F. H. HOPKINS.

INTERMITTENT GRIP DEVICE.

APPLICATION FILED OCT. 26, 1916.

1,312,787.

Patented Aug. 12, 1919.

FIG. 1.

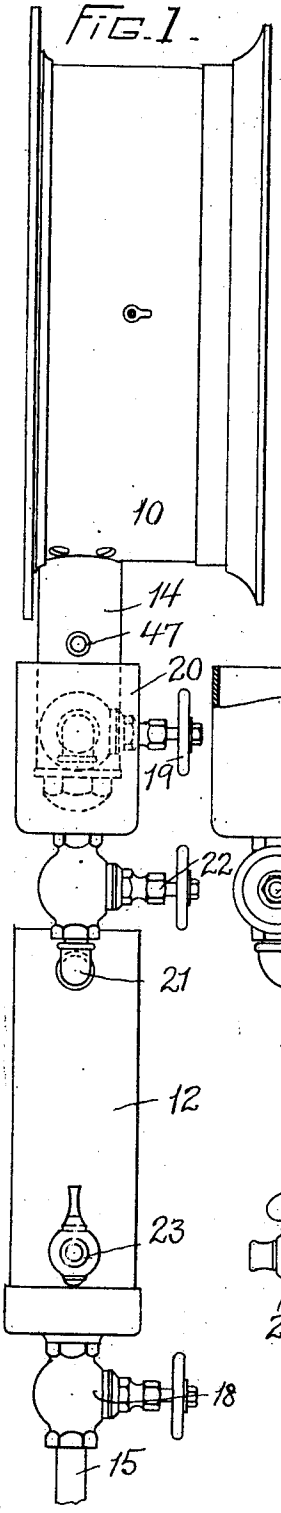
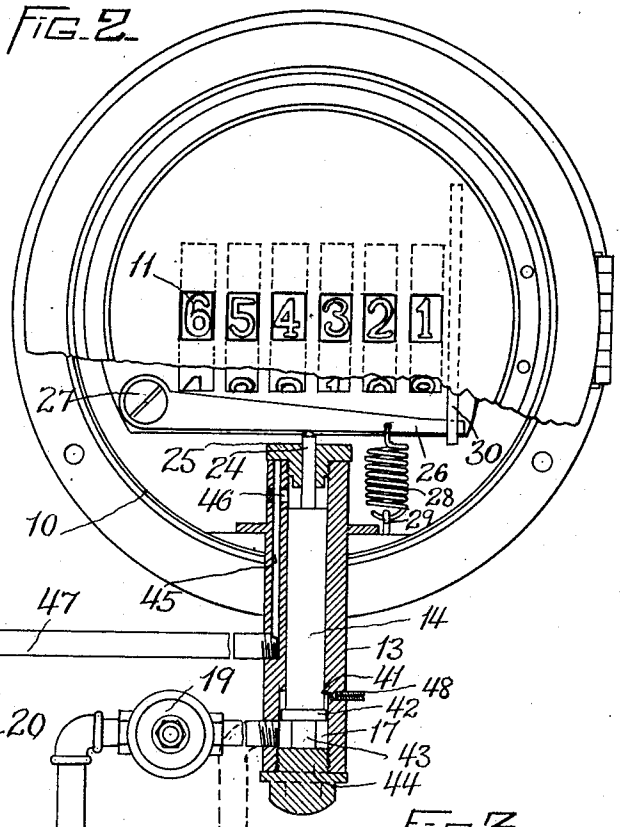


FIG. 2.



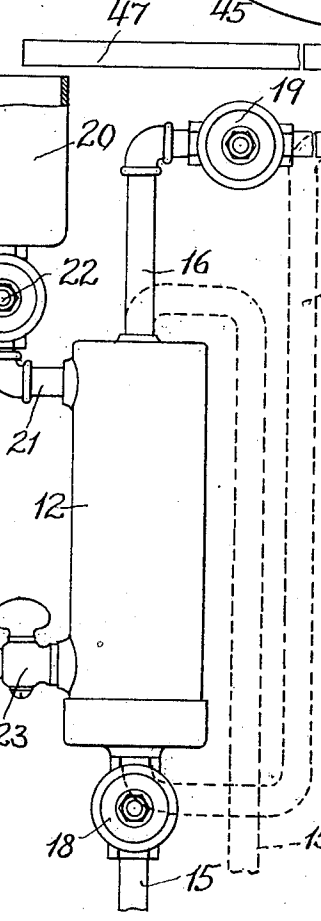
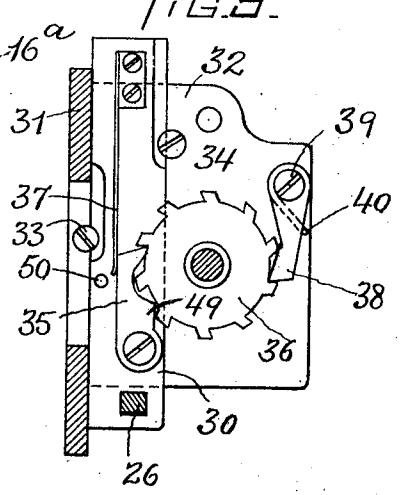


FIG. 3.



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INTERMITTENT-GRIP DEVICE.

1,312,787. Specification of Letters Patent. Patented Aug. 12, 1919.

Application filed October 26, 1916. Serial No. 127,827.

To all whom it may concern:

Be it known that I, FRANK H. HOPKINS, a citizen of the United States, residing at Somerville, in the county of Middlesex and State of Massachusetts, have invented new and useful Improvements in Intermittent-Grip Devices, of which the following is a specification.

The present invention relates generally to a counter of a sort commonly and widely used for tallying the number of strokes or operations of the moving parts of engines and other machines, and is concerned particularly with means for operating the counting elements of the instrument. My special object is to furnish a fluid operated actuator for such counting elements adapted to be operated by impulses originating or produced in the working chambers of motors and pumps, that is by the pressure impulses of the working fluid in motors or engines, and the impulses applied to the fluids acted upon by pumps, so that the number of strokes or impulses of the motor or pump, as the case may be, can be tallied by the counter without joining any part of the counter to a moving part of the motor or pump.

The term "machines" in the foregoing statement and in the following description and claims is used with generic significance, including prime movers as well as combinations of parts which are driven by an external applied force.

In the drawings,

Figure 1 is a side view of a counter with an associated actuator embodying my invention.

Fig. 2 is a front view of the same with parts broken away and in section.

Fig. 3 is a detail elevation of an improved pawl and ratchet drive for transmitting motion from the actuator to the counting elements of the counter.

The same reference characters indicate the same parts in all the figures.

The instrument as a whole is herein termed a "counter." It comprises an inclosing case 10, counting disks 11 and the usual carrying mechanisms for carrying tens from each disk to the next aljacent left hand disk. Such casing, disks, and carrying mechanism may be of any common or other construction. I have chosen for illustration a common form of counter, which is so well known as to require no detailed description. It is enough to state that such counter is equipped with a row of coaxial counting disks or wheels, each carrying ten digits, of which the right hand disk indicates units and is turned through one-tenth of a revolution at each operation of the machine with which the counter is associated. In thus illustrating such a counter I have not intended to limit the invention to any particular counter or in any other manner than indicated by the express terms of the appended claims.

For driving the counting elements, by which I mean the disks or wheels 11 or equivalent devices, I provide a chamber 12, a cylinder 13 and a piston 14 within the cylinder. When the counter is used in connection with a pump which acts upon liquids the lower end of the chamber 12 is connected with the pressure chamber of the pump by a pipe or conduit 15, and the upper end of the chamber is connected by a pipe 16 with the chamber 17 in the cylinder 13. When the counter is used with a motor, or an air pump, the connection 15^a from the cylinder of the motor or pump leads to the upper end of the chamber 12 and the connection 16^a from the latter to the cylinder 13 leads from the bottom thereof as indicated by dotted lines in Fig. 2.

Valves 18 and 19 are placed in the connections 15 and 16, respectively. A feed cup 20 is connected with the upper part of the chamber through a pipe 21, in which is a valve 22, tapped into the side of the chamber. A drain cock 23 is connected with the lower part of the chamber.

Above the piston 14 is an extension rod or pin 24 passing through a plug 25 in the head of the cylinder and bearing against an arm 26 which is pivoted on a stud 27 fixed on some convenient part of the counter case. Said arm 26 is connected to a spring 28 which reacts against a fixed anchorage 29 and holds the arm at all times against the stem 24. Arm 26 is connected with a pawl carrier 30, here shown as a sliding plate or bar arranged to travel endwise in a guideway formed between the back plate 31 of the casing and a plate 32, to which plates respectively are attached screws 33 and 34, the heads of which overlap opposite edges of the

bar 30. The bar 30 carries a pawl 35 which coöperates with a ratchet wheel 36 connected with the unit counting wheel. This ratchet has ten teeth so that each trip of the pawl causes the unit wheel to be turned far enough to place the next successive number on its periphery in the visible position. A spring 37 fixed at one end on the pawl carrier 30 bears against the pawl and holds its toe in contact with the ratchet wheel. A holding pawl 38 is mounted on a pivot stud 39 and is held by a spring 40 so as to prevent return movement of the ratchet.

The chamber 12, connections 16 and chamber 17 all contain a transmitting fluid which is preferably a body of medium heavy oil, although I do not limit myself to any particular fluid for this purpose. Most satisfactory results are secured, however, when the fluid used is a liquid having sufficient body to prevent any material leakage past the piston 14. Said piston fills a considerable length of the cylinder, but is small enough to slide freely therein. That part of the cylinder which forms the chamber 17 is enlarged somewhat and provides a shoulder 41 which constitutes a valve seat, and the piston 14 has a shoulder 42 near its end to constitute a valve co-acting with said seat when the piston is raised. A foot 43 on the piston rests against the head 44 of the cylinder when the piston is in its lowered position and holds the head of the piston well above the entrance point of the pipe 16, whereby the oil is able to flow readily under the head of the piston.

It will be obvious to those skilled in the art that every pressure impulse in the cylinder of the engine or the chamber of the pump, caused either by the admission of working fluid or the combustion of working fluid, in the case of an internal combustion motor, or the application of pressure to fluid in the case of a pump, will transmit pressure through the transmitting fluid in the chamber 12 and pipe 16 so as to act on the piston 14 and raise the latter. Said piston constitutes a fluid pressure operated actuator which operates the counting elements through the arm 26 and the ratchet and pawl mechanism 35, 36. When the piston reaches the end of its stroke the valve shoulder 42 thereof closes against the seat 41 to prevent oil being squeezed past the piston by excessive fluid pressure acting thereon, so that leakage of oil past the piston is reduced to the minimum. Provision is made, however, for collection and return of any oil which may escape past the piston, such provision consisting of a passage 45 in the side of cylinder 13 from which a port 46 leads to the cylinder above the piston. This passage 45 joins a pipe 47 which leads to the filling cup 20. When this cup becomes full the oil may be returned to the chamber 12 by opening the valve 22, the valves 18 and 19 being then closed, and opening the drain cock 23 to permit escape of any water which may have been forced into the chamber from the pump or engine.

When the transmission system is first filled with oil, if any air is trapped in the chamber 17 it may be allowed to escape by opening the vent valve 48.

While I have shown and described the cylinder 13 as being vertically arranged and the piston as moving upward on the working stroke, I do not limit the invention to that particular arrangement, since the cylinder and piston may be inverted or placed horizontally or in any other position without impairment of operativeness, because the spring 28 will always return the piston when the pressure impulse ceases.

I claim as part of my invention the feature of the pawl and ratchet mechanism which prevents overthrow of the ratchet wheel in case the actuator should move so suddenly as to impart momentum to the wheel. Such means comprises a shoulder 49 on the pawl 35 which lies in front of the second tooth back of the one on which the toe of the pawl acts, and a stop pin 50 mounted on the pawl carrier beside the pawl. If the ratchet wheel should continue to rotate after the pawl comes to rest, the tooth bearing on the shoulder 49 would swing the pawl away from the wheel until stopped by the pin 50. The shoulder 49 projects so far toward the axis of the ratchet wheel that it still lies in front of the tooth when the pawl is thus arrested by the stop, such stop, however, being placed where it will not prevent the toe of the pawl from swinging out to pass the next ratchet tooth below it when being withdrawn after a working stroke. Fig. 3 shows the pawl and ratchet mechanism at the end of a working stroke, this position being different from the one shown in Fig. 2, which represents the normal position.

What I claim and desire to secure by Letters Patent is:

1. A pawl and ratchet mechanism including a driving pawl, a driven ratchet and means for preventing overthrow of the ratchet comprising a stop in the path of movement of the pawl away from the ratchet, and a shoulder on the pawl in the path of one of the ratchet teeth, said shoulder having an extent sufficient to obstruct such tooth when the pawl is arrested by said stop.

2. A pawl and ratchet mechanism comprising a pawl having an operating toe, a ratchet wheel with which said pawl co-acts, a pawl carrier on which the pawl is mounted, a stop on the pawl carrier in position to arrest movement of the pawl away from the ratchet located to permit said toe to

clear the ratchet teeth on its retracting strokes, and a shoulder on the pawl projecting in front of one of the ratchet teeth in rear of the tooth with which the toe engages, and thus projecting to an extent sufficient to obstruct said tooth when the pawl is arrested by said stop, whereby to prevent overthrow of the ratchet.

3. A pawl and ratchet mechanism comprising a ratchet, a pawl carrier, a pawl mounted on said carrier having a recess in its side toward the ratchet of sufficient extent to admit one of the teeth of the ratchet, that part of the pawl at one side of the recess being the operating toe and a portion at the other end of the recess and nearer to the axis of the pawl being a shoulder, and a stop on the pawl carrier at the side of the pawl away from the ratchet arranged to arrest outward movement of the pawl when the toe thereof is clear of the ratchet teeth and said shoulder is in the path of such teeth.

In testimony whereof I have affixed my signature.

FRANK H. HOPKINS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."