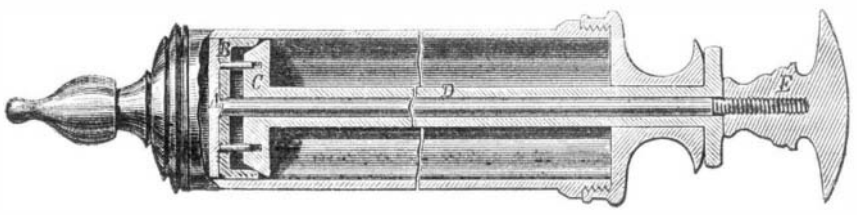
## IMPROVED EXTERNALLY ADJUSTABLE PACKING FOR PISTONS.

The great difficulty which has always attended the use of pistons is that of keeping them tight. Exposed to constant friction the wear is great, and in addition to this, if soft packing be employed, the result of the friction is to condense its texture and impair its elasticity. Hence the piston which fits the cylinder accurately to-day, must, unless re-adjusted, fit it less accurately to-morrow.

In the use of pumps, syringes, etc., it has been necessary to rearrange frequently the packing, for which purpose it was necessary to take off the head of the cylinder, and often to remove the piston.

By means of the invention, shown in the accompanying engraving, this necessity is avoided, the expansion of the packing being effected without opening the cylinder, by simply turning a nut at the outer end of the piston rod.



The engraving represents the invention as applied to a common syringe, but, with slight modifications in the details, it is applicable to all classes of pistons.

The piston, A, is provided with a cup leather packing, B. This cup leather is expanded by a conical head, C, attached to a sleeve, D. The turning of the knob, E, presses the head, D, down into the cup leather, or relieves it from pressure, according as the knob is turned to the right or left. We need not dwell on the means necessary to adapt this principle to pumps, steam engines, etc., as they will readily suggest themselves to all mechanics.

Under the present system when the leakage of the piston becomes too great to be tolerated any longer, the cylinder is opened and the packing re-adjusted. This requires a considerable outlay of time and labor, and to avoid the necessity for its immediate repetition the piston is packed about as tightly as possible. This results in considerable loss of power by friction, which gradually diminishes until it is succeeded by gradually increasing loss by leakage. Thus friction and leakage alternately operate against economy of power.

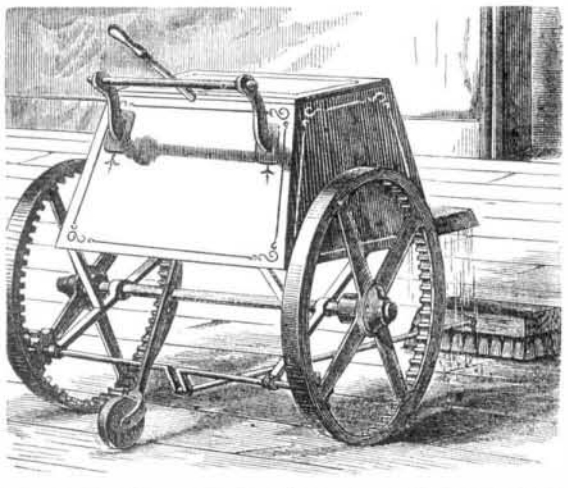
By means of this device it is easy to expand the packing from day to day precisely to the extent required without causing any unnecessary pressure upon the interior of the cylinder. There need therefore be no loss by leakage on the one hand or by unnecessary friction on the other, to say nothing of the time involved in removing the head of the cylinder.

In syringes and pumps in which soft packing is employed an interval of a few days without use is almost certain to be followed by such a shrinking of the packing as to require considerable trouble to get the piston to work. By means of the improved piston this annoyance is entirely overcome. A single turn of the nut renders the packing, however dry and shrunken, perfectly tight.

Patent allowed through the Scientific American Patent Agency, and will issue next week to A. H. Smith. For particulars apply to W. H. Wells, 948 Broadway, New York.

## SCRUBBING MACHINE.

Mr. Andrew Irion, of Femme, Mo., has invented a scrubbing machine, of which our engraving is a representation. A tank containing the water made alkaline by soda or soap, is arranged on wheels, as shown. The wheels have teeth on the interior of their rims, which gear with a pinion on a crank shaft, from which motion is communicated through a connecting rod to a large scrubbing brush. The water is sprinkled upon the floor in advance of the brush, the flow being controled by a valve actuated by a hand lever. In use, the hands grasp a horizontal bar, attached to the tank by brackets, and the machine is rolled over the floor or sidewalk to be scrubbed, which imparts a rapid reciprocating movement to the brush. The substitution of the erect posture for the awkward position on the hands and knees, in scrubbing by



hand, renders the work far more easy and cleanly to the operator; and, as a consequence, the work may proceed with greater rapidity. In the cleansing of large open floors, this machine may be used to advantage.

THE disastrous war in Europe has given great impetus to some of our fancy manufactures, as we are now prevented from obtaining French goods. The change is especially noticeable in the artificial flower trade. The annual consumption of these apparently trifling articles is estimated to reach $16,000,000, and the employment to women and girls it affords is a most important consideration.

### Spurious Metallic Filling for Teeth.

One of the refinements of the art of deception is described in the following passage, for which we are indebted to the *Dental Cosmos*, of Philadelphia:

"A man called upon the doctor to have a tooth extracted, as he had pain all over the right side of his face, which he located in one of the molar teeth, that had apparently a very nice gold filling. The patient was dismissed without extracting the tooth, as the doctor thought that the pain was due to neuralgia, caused by something else, and treated him accordingly. The patient called again the next day, saying the tooth must come out, as it pained intensely. It was extracted, but no relief was afforded. He called on the following day, and desired to have other teeth removed. The molar tooth that had been extracted was broken open, and found to have been half filled with tin foil and finished with gold. The other fillings were then taken out of the remaining teeth, and found to have been in the same condition, thus making a galvanic battery. The patient was sent to a good dentist to have these fillings renewed with gold. Immediate and permanent relief was obtained."

The name of the ingenious dentist is withheld; had it not been we would have given him and his deeds a most undesirable publicity.

## PERPETUAL MOTION.

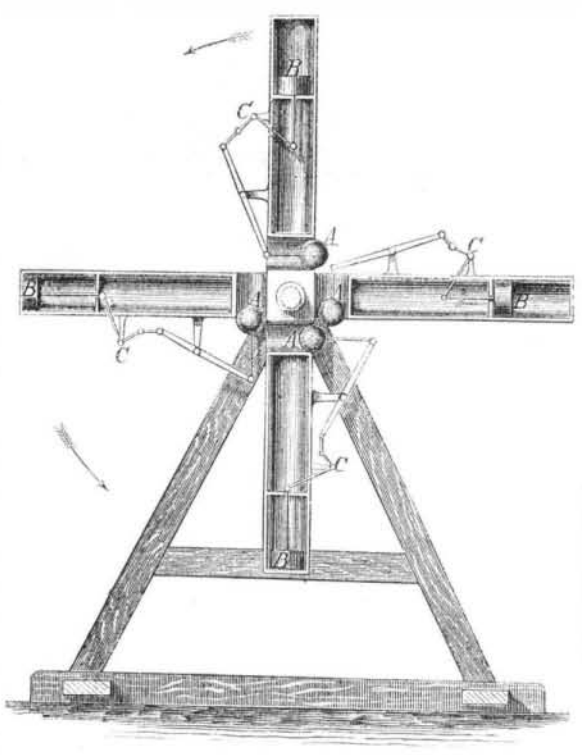
### NUMBER X.

### CARNOT'S OPINION OF PERPETUAL MOTION.

The celebrated physicist and mathematician, Carnot, has given his opinion on "perpetual motion," as follows:

From what we have observed regarding friction and other passive forces, it may be inferred that perpetual motion is a thing absolutely impossible, when only such bodies are employed as are not acted on by motive power, or any heavy body; for, as these passive forces, which cannot be avoided, are constantly resisting, it is evident that the movement must continually abate; and, from what has been said, it will be seen that, when bodies are not acted on by any motive power, the sum of active force will be reduced to nothing; that is to say, that the machine will be brought to rest when the amount of activity absorbed by friction, since the commencement of the movement, will have become equal to one half of the initial active force; and when the bodies are weights, the movement will terminate when the amount of activity absorbed by the friction equals one half of the initial active force; moreover, one half of the active force existing, if all the parts of the system have a common speed, equals that which is due to the hight of the point where, in the first instance of the movement, was the center of gravity above the lowest point to which it can descend.

FIG. 22.



It is easy to apply the same reasoning to constructions where springs are used, and generally to all such constructions where, abstracting from friction, the moving force, in order to bring the machine from one position to another, must consume an amount of activity as great as that which is absorbed by the resisting forces when the machine returns from the last to the previous position.

The movement will terminate still sooner, if any percussion takes place, as the sum of active force is always diminshed in such cases.

It is therefore evident, that one must altogether despair of producing what is called the perpetuum mobile, if it be true that all the motive powers existing in nature consist in nothing but attraction, and that it is a general property of this power to be always equal at equal distances between given bodies; that is to say, to be a function that only varies in cases where the distance of these bodies varies itself.

This opinion may be appropriately followed by that of Dr. Lardner, given in the following extract:

There is no mechanical problem on which a greater amount of intellectual ingenuity has been wasted, than that which has for its object the discovery of the perpetual motion. Since this term, however, is not always rightly understood, it will be useful here to explain what the perpetual motion is not, as well as what it is.

The perpetual motion, then, which has been the subject of such anxious and laborious research, is not a mere motion which is continued indefinitely. If it were, the diurnal and annual motion of the earth, and the corresponding motions of the other planets and satellites of the solar system, as well as the rotations of the sun upon its axis, would be all perpetual motions.

To understand the object of this celebrated problem, it is necessary to remember that, in considering the construction and performance of a machine, there are three things involved: 1st, the object to which the machine gives motion; 2d, the construction of the mechanism; and 3d, the moving power, the effect of which is transmitted by the machine to the object to be moved. In consequence of the inertia of matter, the machine cannot transmit to the object more force than it receives from the moving power; strictly speaking, indeed, it must transmit less force, since more or less of the moving force must be intercepted by friction and atmospheric resistance. If, therefore, it were proposed to invent a machine which would transmit to the object to be moved the whole amount of force imparted by the moving power, such a problem would be at once pronounced impossible of solution, inasmuch as it would involve two impracticable conditions: first, the absence of atmospheric resistance, which would oblige the machine to be worked in a vacuum; and second, the absence of all friction between those parts of the machine which would move in contact with one another.

But suppose that it were proposed to invent a machine which would transmit to the object to be moved a greater amount of force than that imparted by the moving power, the impossibility of the problem would in this case be still more glaring; for, even though the machine were to work in a vacuum, and all friction were removed, it could do no more than convey to the object the force it receives. To suppose that it could convey more force, it would be necessary to admit that the surplus must be produced by the machine itself, and that, consequently, the matter composing it would not be endowed with the quality of inertia. Such a supposition would be equivalent to ascribing to the machine the qualities of an animated being.

But the absurdity would be still greater, if possible, if the problem were to invent a machine which would impart a certain motion to an object without receiving any force whatever from a moving power; yet such is precisely the celebrated problem of the perpetual motion.

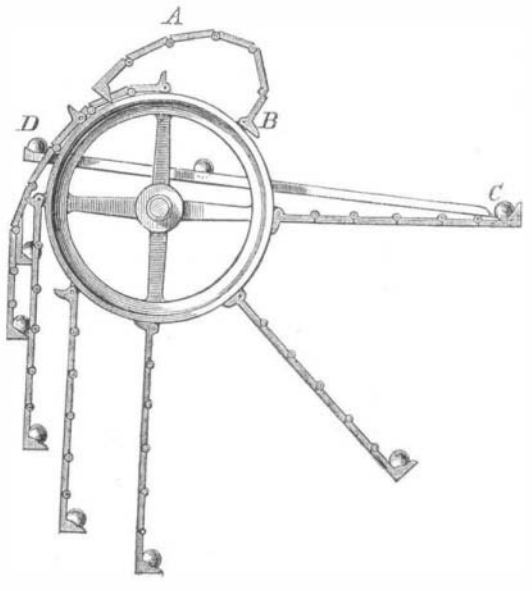
In short, a perpetual motion would be, for example, a watch or clock which would go as long as its mechanism would endure, without being wound up; it would be a mill which would grind corn, or work machinery, without the action upon it of water, wind, steam, animal power, or any other moving force external to it.

It is not only true that such a machine never has been invented, but it is demonstrable that so long as the laws of nature remain unaltered, and so long as matters continue to possess that quality of inertia which is proved to be inseparable from it, not only in all places and under all circumstances on the earth, but throughout the vast regions of space to which the observations of astronomers have extended, the invention of such a machine is an impossibility the most absolute.

Fig. 22 is a drawing of a supposed perpetual motion, which the inventor says will not go, though he has worked at it twelve months. He has now given it up in despair, and vows he will waste no more time upon it. The central weights, A, each weigh one fourth more than the weights, B, at the extremities of the arms. The two sets of weights are connected pairs, each pair being joined by a lever, link, and bell crank, C. The action of gravity in the central weights compels the sliding weights at the ends of the arms to assume the positions shown in the engraving.

Had our correspondent, Mr. Geo. C. Phillips, of Alleghany, Cal., applied a little mathematical calculation to the verification of the truth or falsity of the principle of his device, he might easily have proved that it was a perfect balance, and saved himself twelve months of trouble and expense.

FIG. 23.



The leverage of the outside is exactly counteracted by the leverage of the inside weights.

Fig. 23 is a device contrived by Mr. Geo. Linton, of Middlesex, England. The engraving is an end view of a series of vertical wheels, one only being seen. The lever, A, is represented in the act of falling from the periphery of the wheel into a right line. The lever is composed of a series of flat rods, connected by ruler joints, which said ruler joints are provided with a stop, or joggle, to prevent their collapsing at any time more than will bring any one of the rods which