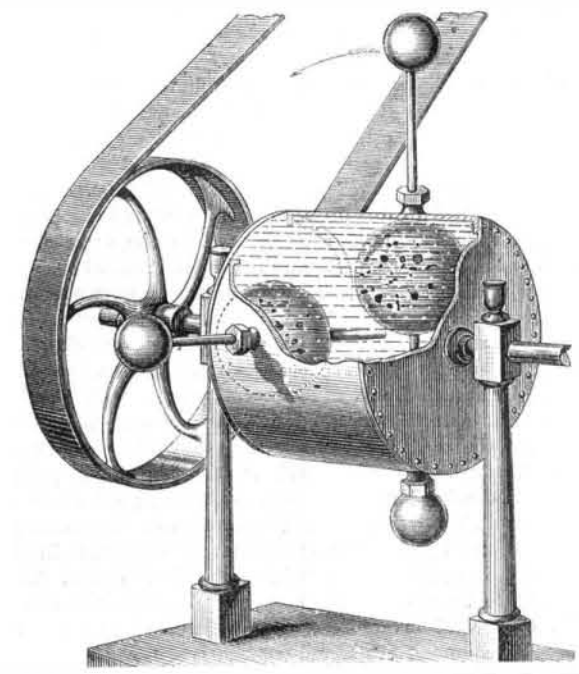
PERPETUAL MOTION.

NUMBER XII.

We this week conclude our series of articles upon perpetual motion, with an illustration of a machine, invented by a Canadian inventor, and a couple of letters upon the subject, lately received. We also would call attention to an article entitled the "Mechanical Equation," published in our editorial columns, and designed to show the folly of spending time and money in the pursuit of this chimera.

Fig. 30 is the device above referred to. It consists of a

FIG. 30.



cylinder containing a fluid, with two or more weighted rods passing through stuffing boxes in the shell. To the middle of each of these rods is fixed a ball of cork, which is expected to rise to the upper side of the cylinder whenever the revolution thereof brings it a little below the axis of the cylinder. In thus rising, it will carry the upper weight away from the center, and bring the lower one toward the center, so that it is thought the center of gravity of cylinder arms, corks, and metallic balls will be kept constantly on one side of the geometrical center, and constant revolution will result. The fact is, however, that the center of gravity will remain always in a perpendicular drawn through the axis, and, consequently, the expectations of the inventor will never be realized. Even if the movement of the arms expected to occur should take place when the cylinder is turned by hand, the decrease of weight, on that side of the cylinder to which the cork would rise, caused by the displacement of the heavier fluid, and the increase of weight on the opposite side caused by the displacement of the cork, would counterbalance the leverage of the weighted arms, and so the exact balance of the machine would remain undisturbed.

MESSRS. EDITORS:—This communication is especially designed for the benefit of those who still believe the perpetual motion of machinery possible. Let it be granted that the the terms weight and force are synonymous, *i. e.*, twenty pounds of weight will require a force precisely equal to the force of its own pressure to sustain it, or neutralize that pressure; for example: if a twenty pound weight be placed upon a scale, and a hand be placed upon the opposite scale, the force applied by the hand must equal twenty pounds to exactly balance the twenty pound weight.

So far we only affirm what every school-boy is aware of.

Keeping strong hold upon this self-evident fact, we may next affirm that each twenty pounds is at an equal distance from the center pin, or fulcrum of the beam. Observe also this additional fact. If either weight be depressed, the opposite one will rise at the same speed and through the same distance which the other has fallen; *i. e.*, equal weights will balance each other, at equal distances from a common point of support, and will move in opposite directions with equal velocities.

Suppose it be required that one of these weights shall rise faster than the other falls. To accomplish this, we must remove it further from the fulcrum or point of support. Observe that a scale beam corresponds to the diameter of a circle, and the arms to the opposite radii of this circle. To the unscientific, these self-evident definitions may appear puerile; but let them reflect that the grandest theorems of scientific investigation wholly depend upon a recognition of self-evident truths.

Returning again to what was proposed, viz.: to cause weights at the extremities of a lever to move at unequal velocities, we find that to do so they must describe arcs of different circles, as the radii are unequal.

But in removing one weight farther from the fulcrum than its opposite, we destroy the balance; for example: suppose its distance to be double that of the other, it will now move with double the velocity, but will require first double weight, or force at the opposite end to balance it; in other words, "all that is gained in velocity, must be replaced in force at the opposite end of the beam."

The converse of this is true, *i. e.*, we may cause a weight to raise a greater, as already shown, but if we raise forty pounds with twenty, we only raise it half the distance which the twenty pounds falls.

The above, being the essence of the "law of virtual velocities," needs only to be comprehended to entirely explode all possible theories of perpetual motion.

Every attempt to produce a self-moving machine has been in open defiance to the co-ordinated relations of force and motion, and any man who comprehends this law of velocities will no sooner attempt to solve the problem of perpetual motion, than to climb upon his own shoulders as a higher point of observation.

I do not propose to exhaust the numerous theories in support of the fallacy, but will analyze a few, serving as a death knell to all.

Before attempting this, let us remark that, in the search for an impossibility, so many valuable and practical certainties have been demonstrated, that perhaps no time has absolutely been thrown away; for as alchemy has fostered and developed chemistry, so has the search after perpetual motion taught how to apply force through complicated machinery, and thus, through unsought channels, has knowledge and civilization flowed all over the world.

A favorite device of the "perpetualists" is one which proposes to employ an overshot water wheel, that shall pump or convey the water back to a reservoir as fast as it comes out! To accomplish this, it only becomes necessary that all the water shall move, in equal volume or weight and equal velocity, in a given circle, or at opposite ends of the scale beam. A simple recognition of the principle laid down at the beginning of this article demonstrates that this is absurd.

The supporters of this species of nonsense, occasionally propose to lift this water above the highest point of the circle. As this supposes the less to exceed the greater, it does not require refutation. The foregoing reasoning applies with equal force to all combinations of tubes and endless chains, belts, cups, etc., proposing finally to act upon a given circle, and to be lifted back to their proper positions to continuously act upon a greater circle, or longer set of levers. The simple fact set forth, that equals can only balance equals, when acting oppositely at equal distances, completely upsets all possible theories of perpetual motion. But a few days since, one of this class of enthusiasts called upon the writer with a rude drawing, in which appeared some half dozen geared wheels, with about an equal number of mystical-appearing levers, by which he exultingly proposed to propel a first-class steamship across the Atlantic, by employing one man at a crank turning a geared wheel two feet in diameter. Of course I dissented, but his faith was sublime; and he left, evidently disgusted with my short-sighted ignorance, and mechanical bigotry. And so it will continue until minds of this class pause and observe a few simple and obvious truths, which, clearly recognized, make the theories of perpetual motion to fade like "the baseless fabric of a vision, leaving not a wreck behind." I. D. J. SWEET.

A humorous correspondent gives the following as a method whereby a perpetual motion may be obtained. He says he has seen a steam boiler advertised which saves 33 per cent of fuel; a valve which saves 15 per cent; a governor which saves 10 per cent; a cut-off which saves 10 per cent; a fire grate which saves 20 per cent; metal packing and and damper regulator which saves 12 per cent; and a lubricator which will save 1 per cent; making in all a saving of 101 per cent. Combining all these improvements, an engine would, he thinks, run itself, and produce an additional one per cent of fuel, which might be used for domestic purposes.

IMPROVEMENTS IN CASTING PULLEYS AND GROOVED ROLLS.

The accompanying engravings illustrate improvements in lasting pulleys and chilled rolls. Figs. 1 and 2 show a method of casting pulleys invented by W. Neemis, of Pittsburgh, Pa., in which the box, A, slides, C, and pattern, B, together with the cast iron case, D, for forming the outer side or face of the pulley, are used, in conjunction with sand molds, made in the box, A. Foundrymen and molders will understand the application of the device without further description. The device was patented in March, 1867.

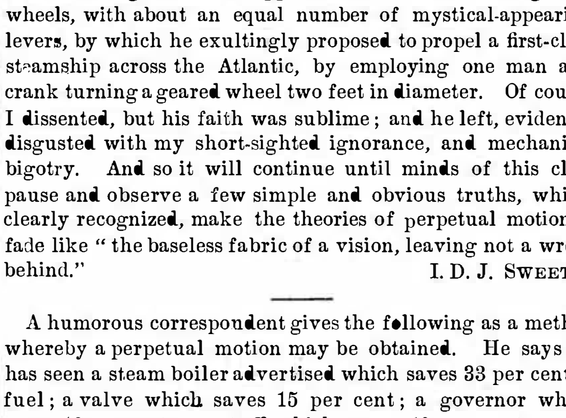


Fig. 1. Fig. 2.

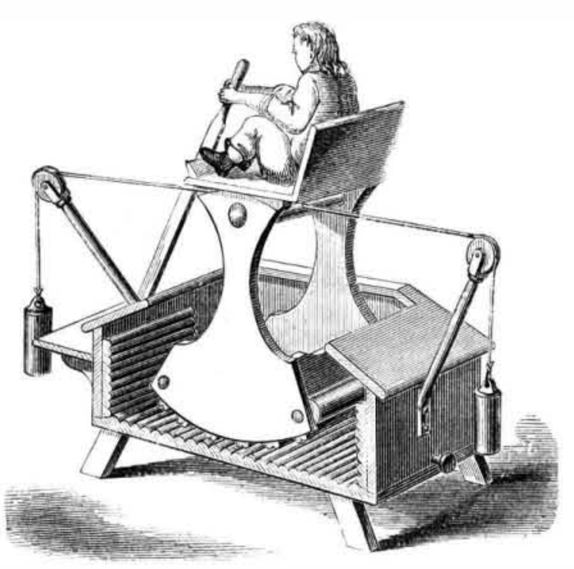
Fig. 3 illustrates a method of casting grooved rolls, invented by R. C. Totten, also of Pittsburgh, Pa., in which a series of metallic rings, made in one or more pieces, with angular, rectangular, or curved inner faces, for forming the grooves of a chilled roll, is employed. The rings are packed in a mold of sand or metallic composition, arranged, substantially as shown in the engraving, with other rings which form the cylindrical surface of the mold. This invention was patented in April, 1867.

ALL persons using coal oil, for illuminating purposes, will read with interest the statement of the manufacturers of "Astral oil," in another column.

INFANTILE POWER WASHING MACHINE.

The credit of this invention—the application of baby power to washing machines—in the unique manner illustrated in the annexed engraving, belongs to John Highbarger, of Sharpsburg, Md., who not long since secured the patent.

A tank with ribbed sides is intended to hold the clothing, and the water and the soap. The clothes are washed by the oscillation of a rocking chair, with ribbed rocker bottom, as shown, the rocking being effected by the hands of the operator, which grasp a hand bar. The rocker is counterpoised by weights, as shown.



This plan of utilizing baby power is certainly novel, and is, no doubt, amusing to the operator, and we are sure it will be to our readers.

The Rice-Paper Plant.

It is only within a very few years that the true nature of the beautifully smooth and uniform, though very brittle paper, so largely used by the Chinese for drawings of birds, butterflies, and other objects of natural history, has been ascertained. It received its popular name of rice paper from an erroneous notion that it was made in some way from rice. It is, however, the pith of a plant not very distantly related to our common ivy, though having a very different appearance. The plant is called by the Chinese Tung-tsau (hollow plant). It grows wild in great abundance on the hills in the northern districts of the island of Formosa, where it is gathered by the natives, and exchanged on the coast for Chinese produce. It is a small tree, at first growing with a simple stem; after flowering, two or more branches are produced, and the tree increases in size until it reaches a hight of twenty or thirty feet; but as the pith deteriorates in the parts of the tree that have become old, it is generally cut down before it is twelve feet high. The large, sycamore-like leaves crown the slender stem, and, when in flower, are surmounted by several wand-like bunches of small, pale-yellowish flowers. A single flower is very insignificant, but the great number of them, borne on thin whitish-pale stalks, have a striking and beautiful effect, especially from the great contrast between them and the crown of large dark green leaves. The stem is strongly marked by the transverse scars formed by the fallen leaves. It is covered by a thickish bark, and the wood is hard, heavy, and durable.

The collectors cut the stems into lengths of nine or twelve inches. The pith is about two inches in diameter, and is very uniform in texture, except in the center, where it is broken into a series of doubly concave cavities. A straight stick is inserted into the end of each piece, and the pith is forced out at the other end by hammering on the ground The pith is then placed in the hollow bamboos, where it swells to its natural bulk, and dries straight. The pith is then dexterously cut by workmen, who hold against the cylinder a long, sharp knife, which is kept quite steady while the pith is moved round and round.

The paring thus goes on continuously until the inner broken pith is reached. Each cylinder produces a smooth, continous scroll, about four feet long. The sheets as they are cut are placed one on the other, then pressed and cut into squares of the required size. These are about three inches and a quarter square, and are sold in packets of one hundred each, at rather less than one penny the packet. The small squares are dyed different colors, and made into artificial flowers for ornamenting the hair of the Chinese ladies.

Large piths occur in other plants besides the Tung-tsau. An Indian plant named Shola, belonging to the leguminous or pea tribe, was by many believed to be the source of the rice paper. It is extensively employed in Singapore for the manufacture of floats and buoys for fishermen, and for the light sun hats worn in the east: but it is greatly inferior in color and quality, to the true rice paper. The Taccada, an erect shrub growing on the shores of India and Ceylon, has a pith of considerable size, and of a firm, white appearance. It is much used by the Malays and Siamese for making artificial flowers, small figures, and other articles used as decorations at feasts and festivals. Among British plants the elder tree has a very large pith, which has not, however, been applied to any practical use. It can be readily pushed out of the stem, in the same way by which the Chinese get the pith of the Tung-tsau. The hollow stems that remain have given to the tree its popular name of bore tree.