(No Model.)

H. R. TOWNE & T. W. CAPEN.

Double Lift Hoist.

No. 239,408. **Patented March 29, 1881.**

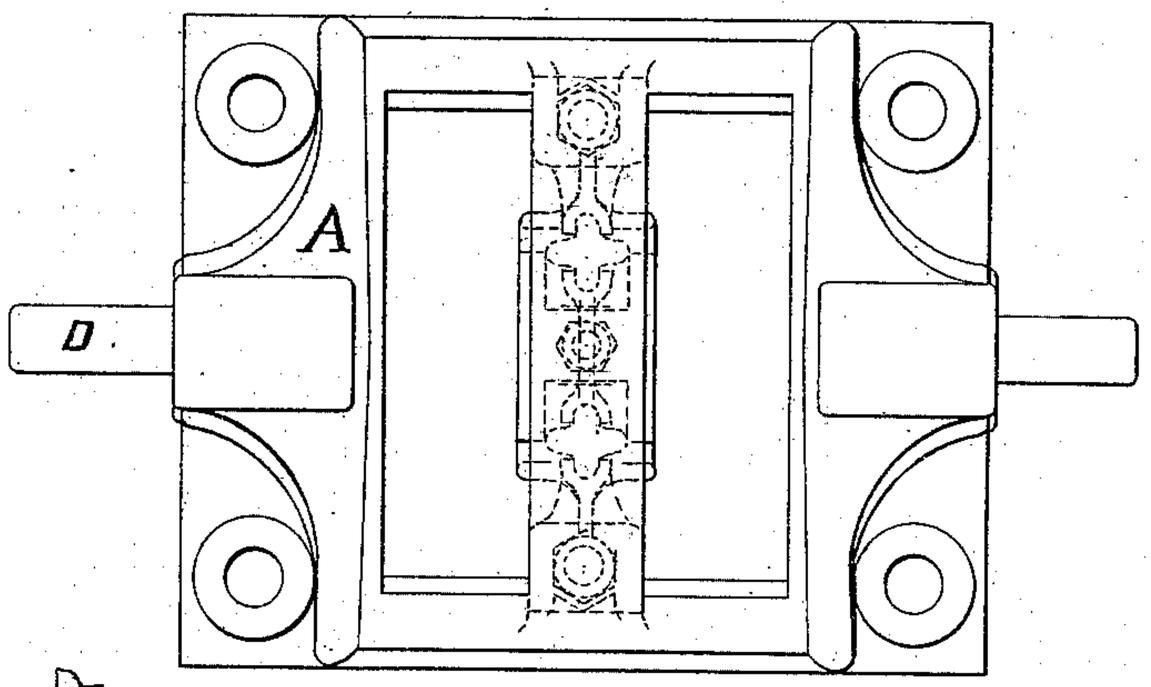

Fig 1.

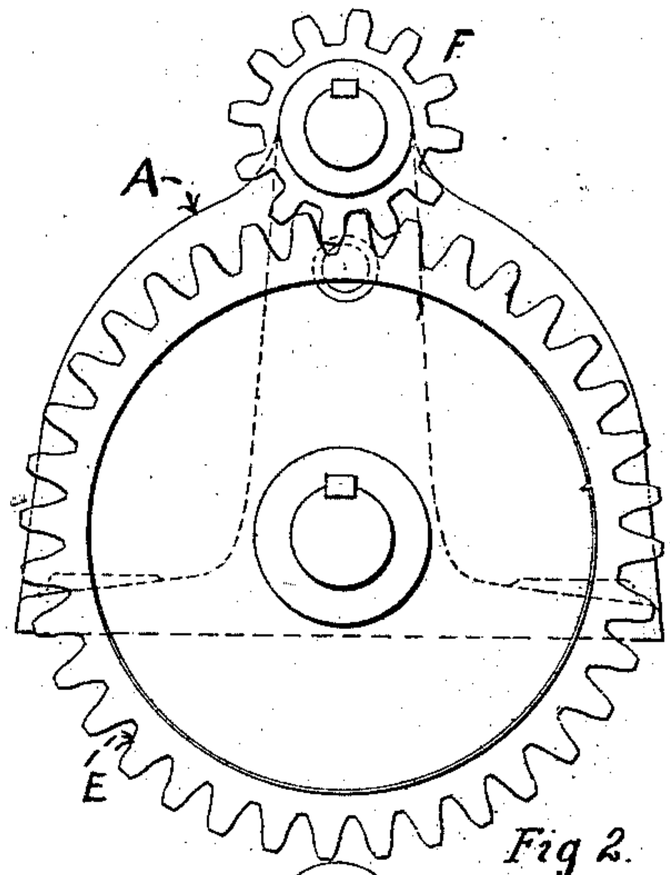

Fig 2.

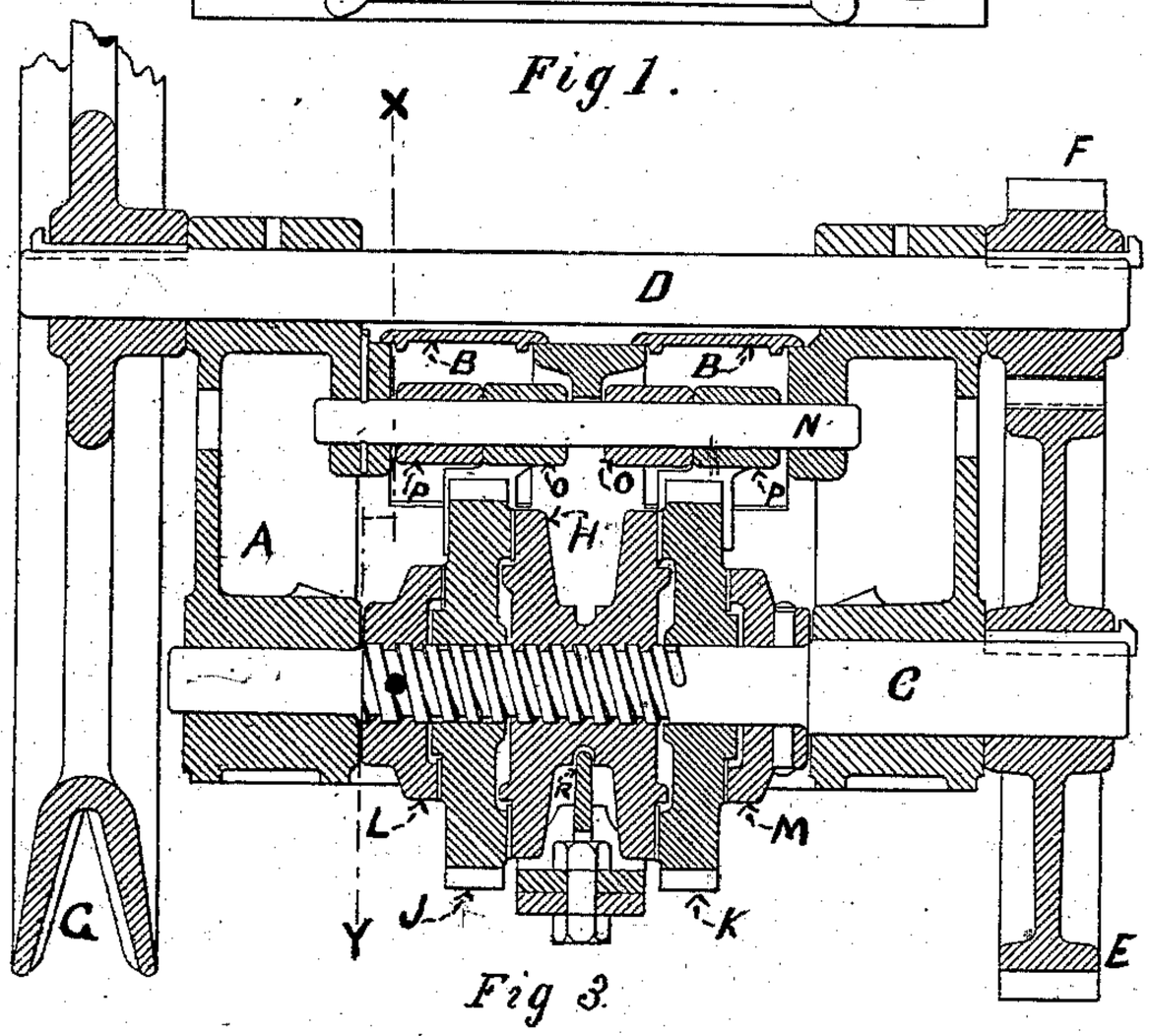

Fig 3.

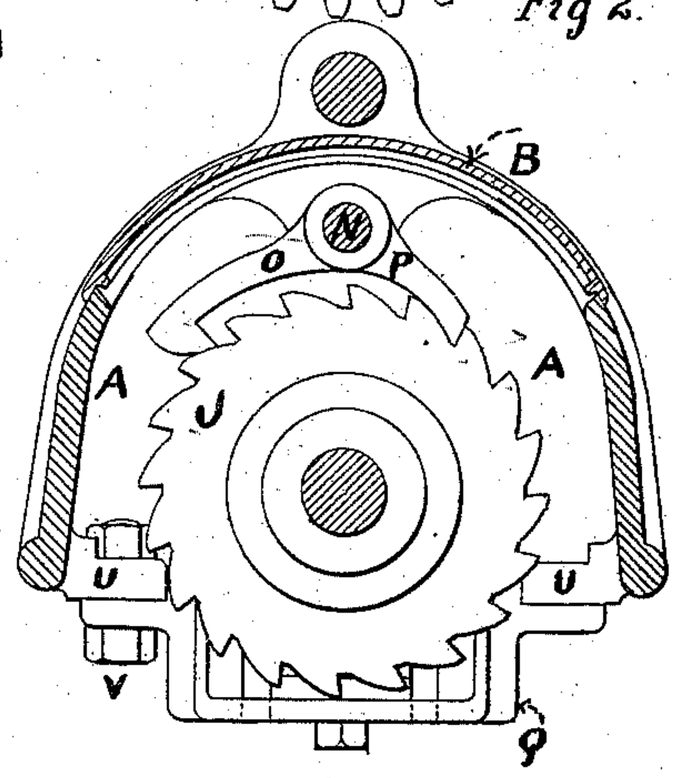

Fig 4.

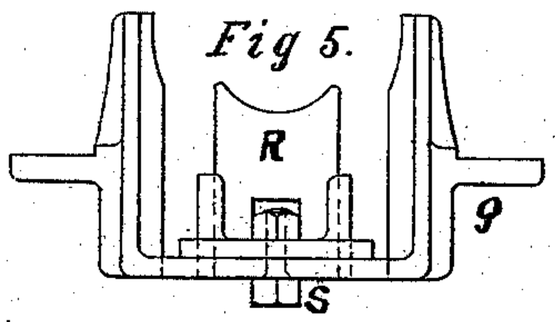

Fig 5.

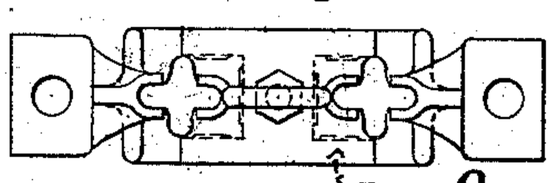

Fig 6.

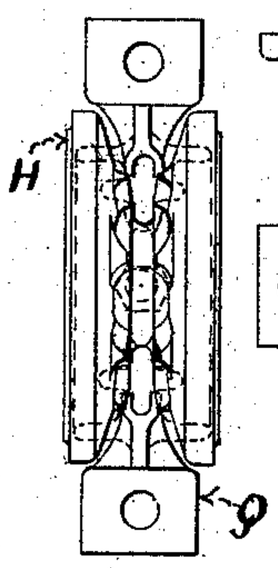

Fig 7

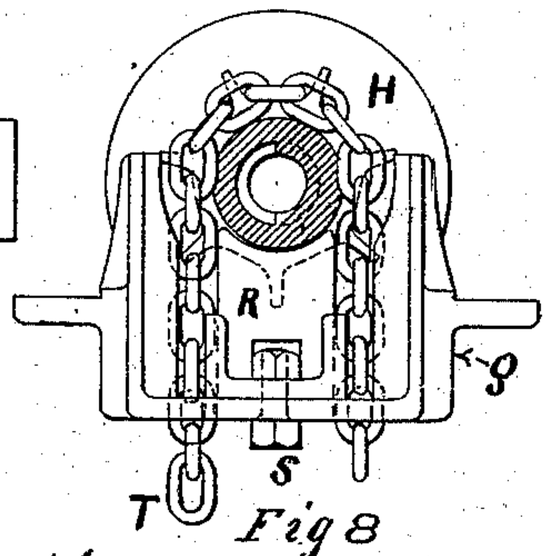

Fig 8

WITNESSES

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UNITED STATES PATENT OFFICE.

HENRY R. TOWNE AND THOMAS W. CAPEN, OF STAMFORD, CONNECTICUT, ASSIGNORS TO THE YALE LOCK MANUFACTURING COMPANY, OF SAME PLACE.

DOUBLE-LIFT HOIST.

SPECIFICATION forming part of Letters Patent No. 239,408, dated March 29, 1881.

Application filed January 20, 1881. (No model.)

To all whom it may concern:

Be it known that we, HENRY R. TOWNE and THOMAS W. CAPEN, of Stamford, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Hoists, of which the following is a specification, reference being had to the accompanying drawings.

Our invention consists in certain improvements in what are known as "double-lift hoists," made under the patents of Thomas A. Weston.

The objects of our invention are the better guiding of the chain into engagement with the pocketed chain-wheel, the stripping of the chain from the same wheel on the opposite side, and the arrangement of the ratchet-wheels and disks so as to insure proper frictional contact and the retention of the disks in their proper axial positions.

Referring to the drawings, Figure 1 is a top view of the hoist; Fig. 2, an end elevation of the same; Fig. 3, a longitudinal cross-section on the line X Y; Fig. 4, a transverse section; Fig. 5, an elevation of the chain-guide and stripper removed from the machine; Fig. 6, a top view of the same; Fig. 7, a top view or plan of the chain-guide, stripper, and chain-wheel in their relative positions; and Fig. 8, an end elevation of the same with the chain shown in position.

A is the main frame or housing of the machine, which we prefer to cast in one piece.

B B are two caps covering apertures in the top of the frame or housing.

C is the main shaft or axle, and D the counter-shaft. On one end of shaft C is the spur-wheel E, gearing into the pinion F on the end of the shaft D. On the other end of the shaft D is the rope-wheel G, by which power is communicated to the machine in the usual manner. If desired, a crank or pulley may be substituted for the rope-wheel G.

H is the pocketed chain wheel or sheave, around which passes the chain T, as shown in Fig. 8. This sheave has pockets formed in it, with which the links of the chain engage, so that the chain cannot slip within the wheel.

J and K are two ratchet-wheels with teeth inclined in opposite directions.

L and M are collars pinned fast to the shaft C.

N is a small fixed shaft carrying the four pawls O O P P, which engage with the ratchets J and K, as shown in Fig. 4.

Q is the chain-guide, bolted to the under side of the housing by the bolts V passing through the lugs U. Attached to the chain-guide by the bolt S is the chain-stripper R, the upper end of which is curved to fit against the inner circumference or groove of the sheave H, as shown in Figs. 3, 5, and 8, so that its two points serve to strip the chain from the sheave and prevent its clinging to the latter. The adjacent faces of the chain-guide Q and stripper R are formed so as to leave two cruciform openings at the bottom, as shown in Fig. 6, through one or the other of which openings the chain must always pass in order to engage with the sheave H. The chain-guide and stripper, instead of being formed of two parts, Q and R, and bolted together, may, of couse, be formed of these two parts cast in one piece.

The shaft C has cut upon it a coarse screw-thread, as shown in Fig. 3. The sheave H has formed within it a corresponding screw-thread, so that motion either of the shaft C or of the wheel H independently of one another tends to cause the wheel H to move longitudinally upon the shaft, as a nut moves upon its screw. The ratchet-wheels J and K are free to turn upon the shaft C, or the latter to turn within them, and they are also free to slide endwise upon the shaft. The collar M, as shown in Fig. 3, bears against a shoulder and is pinned fast to the shaft C. The collar L is screwed onto the shaft C, and afterward pinned in the same manner as the collar M, so that it cannot unscrew. Each of the ratchets has two pawls, in order to diminish the amount of back motion or play, and the teeth of the ratchet-wheel K turn in an opposite direction to those of the wheel J.

The action of the machine is as follows: If we suppose a load to be suspended upon the left-hand part of the chain T, (see Fig. 8,) the

weight of the load will tend to rotate the chain-wheel to the left, or away from the eye, as the parts are seen in Fig. 3. The shaft C remaining stationary, the effect of this rotation of the wheel H is to screw it on the shaft to the left, and thus, by frictional contact, into engagement with the ratchet-wheel J. The rotation of this wheel, as shown in Fig. 4, is checked by the pawls O and P, so that it cannot rotate to the left, and the sheave H and ratchet J being securely locked together, the load cannot descend. The heavier the load the greater is the rotative pressure on the sheave H, and the greater its consequent engagement by the action of the screw on the shaft C with the ratchet J. Practically these two parts thus become one, and the pawls, engaging with ratchet J, sustain the load. In like manner the same endwise pressure caused by the load presses the ratchet-wheel J to the left until it bears against the fixed collar L, which latter is prevented from moving endwise by being screwed onto the shaft C and pinned thereto, as above described. It will thus be seen that the pull of the load, acting upon the sheave H, causes the latter to be screwed up on the shaft C, thus pressing the ratchet-wheel J against the collar L and locking these three parts into engagement with one another. If, now, the rope-wheel G be turned so as to rotate the shaft C to the right, or backward—that is, in the direction to raise the load—the collar L, being pinned fast to the shaft C, rotates with it, and, being also locked by frictional contact into rigid engagement with the ratchet-wheel J, carries the latter with it, and this, in turn, rotates in the same direction the sheave H, which carries the chain, and thus raises the load. During this action the pawls O and P slip over the teeth of the ratchet J. If the motion of hoisting be stopped, these pawls, engaging with the ratchet, hold the load suspended and prevent its descent. During this action the opposite ratchet-wheel, K, has been idle, since, the sheave H being screwed hard to the left, the ratchet K and collar M are only loosely in contact with one another, and thus the former is at liberty to remain stationary while the shaft C revolves within it. In order to lower the load it is necessary to reverse the motion of the rope-wheel G, the effect of which is to cause the shaft C to rotate to the left, or from the eye, as seen in Fig. 3. As the shaft C is prevented from moving endwise by the collars L and M fitting between the sides of the housing A, it follows that rotation of shaft C to the left will tend to unscrew the sheave H from its engagement with the ratchet J and push it endwise toward the right. As soon as this endwise motion of the sheave H becomes sufficient to neutralize the frictional contact between it and the ratchet-wheel J the sheave is free to yield to the pull of the load upon the chain T, the effect of which is to again screw up the sheave H into engagement with the ratchet J. If the backward motion of the shaft C is continuous, it is found in practice that the load will descend with a perfectly uniform and easy action, although we know that its descent consists of an infinite number of infinitely small engagements and disengagements between the sheave H and the ratchet-wheel J, the motion of the shaft C first unscrewing these two parts from engagement with one another, and the pull of the load, as soon as they are disengaged, acting to immediately screw them together again. This action, however, is imperceptible to the eye, and apparently the load descends smoothly and continuously. As soon as the backward motion of the rope-wheel G is discontinued the automatic action of the load locks the sheave H, ratchet-wheel J, and collar L again into engagement, and everything comes to rest. The machine thus constitutes a safety-hoist in which the load is at all times suspended and cannot run down. In order to lower it, it is necessary to reverse the motion of the parts by means of the handle or its equivalent.

The "double" feature of the machine consists in the duplication of the loose ratchet-wheel and fixed collar on the other end of the shaft. so that if the load be hung to the opposite side of the chain, (the right-hand side,) as shown in Fig. 8, its tendency will be to cause the engagement of the sheave H with the ratchet-wheel K and fixed collar M. In this event hoisting, lowering, and the automatic suspension of the load all occur precisely as before, but in the reverse direction, and by means of the parts H, K, and M, instead of the parts H, J, and L. For a single-acting machine only one set of these parts is required. Duplicating them, however, makes the machine double-acting and adds greatly to its utility.

Experience has shown that there is a tendency in machines of this kind for the chain to become twisted in passing onto the chain-wheel or sheave, and also for it to cling to the latter at the point where it should properly become disengaged from it. To overcome these difficulties we provide a chain-guide, Q, and the stripper R, bolted together, as shown in Fig. 5, and attached to the under side of the housing, as shown in Fig. 4. The construction of these parts is such as to leave two cruciform openings, as shown in Fig. 6, through one or the other of which the chain must pass in going onto the sheave, according to the direction in which the machine is being used. An opening of this form makes it impossible for a twist to occur in the chain, as it compels every link to follow in the path of its predecessor. It also permits the chain to be drawn off at an angle in any direction, and yet insures its passing in a proper line and direction onto the sheave H after it has entered the chain-guide Q. The points of the chain-stripper R enter within the deep central groove of the chain-sheave, and thus, in the event of the chain clinging to the sheave, pass with a wedge-like action between the sheave and the chain and strip them apart.

Experience has shown that the durability of

the machine is enhanced by the use of thin disks of metal interposed between the frictional surfaces of the collars and ratchet-wheels and of the ratchet-wheels and sheave. At first these disks were made of the proper exterior diameter to fit the desired surfaces, and with an interior diameter or bore corresponding to the diameter of the shaft. Difficulty in their use was experienced, however, owing to the thin disk engaging with the screw-threads of the shaft, and thus getting out of place. In order to remedy this difficulty, we make use of annular disks having large central openings, and in order to locate and retain them in their proper positions we provide a projecting hub and overhanging lip or ring upon the two adjacent parts—as, for instance, between the collar L and ratchet-wheel J, and again between the ratchet-wheel J and the sheave H. The internal diameter of our annular disks is such as to just fit over the projecting hub referred to. In this way the disks are guided axially, and are at all times supported so that they cannot get out of place. One disk is required between the sheave and ratchet and another between the ratchet and collar, and we proportion these two disks so that the smaller one may be punched out of the larger one, thus economizing material.

A further feature of our invention consists in the combination, with the shaft C and its devices, of the parallel shaft D, the two being connected by suitable gear-wheels. In this way we are enabled to greatly increase the efficiency and capacity of a machine of this class with an almost imperceptible increase in its dimensions. Our arrangement of the parts admits of this employment of two shafts and gearing within the least possible space, and secures the greatest possible compactness of parts.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In combination with the screw-threaded shaft C, carrying the screw-threaded hoisting or chain wheel H and spur-wheel E, the shaft D, having the driving-pinion F, the combination being substantially as and for the purpose set forth.

2. In combination with the chain-wheel H, the chain-guide and stripper, composed of parts Q and R, united by the bolt or rivet S, or cast in one piece, substantially as and for the purpose set forth.

3. The improved combined chain-guide and stripper, consisting of the separate parts Q and R, united by the bolt or rivet S, substantially as and for the purpose set forth.

4. The combination of the chain-wheel H with one or more ratchet-wheels, J and K, the adjacent faces of said wheels being provided on one side with a projecting hub or center and on the other side with a projecting rim, substantially as and for the purpose set forth.

5. The combination of the ratchet-wheel K with the collar M, the adjacent surfaces being provided on the one side with the projecting hub or center and on the other with an overhanging annular face, substantially as and for the purpose set forth.

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THOS. W. CAPEN.

Witnesses:
E. D. OGDEN, Jr.,
SCHUYLER MERRITT.