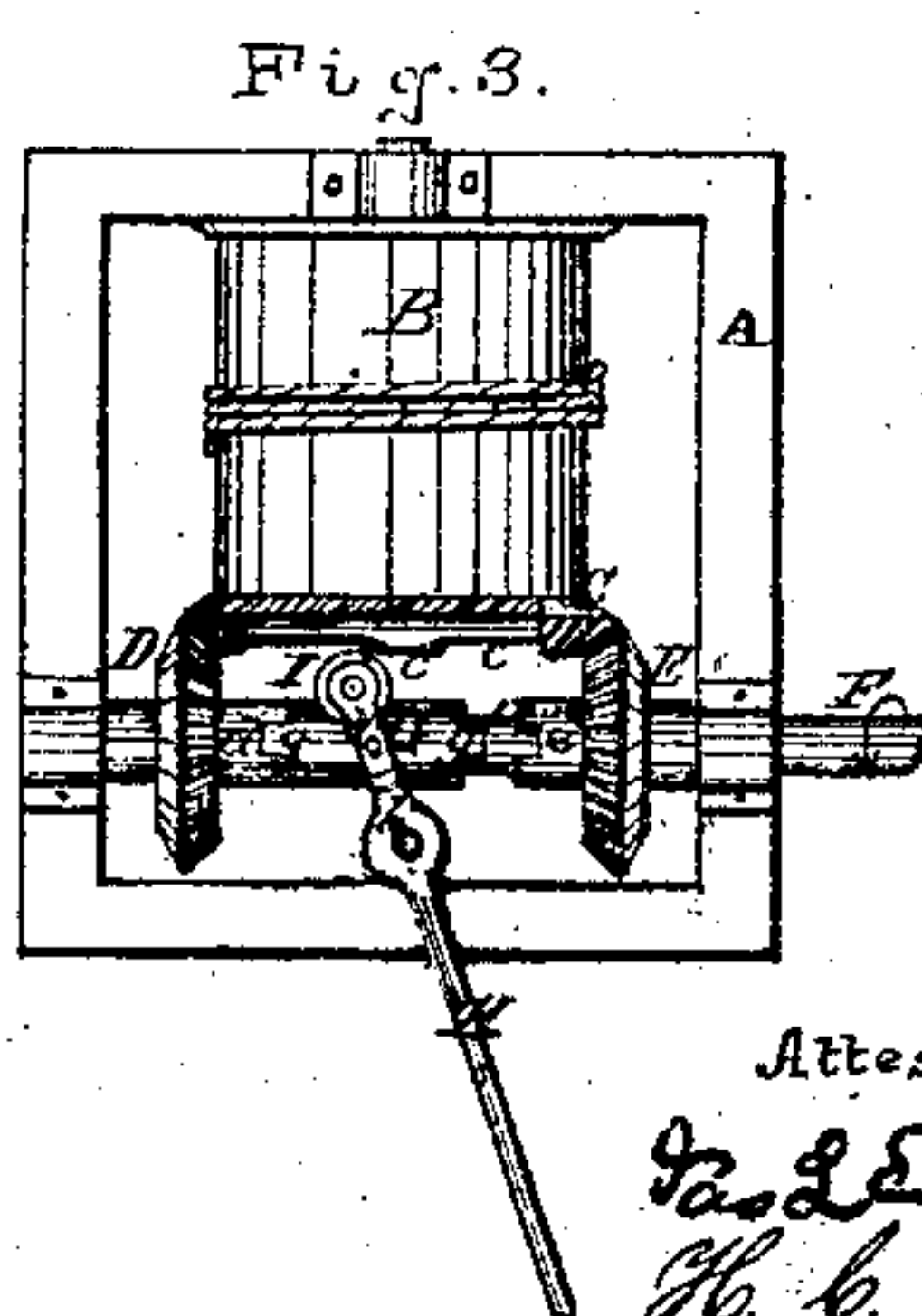
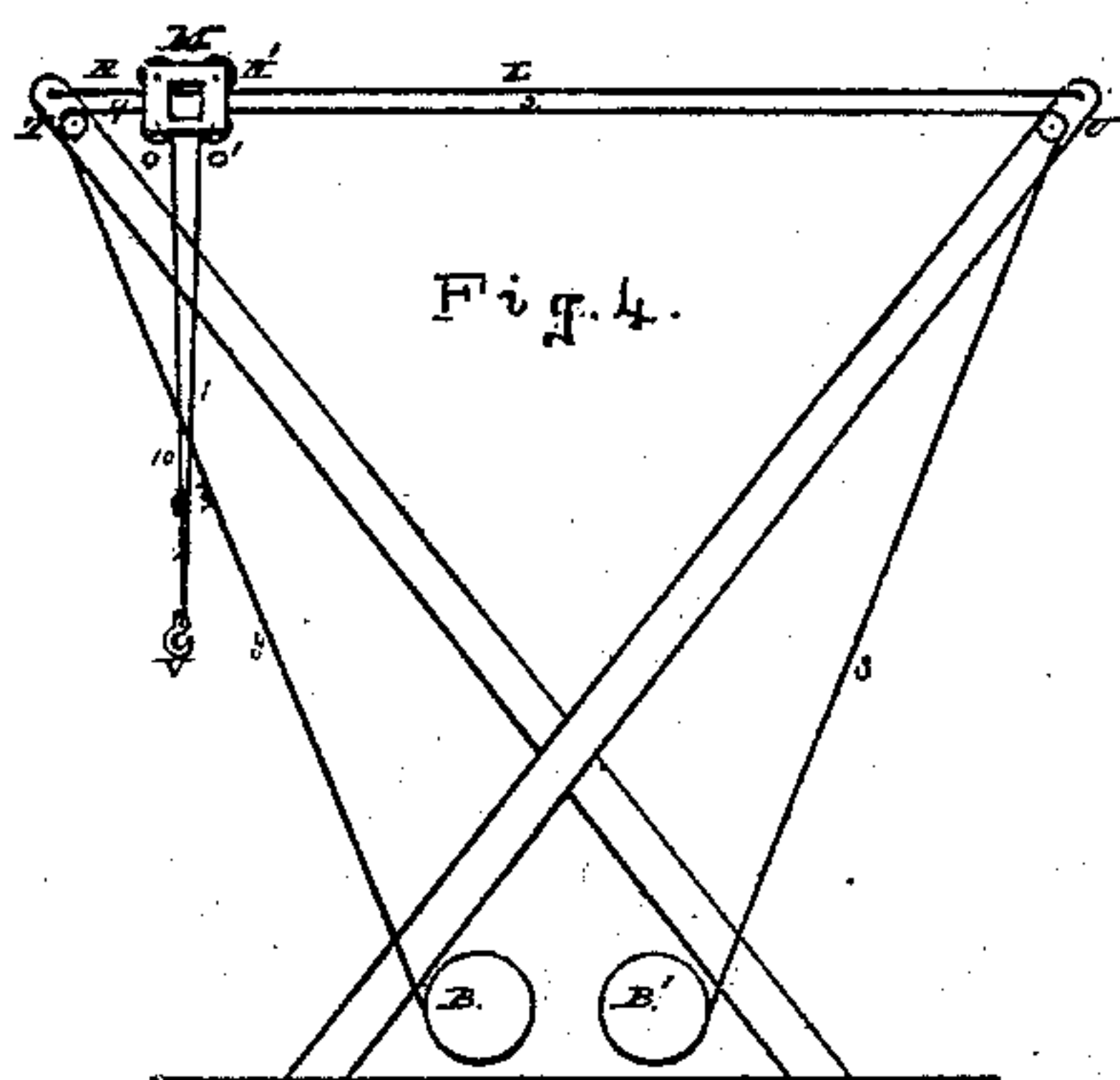
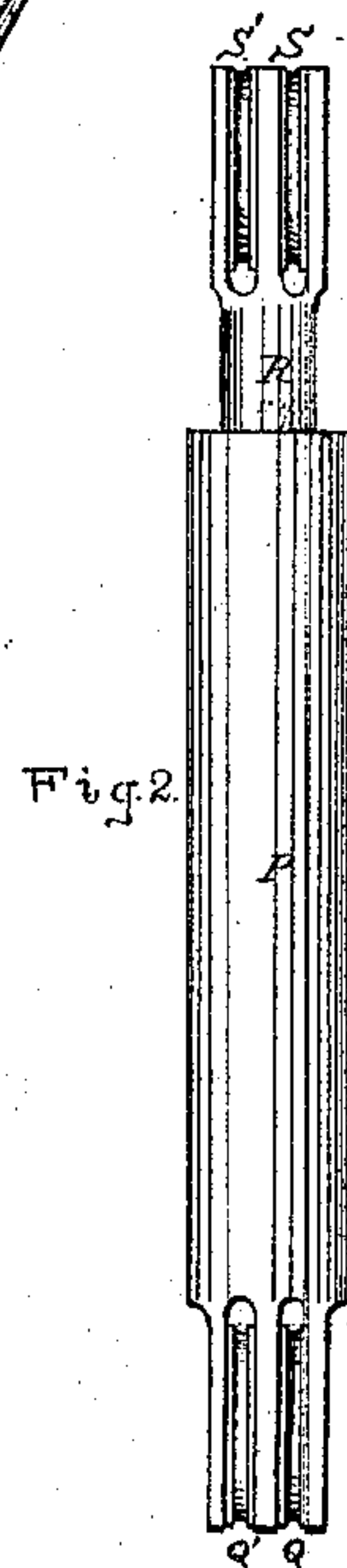
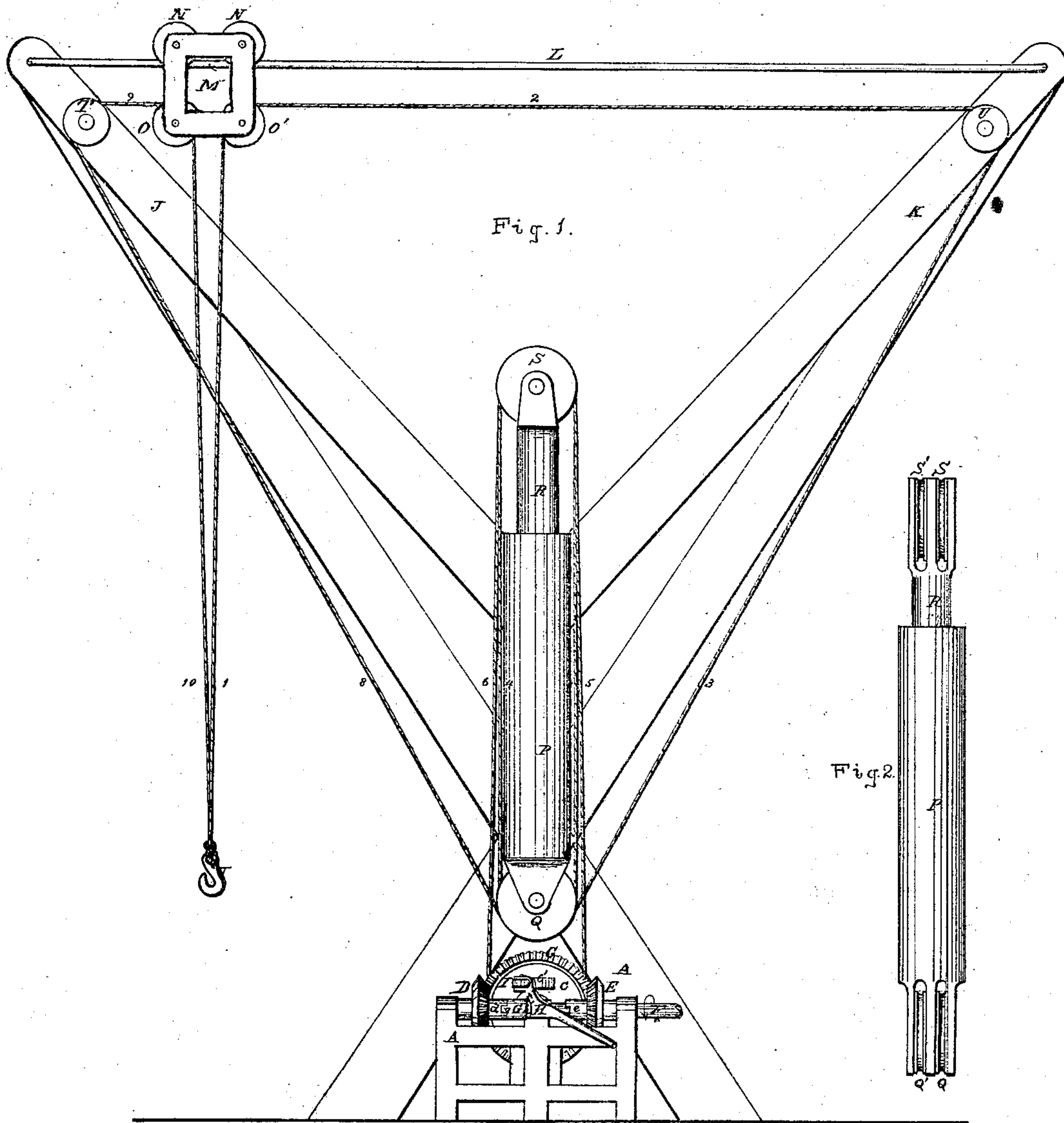


Flad & Eads,

Derrick.

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Letters Patent No. 111,188, dated January 24, 1871.

IMPROVEMENT IN HOISTING APPARATUS.

The Schedule referred to in these Letters Patent and making part of the same.

We, HENRY FLAD and JAMES B. EADS, both of St. Louis, in the county of St. Louis and State of Missouri, have invented a certain improved Hoisting Apparatus, of which the following is a specification.

Nature and Object of the Invention.

The first part of our invention consists in an arrangement by which a single rope or chain is combined with a pulley-carriage, upon an elevated horizontal track and a hydraulic ram, or equivalent mechanism, to enable the raising of a stone or other load in any position of the carriage upon its track.

The second part of our invention consists in combining with the aforesaid devices a drum, around which a portion of the rope or chain is coiled, (to give it a frictional hold thereon,) so that, on the said drum being caused to rotate in either direction, the rope is taken up on one side and unwound upon the other, and causes the horizontal movement of the pulley-carriage, as hereafter explained.

Description of the Drawing.

Figure 1 is a front view of an apparatus illustrating our invention.

Figure 2 is a side view of the ram.

Figure 3 is a top view of the drum, reversing-clutch, and brake, a portion at the upper part of the miter-wheel being broken away to exhibit the brake.

Figure 4 is a diagram, showing a modification of our apparatus.

General Description.

A is the main frame.

B is a drum, around which a portion of the hoisting-rope is coiled.

C is a miter-wheel, fixed to one end of the drum.

D and E are two pinions engaging with the miter-wheel C, and turning loosely on a shaft, F, which may receive continuous rotation from any suitable motor.

The tubular hubs of the pinions D and E have notches, *d* and *e*, to receive the teeth *g g'* of a sliding-clutch collar G, which has longitudinal motion on the shaft F, but is caused to turn therewith by a feather-key or other means.

The collar G has a circumferential groove, *h'*, which receives a stud, *h''*, upon the lever H, by which the said clutch-collar is caused to slide on the shaft, to engage the tooth *g* in the notch *d*, or the tooth *g'* in the notch *e*, according as it is required to rotate the drum in one or the other direction, by means of the pinions D or E and miter-wheel C.

At the end of the lever H is journaled a horizontal roller, I, which, when the clutch is disengaged from both pinions, presses against the most salient part of a doubly-inclined projection, *c'*, of an annular

brake-plate, *c*, and presses the brake-plate against the side or web of the miter-wheel C, to prevent the rotation of the drum.

J and K are upwardly and outwardly-extending arms of the frame, whose upper ends are connected by the horizontal track L of the pulley-carriage M.

The pulley-carriage has journaled in its upper part two pulleys, N N', which are grooved at their peripheries to embrace the track L, upon which they run, giving support to the carriage.

In the lower part of the carriage are journaled two grooved pulleys, O O', over which pass the ends of the hoisting-rope.

P is the cylinder of a hydraulic ram, firmly attached to the frame A, and having journaled at its lower end two or more pulleys, Q Q'.

R is the plunger of the ram, having at its head two or more pulleys, S S', similar to the pulleys Q Q'.

Journaled to the arms J K, at the same elevation as the pulleys O O', are the pulleys T U.

V is the hook to which the ends of the hoisting-rope are attached, and to which the load is hung.

The rope or chain is applied to the apparatus as follows:

Beginning at the hook V, the end 1 extends to and over the pulley O', then over the pulley U, then under the pulley Q, then over the pulley S, then under and around the drum B, on which it is coiled sufficiently to give a frictional hold. From the drum the rope passes up to and around the pulley S', then under the pulley Q', then over the pulley T, then over the pulley O, and to the hook V, to which both ends are attached. The stretches of the rope from pulley to pulley are marked numerically, to show the course of the rope more clearly. The rope pulleys are all grooved circumferentially, for the retention of the rope.

The number of pulleys in the sets Q Q' and S S' may be increased to any desired extent, so as to take up a greater length of rope for an equal movement of the plunger, and to increase the play of the hoisting-hook.

Operation.

In operating our apparatus, the load is secured to the hook V, and the hydraulic ram put in operation, so as to drive the plunger upward and increase the distance between the sets of pulleys Q Q' at the foot of the cylinder, and the set S S' at the head of the plunger, thus increasing the length of the stretches 4 5 6 7 of the rope, and shortening the stretches 1 and 10 between the pulleys O O' and the hook V, and drawing up the load toward the carriage M. When the load is sufficiently elevated, or even during the elevating of the load, the lever H may be moved to

the right or left, which releases the brake *c* and allows the drum *B* to turn. One of the pinions *D E* is simultaneously clutched to the shaft *F*, and communicates motion from the shaft to the drum (the shaft *F* being supposed to be in continuous rotation). The drum by its rotation draws up a portion of the rope upon one side and releases a like quantity on the other side, and gives horizontal motion to the carriage *M*. Thus supposing the tooth *g* to engage in the notch *d*, (as shown in the drawing, and the shaft *F* having rotation in direction shown by the arrow,) the pinion *D* will turn with the shaft *F*, and cause the drum *B* to draw down the rope on the stretch marked 5. This would cause the carriage to move to the right. When the proper point is reached, the lever is brought at right angles with the shaft *F*, and the clutch is released, the brake being at the same time applied, by the pressure of the roller *I*, against the inclined projection *c'* of the brake-plate *c*. The load is caused to descend by allowing the water to escape from the cylinder of the ram, and the plunger to descend.

By operating with the ram and the drum simultaneously, the load may be moved obliquely either upward or downward.

We have described the vertical movements of the load as being accomplished by means of a hydraulic ram, but this is not necessary, as the two sets of pulleys *Q Q'* and *S S'* may be made to recede or approach by means of a screw or rack and pinion, or in any other manner found to answer the purpose; so that we do not confine ourselves to the use of hydraulic power in hoisting. The set of pulleys *S S'* is described as being vertically above the set *Q Q'*, but this is not necessary, as the sets may be on the same level.

In place of one drum *B* we may use two drums, one end of the rope being coiled around each drum, and the hook *V* being attached to the middle of the rope. In this case, supposing the rope to be coiled in the same direction on both drums, they would be rotated in opposite directions to cause the horizontal movement of the carriage *M*; and the drums may be connected by cog-wheels, to insure an equal and opposite rotation.

If preferred, the two drums *B B'* may be disconnected, so as to operate independently, and, in this case, the pulleys *Q Q' S S'* may be dispensed with, as the horizontal, vertical, or oblique movements of the load can all be accomplished by means of the two drums *B B'*, pulleys *T U*, and pulley-carriage *M*, (see diagram, fig. 4, where the ropes are shown coiled on the drums in opposite directions.)

In using this modification, if the rope is simultaneously wound upon both drums, the load is raised vertically; if the rope is wound up on one drum and unwound from the other, the load has horizontal movement; and if the latter drum is then brought to a stand, the load will move obliquely upward; by then reversing the rotation of the winding-up drum, the load descends obliquely.

We do not confine ourselves to any particular form of frame, as the same would be modified to suit the circumstances of the case; nor do we confine ourselves to any particular driving or reversing-mechanism for the drum or drums.

Claims.

We claim as our invention—

1. The combination of the pulleys *Q Q'* and *S S'*, receding and approaching by means substantially as shown, pulleys *T U*, and pulley-carriage *M*, enabling the vertical movement of the load by a single rope, irrespective of the position of the carriage upon its track *L*, substantially as described.

2. In combination with the pulleys *Q Q' S S'*, operating substantially as described, the pulleys *T U*, and the pulley-carriage *M*, the drum *B*, for causing the horizontal movement of the position of the carriage without interfering with the horizontal movement of the load.

In testimony of which invention we hereunto set our hands.

HENRY FLAD.
JAS. B. EADS.

Witnesses:

SAML. KNIGHT,
GEO. C. FABIAN.