MERCURIAL PUMP WITHOUT VALVES OR STOP-COCKS.

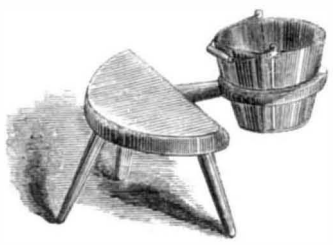
The *Journal of the Franklin Institute* is indebted to Prof. Young, of Dartmouth College, for an account of the following ingenious arrangement, which was first suggested by Mr. C. H. Smith, of Mt. Auburn Institute, Cincinnati, Ohio, to Prof. C. O. Thompson, of Worcester, Mass., and was by the latter gentleman carried out in practice with entire success.

A glass tube, A B, of such size as may be desired, is drawn out at one end, B, and by means of a stout rubber tube is connected with a mercury reservoir, C. A rubber cork at the end, A, carries two tubes; one, D, leading from the vessel to be exhausted to the bottom of A B, the other from the top of A B to a beaker, G, containing a little mercury, the hight, F E, being about 30 inches.

When the reservoir, C, is raised, the mercury entering B C closes the lower end of the tube, D, and expels all the air contained in A B by the tube, E F, and, in fact, is allowed to fill and flow through E F for a moment. On depressing the reservoir the mercury descends in A B and leaves a vacuum into which air flows from D; E F being over 30 inches in hight, the mercury in F rises in it but no air can enter by that way. To render the joints at A tight, a little mercury is run in over the rubber cork, as was suggested by Dr. Gibbs, of Cambridge, in his modifications of Sprengel's pump.

MILKING-STOOL AND PAIL-HOLDER.

L. B. Hoit, of Cedar Falls, Iowa, has invented an improved milking-stool and pail-holder, of which the accompanying engraving is a representation.



The object of this improvement is to hold the pail near the bag of the cow, so that the milk shall not be lost by spraying, as is the case when the pail rests upon the ground, to keep the pail from being soiled on the bottom by filth, and to obviate the fatigue of holding the pail on the knees.

The stool has attached an arm with a circular frame at the end to support the pail. The weight of the milker on the stool counterbalances that of the milk-pail.

By the use of this simple article, milk is saved, and also preserved from filth, the bucket is out of the way of the cow's tail, and she cannot kick it over. At the same time much fatigue is saved to the milker.

IMPROVED MOP WRINGER.

This improvement is the invention of B. B. Choate, of Springfield, Vt., and its object is to save the hands from strain, as well as contact with filthy water in the wringing of floor mops.

A, in the accompanying engraving, represents two metallic bars, which are bent at their centers, in the line of their edges, nearly double, and then have their edges and sides curved or bent, in the manner represented in the drawing. These bars are pivoted together a short distance from their ends, and between their ends are placed the rollers C and D. The rollers have axles, which have bearings in the ends of the bars, holes being made in said bars for receiving the axles. The centers of the bars are so formed as to answer as foot pieces, upon which the operator may place his foot in bearing the rollers together. When the foot pieces at the centers of the bars are separated, the rollers, of course, separate at the same time, so that a mop may be placed between them. When the foot pieces are closed towards each other, the rollers close upon the mop, and press it as tightly as may be desirable for wringing the water, etc., from it.

The bars, A, are spread wide enough apart at a point just above their pivots that they embrace an ordinary water or mop pail on opposite sides, and are provided with hooks catching upon the edges of the pail, so as to support the bars and keep them in position. Upon one of the shafts of the rollers is secured a crank handle for revolving or giving motion to them.

The operator stands over the bucket and operates one of the bars with his foot, while he turns the rollers with his hand by means of the crank handle. One bar will remain stationary, while the other can be raised or lowered, so as to separate or close the rollers. The mop is pressed and drawn between the rollers in the usual manner.

A NEW INK FOR PRINTERS.

In the official announcement of patents issued during the past week, published in another column, will be found that of a new printers' ink, which, while it is said that it can be furnished 33 per cent cheaper than the ordinary ink, is claimed to possess superior advantages to any hitherto used.

The patentee is Mr. Julius Kircher, a pupil of the celebrated chemist, Liebig.

The ink in question consists of 10 parts of hydrated peroxide of iron, 6 parts of hydrated protoxide of iron, and from 10 to 16 parts of varnish.

The two first-named ingredients are mixed in a moist state by stirring; 48 parts of water are then added; and the water being evaporated by boiling converts the mixture into a fine velvety black powder. This powder is washed and dried, and finally mixed with the varnish, the proportion of which varies in accordance with the desired quality of the ink.

The advantages claimed for this ink are that it never changes its color. It has no disagreeable odor; it is a fine glossy black; and, as above stated, is one third cheaper than ordinary ink.

The manufacture of this ink is shortly to be introduced into this country, the requisite machinery for the purpose being now *en route* from Europe.

We understand that the Austrian Government has adopted this ink on account of its permanent unchangeable quality for printing the Government documents.

The patent is owned jointly by L. Bamberger, J. Kircher, the inventor, and Leopold Mendelson, the originator of Mendelson's *Bank Note Reporter*, whose name appears in connection with the macaroni and vermicelli manufacture in another column.

We have before us a copy of an Austrian newspaper published at Vienna, printed with this ink, which presents an unexceptionable appearance.

Any information relative to this ink may be obtained by addressing Mr. Leopold Mendelson, 311 and 313 Avenue A, New York city.

Triumphs of Science.

The second of the course of four lectures before the Young Men's Christian Association, in this city, on the "Triumphs of Science," was delivered on the evening of December 8th.

After a few introductory remarks, Professor Doremus said there was a class of men who claimed to have discovered the distance of most of the bright orbs in the firmament, as well as the sizes and weights of many of them. Now, how was this knowledge gained? It was generally known that we could measure the distance between two objects on this globe without actual measurement, simply by watching the angles which were made between the eye and the objects themselves. The same principle was applied by the astronomer to the sun and moon and other celestial objects. Some of the stars were so distant that they could only be measured by the time taken by a ray of light to travel from them to the earth, and, even judged by this standard, were so remote that light took hundreds of years to traverse the space between them and the eye of the astronomer who was gazing at them. When the distance was known the size also could be ascertained by a calculation founded on the diameter and distance of the object, but some stars were so remote that we could not correctly estimate their diameter, though we could form some idea of their grandeur by their comparative brilliancy.

The weight was discovered by ascertaining the power of attraction possessed by the different planets. Some might say that these were mere dreams of fancy. But, in truth, astronomical calculations and measurements were the only ones entitled to absolute credit. He was ashamed to say that there was only one State in the Union that had yet been correctly laid down on the map by astronomical observations, and that State, he was, as a New Yorker, sorry to say was Massachusetts.

At present the maps of this country were very inaccurate, in spite of the delicacy of the lines that were shown as dividing our various counties and States, and they must ever be inaccurate until verified by scientific tests and measurements He ought not, however, omit to state, further, that at neither of the colleges of the city was there an observatory, or any means provided for astronomical instruction.

In view of our wealth, was not that a great opprobrium to our city? Indeed, that melancholy fact was one reason why he believed professors ought to come forward and bring under popular notice the claims of science. New York gave freely to the right and the left in aid of religion, and he thought this reproach of her illiberality to science would not long be allowed to rest upon us.

The Professor then again returned to the discoveries made by means of spectrum analyses. The most common metal in the universe seemed to be sodium, for we found it everywhere all through the starry world, in the air and in the human body. An old inscription at Memphis said that the earth below showed what the planets above were like.

Our earth was but a burned up star, and its crust but a very fragmentary part of its bulk. We all know how terrible were earthquakes or the trembling of the earth's crust under the influence of some internal agitation. By an estimate he had made a few years ago, it appeared that no less than half a million of human beings and millions of other animals had been destroyed by earthquakes and volcanoes within the last two centuries. This showed the vigor of this internal force of the earth and the terrible condition under which we were living.

Dr. Doremus then gave a number of instances of remarkable sinkings and elevations of the earth's crust, which, compared to the entire bulk of the globe, was but as one to forty. He then proceeded to show the nature of the earth's crust and to trace the various modifications to which its surface has been subjected, especially in the relative arrangement of land and water. To the eye of the geologist the earth, as it existed at present, was the product of unalterable and beneficent laws which had slowly worked out conditions of climate and even of wind currents, in exact correspondence with the needs of the animated creation.

The lecture terminated with some brilliant experiments, showing the precision of the ratio in which the elements of matter combine.

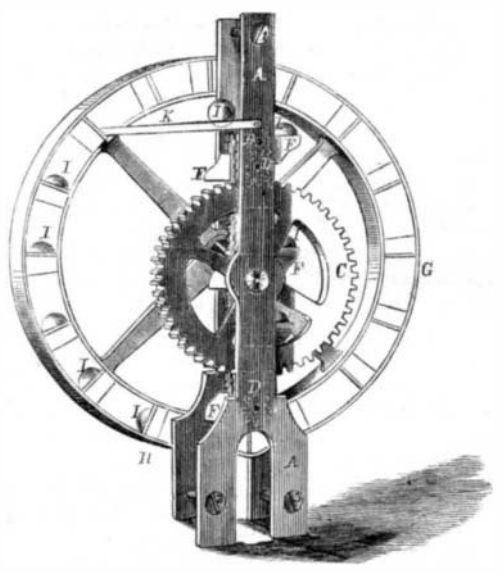
PERPETUAL MOTION.

NUMBER IV.

In 1790 one Conradus Schwiers, a Doctor of Divinity, patented a "Machine on a self-moving principle, or perpetual motion." Fig. 7 is a view of this machine, which, it will be at once seen, is an effort since often repeated, to obtain a wheel so as to keep its center of gravity from ever falling directly under the axis while revolving. The following is the specification:

"Now know ye, that in obedience of the said letters patent, and the proviso therein contained, I, the said Conradus Schwiers, do hereby declare my said new invented self-moving principle, or perpetual motion, is made and performed in manner following, that is to say:

FIG. 7.



"Two stiles or uprights marked in the plan hereunto annexed, A, A, etc., and fastened together by the screws, 1, 2, 3, and to the base, between which stiles or uprights run the wheel, C, and the pinion, D, and the two double pinions, D, D, etc., over which double pinions run a douple chain, etc., to which chain are fixed the buckets, F, F, etc. The chain is made with joints on each side and bars running across, equal in number to the cogs of the wheel, C. Upon the same axle with the wheel, C, on the farther side of the inner stile, A, runs the wheel, G, whose diameter is full double that of the wheel, C; and the pivot of the wheel, G, runs in the back, H, as the other pivot of the same axle runs in the front stile, A. The wheel, G, is divided near the periphery into receptacles in number equal to the buckets on the chain, which receptacles are supplied with metal balls, I I, etc., from the buckets, F, F, etc., by means of the gutter, K, which balls by their weight forcing round the wheel, G, and thereby lifting up the buckets, F, F, etc., on one side as they go down on the other side, discharge themselves again at the bucket, L, where they are taken up by the buckets, F, F, etc., and discharged again at the gutter, K, and are so repeated in a constant succession as often as any receptacle is vacant in the wheel, G, at the gutter, K, for their reception, and by that means the perpetual revolution is obtained, the upper ball being at the same time discharged from one bucket when the lower ball is taken up by another." A very common principle has been worked out to uniform failure in various ways, from the earliest to the latest times. It is shown in the accompanying diagram, Fig. 8, which represents a large wheel, the circumference of which is furnished, at equal distances, with levers, each bearing at its extremity a weight, and movable on a hinge, so that in one direction they can rest upon the circumference, while on the opposite side, being carried away by the weight at the extremity, they are obliged to arrange themselves in the direction of the radius continued. This being supposed, it is evident that when the wheel turns in the direction, *a*, *b*, *c*, the weights, A, B, and C, will recede from the center; consequently, as they act with more force, they will carry the wheel towards that side; and as a new lever will be thrown out, in proportion as the wheel revolves, it thence follows, say they, that the wheel will continue to move in the same direction. But, notwithstanding the specious appearance of this reasoning, experience has proved that the machine will not go; and it may indeed be demonstrated that there is a certain position in which the center of gravity of all these weights is in the vertical plane passing through the point of suspension, and that therefore it must stop.

FIG. 8.

Fit companions to these remarkable specimens of false reasoning are the two modern devices of which we give illustrations in Figs. 9 and 10.