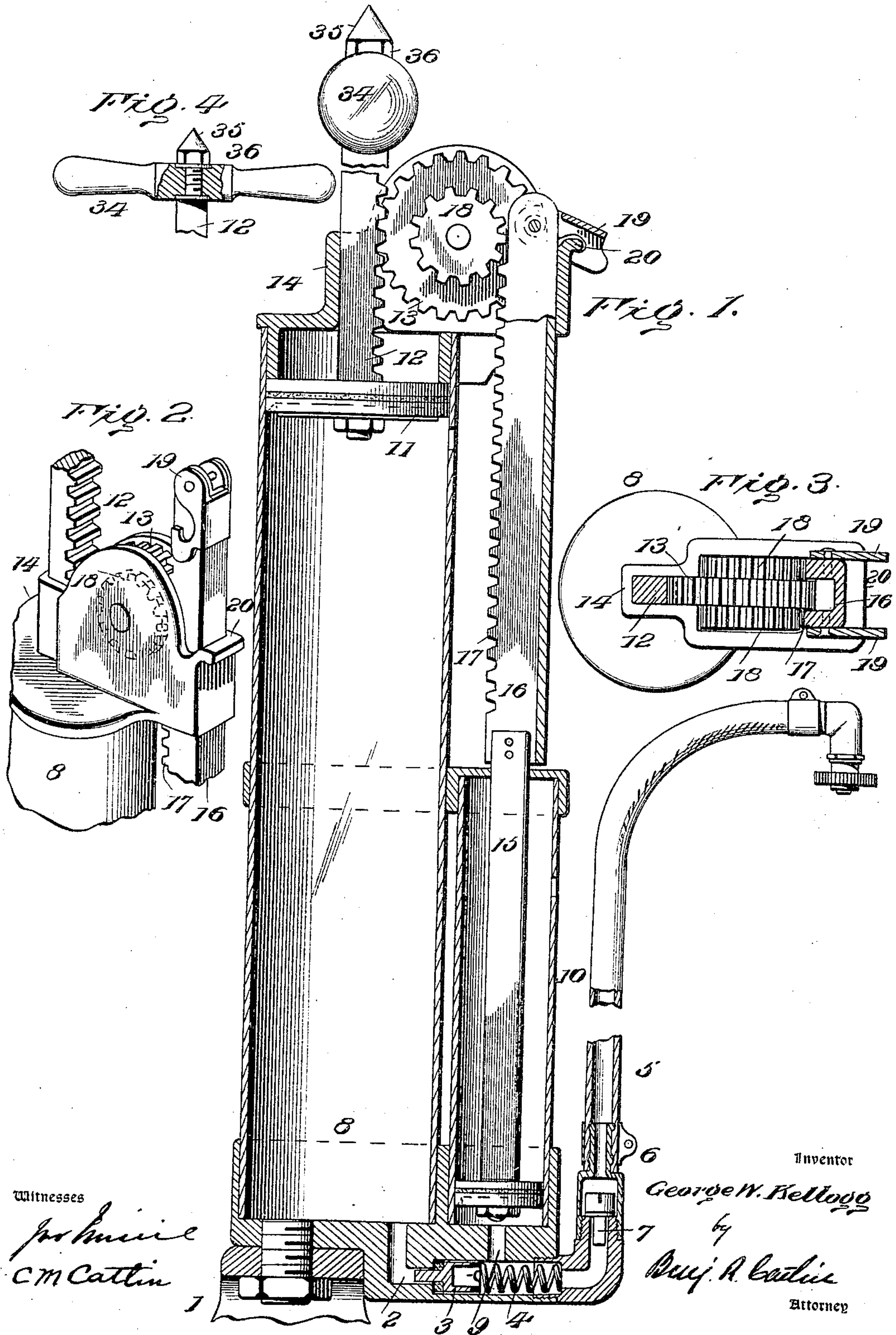


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G. W. KELLOGG.
PUMP.

APPLICATION FILED AUG. 26, 1904.



UNITED STATES PATENT OFFICE.

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PUMP.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, GEORGE W. KELLOGG, a resident of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Pumps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

This invention relates to pumps and to that class comprising two cylinders of unequal capacities, each having a piston reciprocally operated by means of suitably-moved piston-rods in the form of rack-bars combined with a gear. In such a construction having cylinders of equal length it has been a ground of objection that no means was provided for holding both of the racks when not in use and making a compact arrangement on practically the same level, one of the racks at such time extending to a considerable height above the pump; and, further, it has been found impracticable to make the smaller cylinder sufficiently small to secure the desired ratio of compression between the cylinders without interfering with the use of the piston-rod rack on account of the necessary size of the latter.

The objects of the present invention are to obviate these objections and also to provide for applying power differentially to the pistons, for avoiding end thrust on the axis of the gears, and for disconnecting the piston-rods in operation, and to secure other advantages.

The invention consists in the construction herein described and pointed out.

In the accompanying drawings, forming a part of this specification, Figure 1 is a central longitudinal section of the pump. Fig. 2 is a partial perspective of the gears and piston-racks, showing a piston-rack lock. Fig. 3 is a partial plan, the lock and rack being shown in cross-section. Fig. 4 is a broken elevation of the pump-handle.

Numeral 1 denotes a pump-base having the bent delivery-port 2, provided with a check-valve 3, backed by a spring 4 and communicating in usual manner with a hose 5. A coupling is denoted by 6, and 7 is a check-valve. The port communicates with a cylinder 8, and that part of port 2 which is beyond the valve 3 communicates by a port 9 with a comparatively short and small cylinder 10, both cylinders being suitably sup-

ported in the base. In the larger cylinder is a piston 11, having a rod 12, provided with rack-teeth, coöperating with a gear 13, journaled in the cap or frame 14. Said rod is provided with a suitable handle for driving the piston 11, which by means of its rack-teeth and suitable gears drives the piston 15, to which is connected an extension 16 of U shape in cross-section, each edge being provided with rack-teeth 17 to engage two gear-wheels 18, fixed to gear 13 on opposite sides thereof, a double rack and two gears being employed to avoid objectionable thrust on the gear-axis. The U shape of the double rack divides it and provides that it may embrace the larger gear-wheel, as required, for the engagement of the teeth of the smaller gears with the respective series of rack-teeth. The rack-teeth are omitted for a short space on the upper end of the extension 16 to provide that this double rack may be disengaged from the gear-wheels by pushing down the piston and its extension 16.

19 denotes a hook pivoted to the extension and adapted to engage a projection 20 on the frame to positively hold the piston 15 inoperative. The hook when turned to the position indicated in Fig. 2 will prevent the dropping or accidental pushing down of the piston and rack 16 to the inoperative position. When both pistons are in operation, air is compressed in the larger cylinder and forced under the ascending piston in the smaller, and upon the reciprocation of the pistons this is further compressed in the smaller cylinder and driven out of the exit into the hose or the like. In some cases it will be found convenient to use the large cylinder solely and until a considerable back pressure has been established and then to put the smaller cylinder into use, thereby compounding the compressive action and carrying it farther than otherwise practicable. The shortness of the smaller cylinder provides that its capacity may be made relatively small without unduly reducing its diameter, and, further, the short path of its piston enables the power to be multiplied by the use of the comparatively small gears. It also provides for a shorter rack and for its comparatively small extension above the pump at any time. The means of disconnecting the rack from the gear, however, provides for close storage or compact arrangement independently of the difference in the lengths of the racks. The pivotal connection of the piston-rod and pis-

ton extension provides against the bending of the former in the cylinder-cap.

One advantage of a large differential pressure in the cylinder is that the compression may be effected more rapidly and carried farther than otherwise and particularly in the combination employing differential gears, as shown.

The handle 34 is made double to avoid contact of the operator's hand with the free rack that rises to a point near the center of the handle, and a guard or warning device is fixed to the handle immediately over the racks to prevent its being inadvertently grasped at the middle, as by a single hand. This device in the instance illustrated is a sharp cone 35, integral with the nut 36, that locks the handle to the rack; but any projection or equivalent adapted to arrest the attention of the operator, and thereby prevent accidental bruising of his hand, will have substantially the same principle of operation.

I am aware that in a motor-starting mechanism a spring-actuated gear and a motor-pinion normally out of engagement with the gear have been proposed for use in combination with devices for engaging and disengaging the gear and pinion and with means for locking and unlocking said gear, and also that in a mechanism for converting reciprocatory into rotary motion toothed wheels have been made to engage or to be disengaged from each of a pair of racks. Such mechanism I disclaim as unsuitable for the purposes of my improvement, which comprises a pump having cylinders of unequal capacity and including the particular means herein set forth for insuring that the smaller cylinder may remain idle until an initial air-pressure is established by the use of the larger cylinder alone, the sole use of the large cylinder or its joint use with the smaller being regulable at the will of the operator.

Having thus described the invention, what I claim is—

1. The combination of two cylinders of unequal lengths, a piston and rod for each, and means for reciprocating the pistons oppositely, said means comprising unequal gears and rack-teeth on the rods to move the pistons with different velocities.

2. The combination of two cylinders of unequal lengths, a piston and rod for each, and means for reciprocating the pistons oppositely, said means comprising one comparatively large and two smaller gears on opposite sides of the large gear all having the same

axis, and suitable coacting rack-teeth on the piston-rods.

3. The combination of two cylinders of unequal lengths, a piston and rod for each, and means for reciprocating the pistons oppositely, said means comprising one comparatively large and two smaller gears all having the same axis, and suitable coacting rack-teeth on the piston-rods, one of said rods being U-shaped in cross-section to embrace the larger gear and each edge provided with teeth to engage the two smaller gears on opposite sides of the larger one.

4. In a compound pump, a plurality of cylinders, a plurality of pistons each having a rod provided with rack-teeth, coacting gears one for each piston-rod, and means for effecting the disengagement of one of said piston-rods from its gear at will without interrupting the operation of the other piston whereby either both cylinders or one may be used.

5. In a compound pump, a plurality of cylinders, a plurality of pistons each having a rod provided with rack-teeth, coacting gears one for each piston-rod, and means for effecting the disengagement of said piston-rod from its gear at will without interrupting the operation of the other piston, one of said racks being movable lengthwise to an inoperative position.

6. In a compound pump, a plurality of cylinders, a plurality of pistons each having a rod provided with rack-teeth, coacting gears one for each piston-rod, and means for effecting the disengagement of one of said piston-rods from its gear at will without interrupting the operation of the other piston, and a device to prevent accidental connection.

7. In a compound pump, a plurality of cylinders, a plurality of pistons each having a rod provided with rack-teeth, coacting gears one for each piston-rod, means for effecting the disengagement of one of said piston-rods from its gear at will without interrupting the operation of the other piston, and a device to prevent accidental connection, said device consisting of a pivoted latch, said latch being also adapted to prevent accidental disconnection.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

GEORGE W. KELLOGG.

Witnesses:

ELIZABETH L. MACFATE,
BENJ. R. CATLIN.