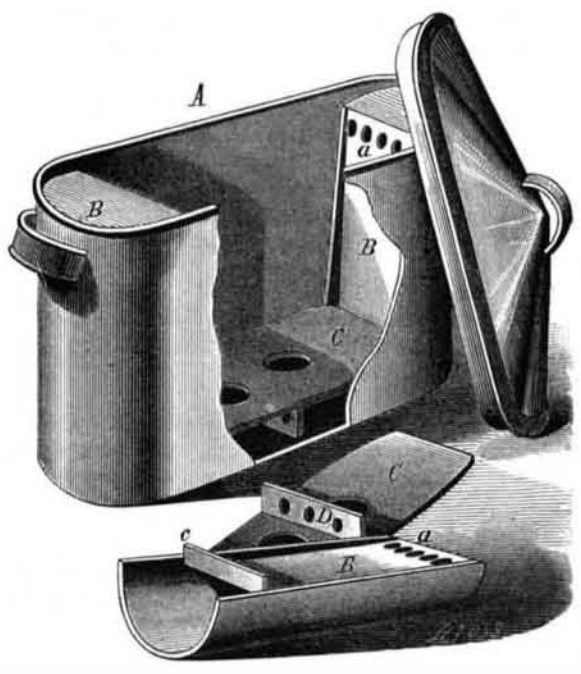
This improved ice machine was patented through the Scientific American Patent Agency, January 31, 1877, by Major D. L. Holden. The pump was patented March 6, 1877. For further information, address D. L. Holden & Bro., Beach and Palmer Sts., Philadelphia, Pa.

Conjunction of Mars and Saturn.

At the last meeting of the London Astronomical Society, Professor Marth exhibited some diagrams of the triple conjunction of Mars and Saturn, between July and November of this year. The dates of the three conjunctions are: July 27, 5:15 P.M.; August 26, 4:19 A.M., and November 4, 12:8 A.M., all New York time. The last of these occurences will be the most interesting, from the remarkably close approach of the two planets, the distance between them being only eleven minutes of arc, or about one third the diameter of the moon. Saturn, the greater Infortune, and Mars, the lesser Infortune, of the old astrological systems, may now be found in the southeast before midnight. Mars is daily increasing in brightness, and in the last days of August and the opening days of September will be much more brilliant than he has been since 1845, or will be again till 1924.

IMPROVED WASHBOILER.

This invention relates to that class of washboilers which are constructed with a false bottom, and have passages or conduits leading to the top of the boiler, through which the water, when heated, escapes from below the false bottom.



The form of the boiler, as shown in the cut, is of the usual construction. The two conduits, B B, are made with a straight front piece and with a rounded back piece, which fits into the curvature of the boiler. These conduits are provided with holes, *a*, at the top, and are made with a projecting shoulder or bracket, *c*, at the bottom. A false bottom, C, has a perforated brace or cross piece, D, at its inner side, and is provided with openings for the ingress of the water under the false bottom. The ends of this button, C, are cut off straight, so as to rest on the brackets, *c*.

When it is desired to use the boiler for washing purposes, the conduits are inserted, after which the false bottom is put in position. Upon this bottom the clothes are placed, after being soaped, in layers, abutting against the conduits at each side, and a quantity of water is put in the boiler, which is then placed over the fire. The heated water and steam will be forced up through the conduits, and, escaping through the openings in a continuous stream, is poured with considerable force down upon the clothes, where it mingles with the soap. This flow is constant and uninterrupted as long as the boiler is kept upon the fire.

This improved washboiler was patented June 5, 1857, by Thomas Gunsalus, West Troy, N. Y., to whom apply for further particulars.

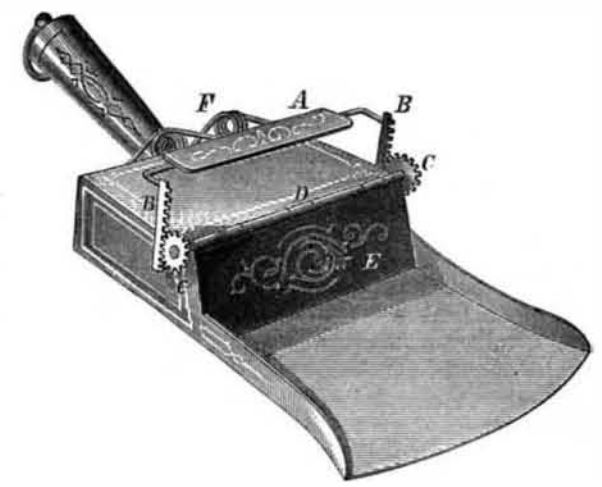
To Remove Tin from Tinned Copper.

Professor Boettger has recently described an easy and practical method of removing the tin from tinned copper vessels or utensils. The vessel to be cleaned is filled with, or immersed in, a solution of sesquichloride of iron. In a few minutes, according to the thickness of the tin, it will be entirely removed, and it is only necessary to polish the copper with sand slightly moistened with very dilute hydrochloric acid.

IMPROVED DUSTPAN.

This dustpan is provided with a recess or box, of convenient size, to hold sweepings, dust, etc. A door is connected in front of the recess or box, and can be opened and shut by means of a lever constructed for that purpose.

The operation is as follows: Pressure on the thumbpiece, A, depresses the vertical ratchet bars, B B, which revolve the cogs, C, with their axle, D, and raises the door, E, when the dust or sweepings can be swept in the box or recess; then,



relaxing the pressure on thumbpiece, A, the spiral spring, F, forces the door in its proper place, and prevents the dust or sweepings from spilling.

Patented May 24, 1875, by Walter J. Parker, of San José, Cal.

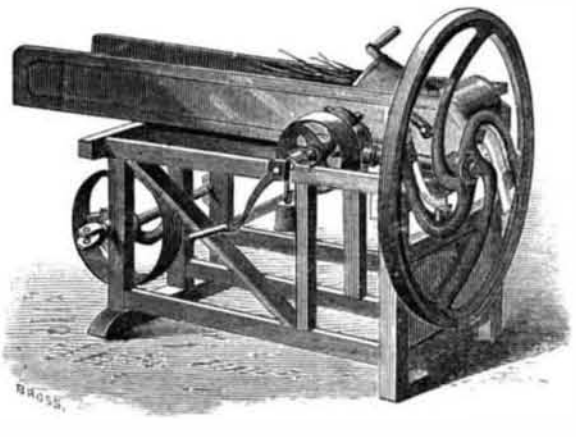
The Great Coal Fields of Ohio.

A district of one hundred miles square, including the counties of Athens, Perry, and Hocking, is the future coal field of this nation. It is to be the "Black Country" of the United States, as the noted district in Staffordshire is the "Black Country" of Great Britain. In fifty years it will probably equal Staffordshire or any district in the world. This district has twenty-two feet of solid coal in five seams. The great vein (properly "bed") is in places twelve feet thick, and nowhere less than six feet. Mingled among the coal beds are inexhaustible beds of iron. The thickest is five feet deep at the outcrop; the thinnest, in places, sinks to six inches. But the thickness of neither seam is quite persistent; there are "waves" from time to time, which narrow the seam. The coal, on the contrary, may be said to run from hill to hill with perfect uniformity. Limestone is also present in any desired quantity.—*Nelsonville (O.) Gazette.*

IMPROVED FEED CUTTER.

A feed cutter is deemed an indispensable adjunct to the farm and stable. Many forms are used, some of simple while others are of more complicated structure. In nearly all of the cutters, as used, the length of the material as cut is arbitrary, there being no means provided to readily change the mechanism so as to produce cut feed of varying lengths.

The machine which we illustrate in the annexed engraving is intended to obviate some of these difficulties, and can be set so as to cut feed from one quarter inch to one inch. As will be seen in the engraving, the knives are arranged upon and attached to the curved spokes of the fly wheel, and can be set, by means of set and binding screws, to cut the length of feed desired. When operated by hand, the power is applied to cranks, of which there are two, one on each side of the machine, and their rotation, by means of miter gears, causes the revolution of the fly wheel with knives attached Upon the shaft, to which the cranks are attached, is seen a pulley, which may receive motion from the pulley shown under the rear portion of the cutting box, which pulley,



in turn, may be rotated by a shaft attached to a horse or steam power.

Patented through the Scientific American Patent Agency, July 17, 1877, by Charles Silberzahn and Herman Heyssen, of Sheboygan, Wis., to whom reference is made for further particulars.

DURING 1876 the quantity of fruit canned in Cincinnati was as follows: Tomatoes, 1,200,000 cans; blackberries, 60,000 cans; raspberries, 120,000 cans; cherries, 60,000 cans; damson plums, 72,000 cans; string beans, 36,000 cans; pickles, 6,000 packages; tomato catsup, 500 barrels.