(No Model.) 2 Sheets—Sheet 1.

H. R. TOWNE.

PAWL AND RATCHET MECHANISM.

No. 530,734. Patented Dec. 11, 1894.

Fig. 1.

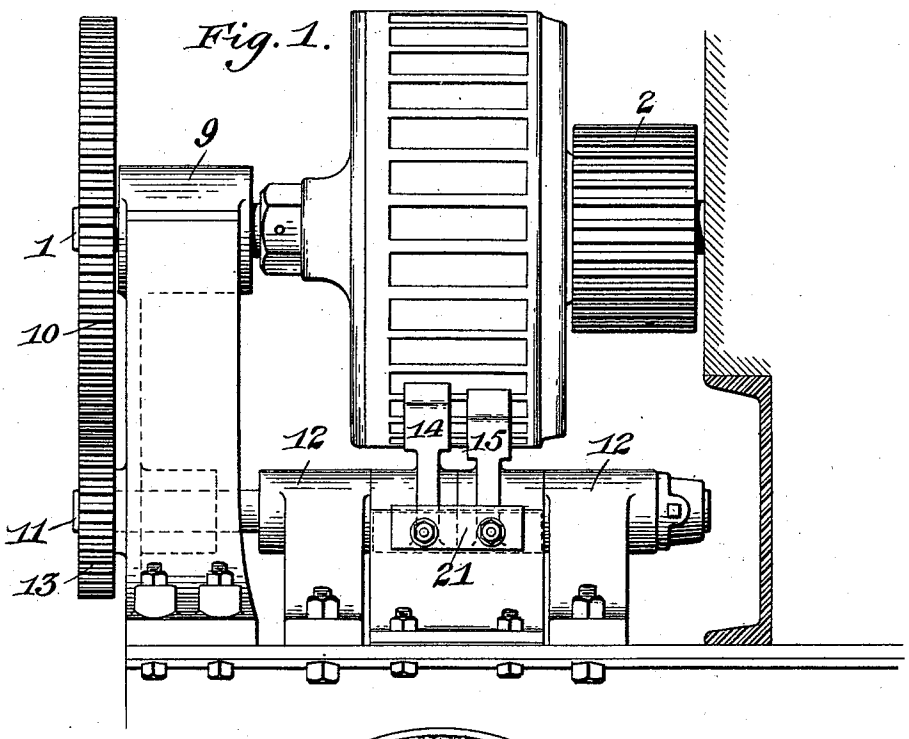
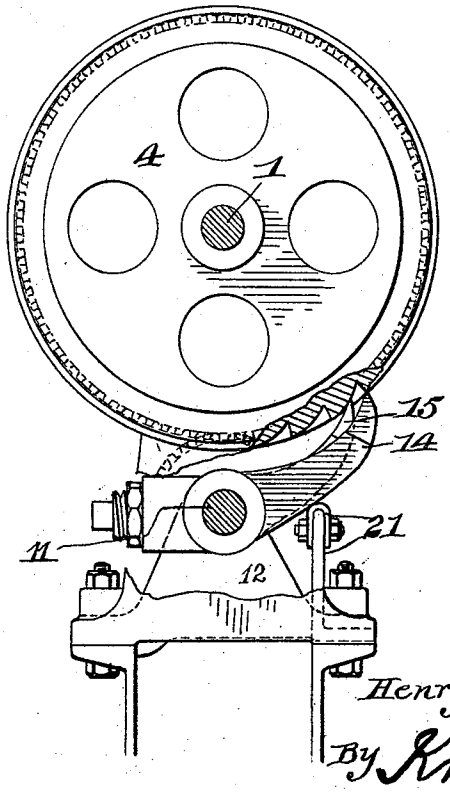


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

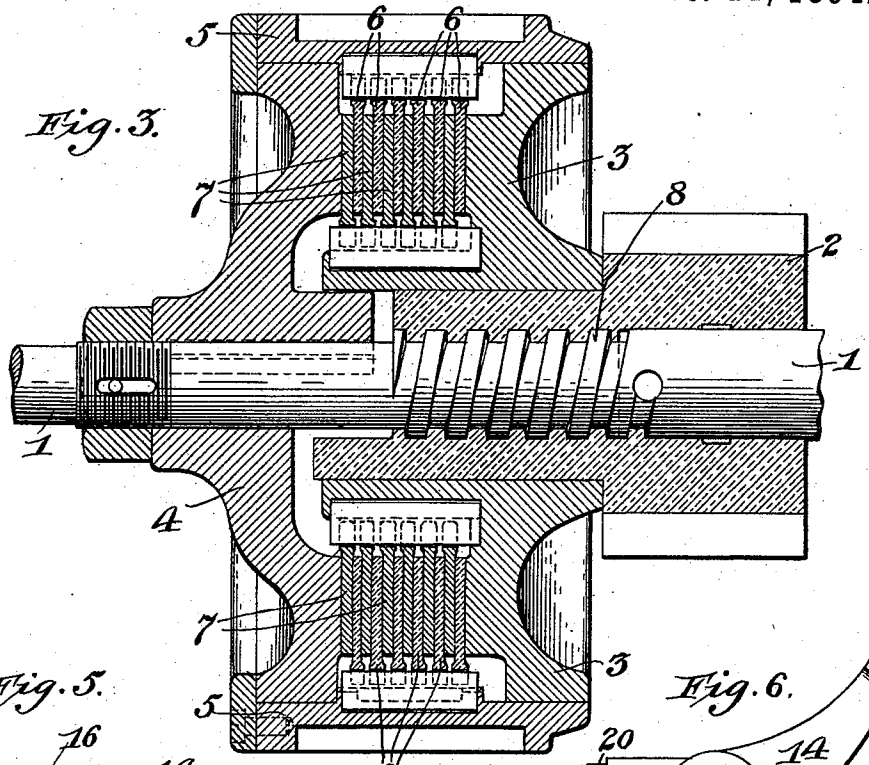


Fig. 5.

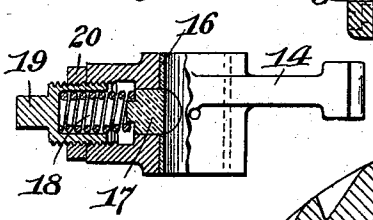


Fig. 6.

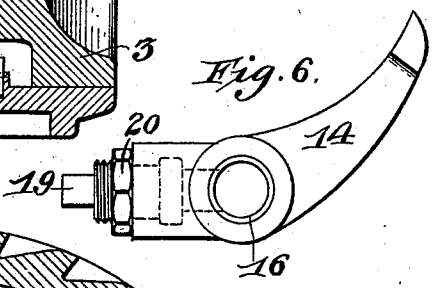
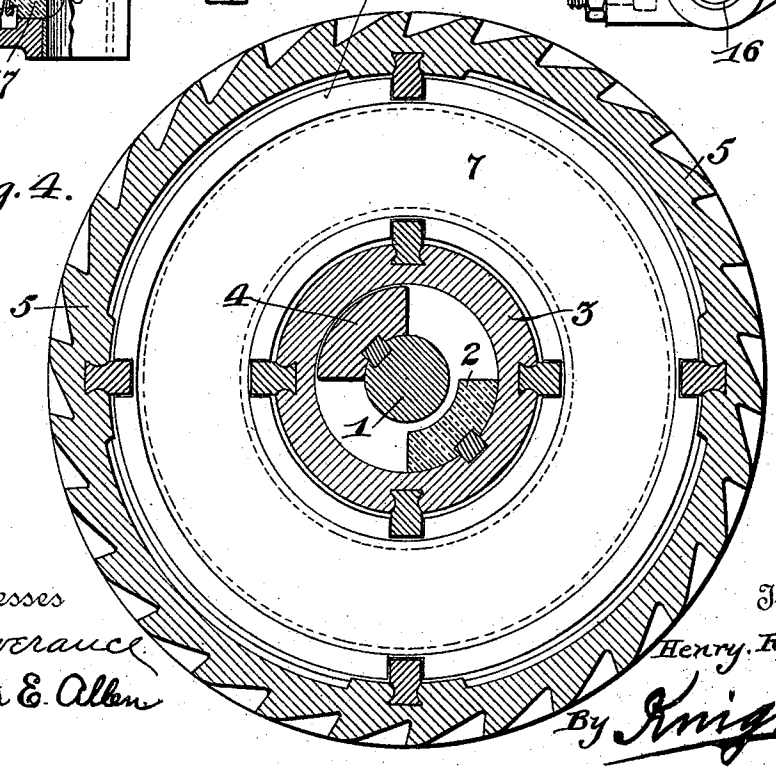


Fig. 4.



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UNITED STATES PATENT OFFICE.

HENRY R. TOWNE, OF STAMFORD, CONNECTICUT, ASSIGNOR TO THE YALE & TOWNE MANUFACTURING COMPANY, OF SAME PLACE.

PAWL-AND-RATCHET MECHANISM.

SPECIFICATION forming part of Letters Patent No. 530,734, dated December 11, 1894.

Application filed February 12, 1894. Serial No. 499,962. (No model.)

To all whom it may concern:

Be it known that I, HENRY R. TOWNE, a citizen of the United States, residing at Stamford, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Pawl-and-Ratchet Mechanism, of which the following specification, taken in connection with the accompanying drawings, is a full, clear, and exact description.

The object of my invention is to produce a pawl and ratchet mechanism in which the pawls will certainly engage with the ratchet at the proper time, but which will be disengaged from the ratchet when it is desired to have the ratchet run freely. The beneficial results of such a structure are the insurance of engagement between the pawl and ratchet when the movement is reversed, and the avoidance of the clicking noise of the pawl upon the ratchet, which is very annoying, especially in connection with fast running machinery. To accomplish this object, I mount the pawl or pawls upon a shaft which is revolved through suitable gearing or other connections with the ratchet wheel shaft, the gearing being such that the pawl-supporting shaft and ratchet-wheel shaft will always revolve in opposite directions. The pawls are not keyed to their supporting shaft so as to revolve positively with them, but have frictional contact therewith in order that they will tend to move with the shaft unless their movement is prevented, in which case the shaft will revolve in the journals of the pawls. The pawls are mounted so as to be approximately balanced, although if preferred, they may be supported so as to have a slight tendency to engage with the ratchet through the action of gravity. Any tendency of the machinery to run down, whether under the operation of the load, or through the retrograde movement of the shaft, will cause the pawl-supporting shaft to revolve in the direction toward the ratchet wheel, and the frictional contact between the shaft and the pawls will move the latter into engagement with the ratchet, and thereby arrest the retrograde movement. On the other hand, any movement of the machinery in the direction of hoisting will cause the pawl-supporting shaft to move in the opposite direction away from the ratchet wheel, which will raise the pawls out of engagement with the ratchet wheel and allow the ratchet wheel to move forwardly freely and without the objectionable clicking sound.

In order that my invention may be fully understood I will first describe the same with reference to the accompanying drawings, and afterward point out the novel features in the annexed claims.

In the accompanying drawings, I have shown my invention applied to a modification of a well-known form of Weston disk clutch, though it will be obvious that the form of clutch does not enter into the invention.

Figure 1 is a side elevation of my improved pawl and ratchet mechanism. Fig. 2 is an end view of the same, parts being broken away. Fig. 3 is a longitudinal sectional view of the ratchet wheel and clutch. Fig. 4 is a transverse sectional view of the same. Figs. 5 and 6 are detail views of one of the improved pawls.

1 is the motor or drive shaft having mounted upon it the pinion 2, to which the driving hub 3 is fastened.

4 is an abutment or collar keyed or otherwise fastened to the shaft 1.

5 is the ratchet rim which loosely surrounds the abutment collar 4 and driving hub 3, and carries one set of disks 6. The other set of disks 7 is carried by the hub 3. The shaft 1 is formed with a strong screw-thread 8 which engages with a corresponding internal screw-thread on the pinion 2, so that when the motor shaft is rotated in the direction of hoisting, the motion of the screw forces the pinion 2 and the hub 3 toward the abutment collar 4, which causes a pinch between the disks 6 and 7, which in turn causes the entire clutch and ratchet wheel to revolve together. This part of the construction is well-known.

The outer end of the shaft 1, which is journaled in the bearing 9, has keyed to it a gear wheel 10. Extending parallel to the shaft 1 below the combination clutch and ratchet wheel, is a pawl-supporting shaft 11. The shaft 11 is journaled in suitable bearings 12, and has keyed to its outer end a small gear wheel 13.

14 and 15 are the pawls which are mounted upon the shaft 11 between the bearings 12. Each of the pawls is provided with a friction bushing 16 for the supporting shaft to journal in, and to prevent sticking between the pawl and the shaft. To insure sufficient frictional engagement between the pawls and support-

ing shaft, each pawl is provided with a shoe 17 fitting in a transverse opening and held against the supporting shaft 11 with a yielding pressure by means of a spiral spring 18 which is confined by the screw plug 19.

20 is the clamping nut for holding the screw plug in the proper adjusted position. The pressure of the shoe on the shaft, and consequently the friction between the pawl and the shaft can be adjusted to a nicety by this this means, but it is not absolutely essential that the spring shoe should be employed.

The movement of the pawl-supporting shaft 11 in the direction away from the ratchet wheel moves the pawls out of engagement with the ratchet wheel, but in order that the pawls should not move too far away from the ratchet wheel, a supporting bracket 21 is provided, which is adapted to engage the rear edge of the pawls and hold them against their tendency to rotate with the shaft beyond this point.

When the ratchet wheel and clutch move forward in the manner already explained in the action of hoisting, the motion of the shaft 1 will be communicated through the gear wheels 10 and 13 to the shaft 11, which will cause the pawls 14 and 15 to be moved out of engagement with the ratchet wheel, and thus allow the ratchet-wheel to revolve freely and without any noise or chattering of the pawls. When the motor shaft is reversed and revolved in the direction of lowering, the pinion 2 and driving hub 3 are pulled away from the abutment collar, and at the same time the pawl-supporting shaft 11 is rotated in the opposite direction toward the ratchet wheel, which throws the pawls into engagement with the ratchet wheel and prevents its rotation. As soon as the pinion and driving hub are moved away from the abutment collar by the action of the screw on the motor shaft 1, the disks are freed and thereupon the load acting on the pinion 2 tends to screw up the pinion and driving hub against the abutment collar; but this tendency is continually counter-acted by the continued motion of the motor shaft in the direction of lowering, the result being a continued lowering of the load under control so long as the motor shaft is revolved in the direction for lowering, and the immediate coming to rest when such revolution is stopped.

Although my improvements have been described in connection with the particular form of clutch, it is quite obvious that their application is not confined to this or any other form of clutch or to any style of machine, but that my improvements may be applied to any position in which a pawl and ratchet are used.

Having thus fully described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. The combination of a ratchet-wheel, supported upon a suitable shaft, a pawl also supported upon a suitable shaft in proper relation to the ratchet-wheel and having frictional engagement with its shaft, and means for communicating motion from the ratchet-wheel shaft to the pawl-supporting shaft, whereby the pawl will be held out of engagement with the ratchet-wheel when the ratchet-wheel is rotating forwardly and in engagement therewith when it tends to rotate backwardly, substantially as and for the purposes set forth.

2. The combination of a ratchet-wheel mounted upon a suitable shaft, a pawl supported upon a suitable shaft in proper relation to the ratchet-wheel and having frictional engagement with its supporting shaft, and gearing between the ratchet-wheel-supporting-shaft and the pawl-supporting-shaft for rotating the latter in opposite direction to the former, whereby the pawl will be held out of engagement with the ratchet-wheel when it is rotated forwardly and in engagement with the ratchet-wheel when it tends to rotate backwardly, and the clicking of the pawl is thereby obviated, substantially as set forth.

3. The combination of a ratchet-wheel, a pawl supported upon a suitable shaft in proper relation to the ratchet-wheel, and means for rotating the pawl-supporting shaft in an opposite direction to the ratchet-wheel, said pawl being provided with a spring-pressed friction shoe for affording suitable frictional contact between the pawl and its supporting shaft, substantially as and for the purpose set forth.

4. The combination of a ratchet-wheel, a pawl-supporting shaft, means for rotating said shaft in a direction opposite to that of the ratchet-wheel, and a pawl mounted upon said shaft and provided with a spring-pressed friction shoe, and means for adjusting the pressure of said shoe upon the shaft, substantially as set forth.

5. The combination of a ratchet-wheel, a pawl-supporting shaft geared thereto so as to rotate when the ratchet-wheel rotates and in a direction opposite thereto, and a pawl mounted upon said shaft and adapted to gear with said ratchet-wheel; said pawl having a cut-out portion, a friction shoe mounted in said cut-out portion, a spiral spring engaging said shoe and an adjustable screw plug confining said spring, substantially as and for the purpose set forth.

6, The combination of a power shaft, the two part clutch mechanism mounted upon said power shaft, the ratchet-wheel, the load pinion, the pawl-supporting shaft, gearing between the power shaft and the pawl-supporting shaft, and a pawl mounted upon said shaft and having frictional engagement therewith and adapted to engage the ratchet-wheel, substantially as and for the purpose set forth.

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