IMPROVED WASHING MACHINE.

The engraving shows an improved washing machine recently patented by Mr. Thomas J. Meroney, of Salisbury, N. C. In this machine the clothes, while under the pressure of a corrugated roller, are subjected to the action of steam, so that while the clothes are being agitated or rubbed they are subjected to the action of steam.

This machine has a plain wooden tank lined with copper or galvanized iron, with perforated pipes in the bottom for the admission of steam, with corrugated copper or galvanized iron roller of sufficient weight. This roller gathers the air while passing back and forth over the clothes, and forces air and water through the fabric. At same time the steam is thrown up through the perforated pipes at the bottom of the tank. There are wooden strips between the pipes to protect them and make the bottom of the tank smooth. This machine is very simple both in construction and operation. It can be operated with very little exertion, and does its work quickly and thoroughly. It will wash the thickest fabric as well as the thinnest muslin or lace. In addition to its use as a clothes washer it may be used for washing wool, and the boiler answers a good purpose for steaming and boiling grain and vegetables for stock.

This machine differs from other washing machines in using steam as the principal agent for agitating the clothes and removing the dirt. Of course the steam always keeps the water at the boiling point, which is very desirable for rapid work.

Further information may be obtained by addressing the inventor as above.

IMPROVED CORN CRUSHER.

An improved corn crusher invented by Mr. George C. Mueller, of Red Bluff, Cal., is shown in the engraving. It is designed for crushing ears of corn to reduce them to the proper state for fodder. The machine consists of two parallel cylinders journalled in a frame, and inclosed by a suitable casing, surmounted by a hopper, into which the ears of corn are fed. The upper cylinder carries a number of saws arranged a small distance apart, and revolves near a concave also made of saws, which are curved to form a tapering cavity in which the ears of corn are received. The saws of the concave enter the spaces between the saws of the cylinder, so as to insure a more thorough breaking up of the ears.

The corn entering the machine is first crushed into small fragments by the saws. It is then delivered by an inclined chute to the cylinder below, which is provided with a series of pins arranged in circumferential rows. This lower cylinder revolves near a concave, also armed with pins, and between these pins the corn is reduced to meal suitable for fodder. The meal is discharged into the box below,

The machine may be driven by hand power, horse power, or by connection with any convenient motor. It is compact, effective, and easily operated.

Further information may be obtained by addressing the inventor as above.

SQUARING THE CIRCLE.—There is one problem very often presented in laying out gear, especially where there is a rack to mesh with as pur wheel or a pinion, and that is "rectifying an arc." It is about as near to the impossible "squaring the circle" as approximation permits. It consists in stepping off upon a straight line tangent to a given circular arc the exact length of the arc, or, conversely, stepping off upon a circular arc the exact length of a given straight line. This problem may be solved on the drawing-board by geometrical construction, with an approximation closer than men can work with ordinary tools.

Suppose that A B in Fig. 1 is a circular arc, and that it is required to find upon the tangent A F its exact length. It is done as follows: Draw the chord A B and produce it to E, making A E equal to one-half A B. With center E and radius E B describe the arc B C, cutting A F in C. Then the straight line A C equals the arc A B, provided the latter does not exceed 60°.

To get the length on a circular arc, as A K, Fig. 2, which shall be equal to a given straight line—for example, A C, tangent to that arc—lay off A O equal to one-fourth of A C. With radius O C equal to three-fourths of A C, from O as center, draw an arc C K, cutting the circular arc in K. Then the arc A K will equal the straight line A C.—*Metal Worker.*

Chemistry, Physics, Technology.

THE PHOTOGRAPHING OF MOTION.

The admirable method devised by Mr. Muybridge, and which consists in employing instantaneous photography for analyzing the motions of man or animals, still left to the physiologist a difficult task; for it became necessary to compare with each other successive images, each of which represented a different attitude, and to class such images in series according to the position in time and space that corresponded to each of them.

Let us admit that nothing has been neglected in the experiment; that, on the one hand, the points of reference that photography is to reproduce have been arranged along the track to be passed over by the animal, so as to permit of ascertaining at each instant the position that he occupies in space; and that on another hand, the instant at which each image has been taken is determined, as happens with photographs taken at equal intervals. All such precautions having been taken, it is still necessary in order to obtain from the figures the meaning hidden therein, to superpose them one over the other (either in imagination or actually), so as to cover a paper band, corresponding to the road traversed, with a series of overlapping images, each of which expresses the position that the body and limbs occupied in space at each of the moments considered.

Such representations give rise to figures like those that the Weber brothers have introduced into use for explaining theoretically how man walks. In the works of these gentlemen we see only a series of silhouettes of men, shaded with cross-hatching of decreasing strength, and overlapping so as to represent the successive displacements of the legs, arms, trunk, and head at the different phases of one step. This mode of representation is the most striking one that has as yet been devised, and it has been adopted in the majority of classical treatises. Now, it has appeared to me (and experience has confirmed the prevision) that we might demand figures of this kind from photography: that is to say, unite on the same plate a series of successive images representing the different positions that a living being moving at any gait whatever has occupied in space at a known series of instants.

Let us suppose, in fact, that a photographic apparatus be set up on the road which is being traversed by a walker, and that we take the first image in a very short space of time. If the plate were to preserve its sensitiveness, we might, in an instant, take another image that would show the walker in another attitude in another point of space. The latter image, compared with the former, would exactly indicate all the displacements that had occurred at the second instant. By multiplying the images in this way at very short intervals, we should obtain a succession of the phases of locomotion with perfect authenticity. Now, in order to keep the photographic plate as sensitive as necessary for successive impressions, it is necessary that absolute darkness shall exist in front of the apparatus, and that the man or animal that is passing shall be detached in white from a black background. But the blackest objects, when they are strongly lighted, still reflect many actinic rays; and so I have had recourse, in order to obtain an absolutely black field, to the method pointed out by Chevreul, my screen being a cavity with black sides. While a man wholly clothed in white, and brightly lighted by the sun, is walking, running, or jumping, the photographic apparatus, which is provided with a more or less rapidly revolving shutter, takes its image at more or less approximate intervals. This same method may be applied to the study of different types of locomotion; and a white horse, or a white bird, will give in the same way a series of their attitudes.

The window in the disk of my shutter may, at will, be enlarged or reduced, so as to regulate the duration of pose according to the intensity of the light, or according to the velocity with which the disk revolves. With the window reduced, and a slow rotation, we obtain images widely spaced apart. A rapid rotation gives more approximate images, but one whose time of pose might be insufficient if the windows were not enlarged. Finally, a swinging shutter placed before the other serves for regulating the beginning and end of the experiment.

The proofs from the negatives that I have obtained, and a sample of which is shown in the engraving, were made at the physiological station of the Parc des Princes, where I worked with the aid of Mr. G. Demeny.—E. J. MAREY in *La Nature.*