

(No Model.)

J. N. STARR.
AUTOMATIC CLUTCH PULLEY.

No. 565,241.

Patented Aug. 4, 1896.

Fig. 1.

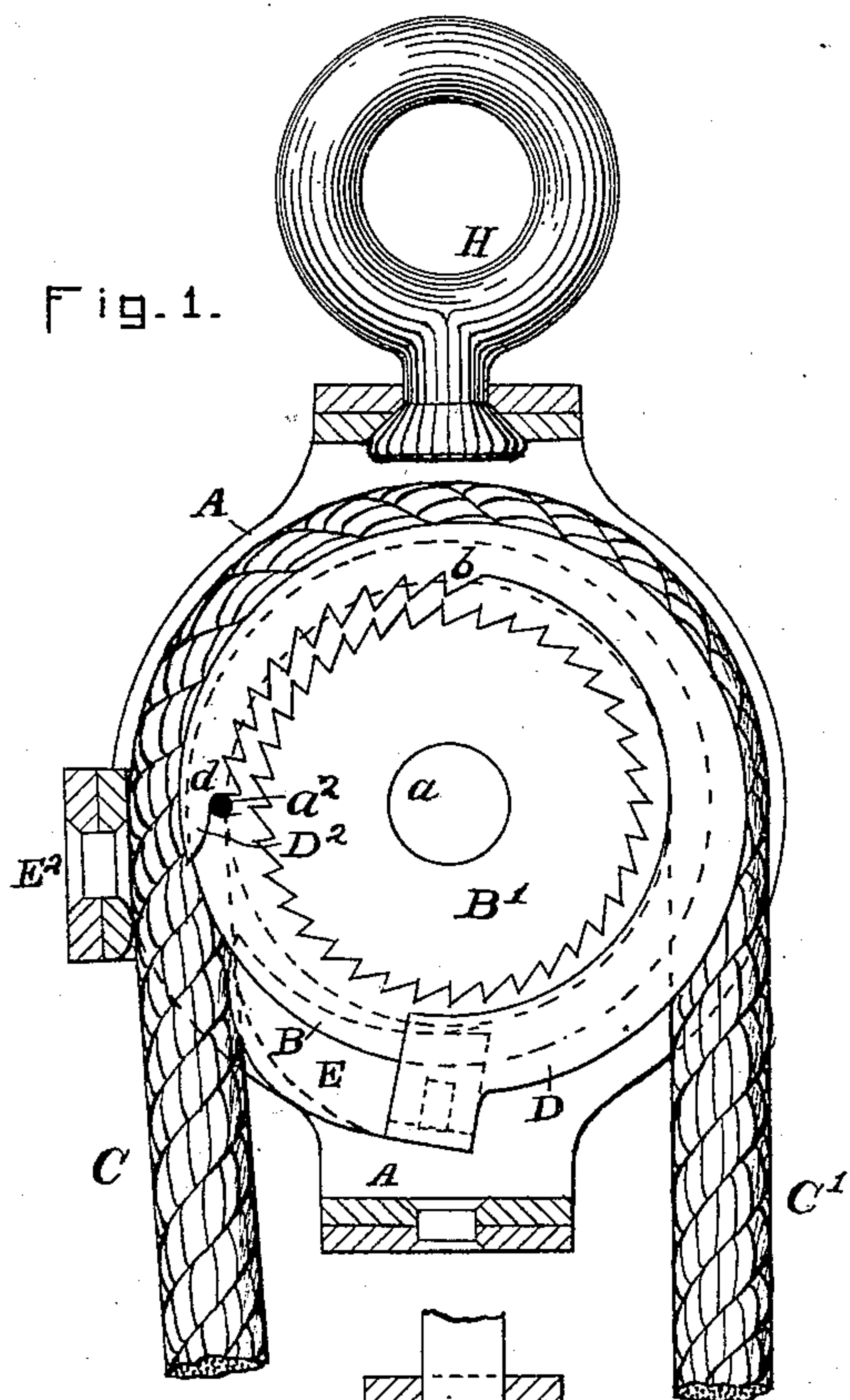


Fig. 2.

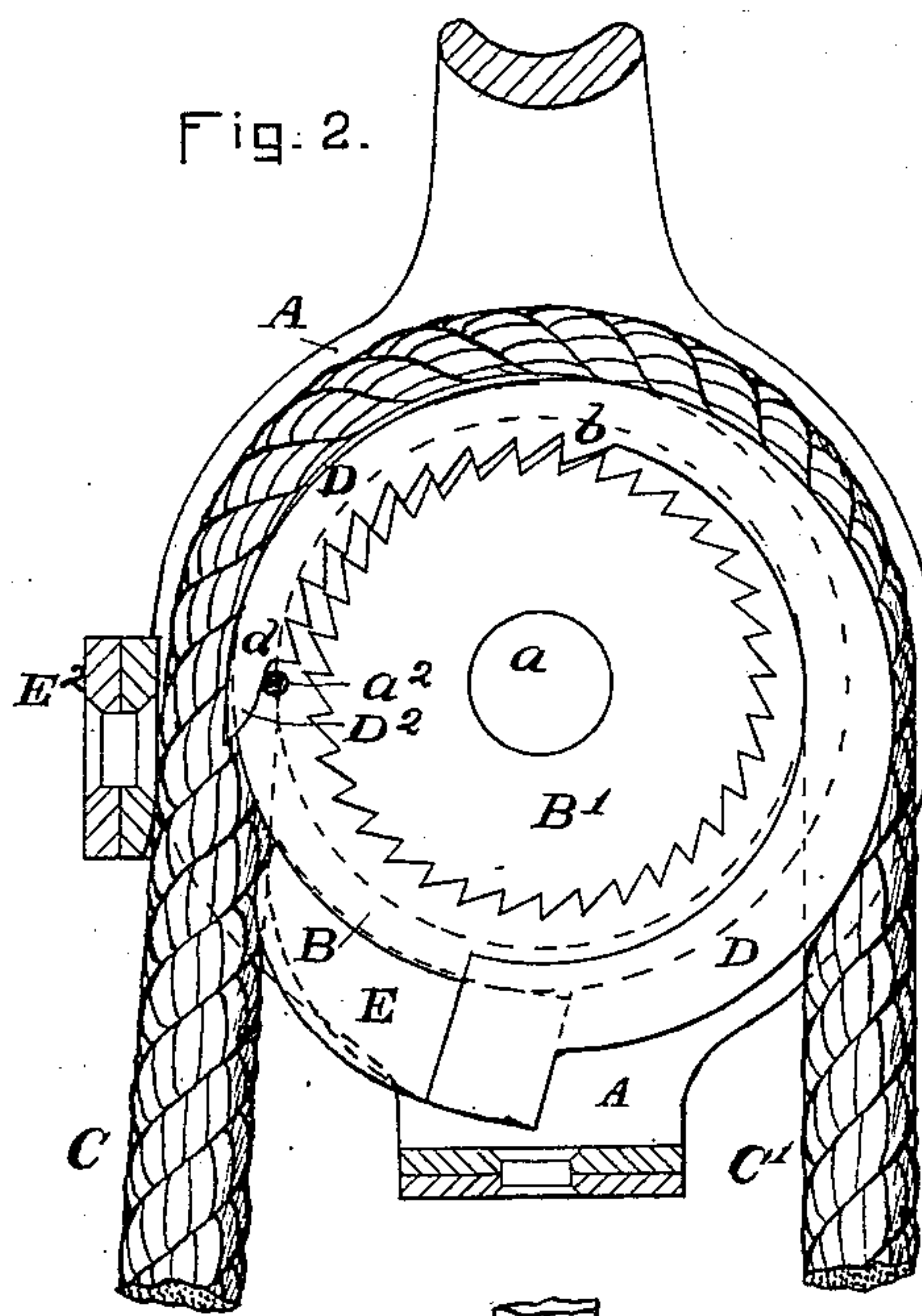


Fig. 4.

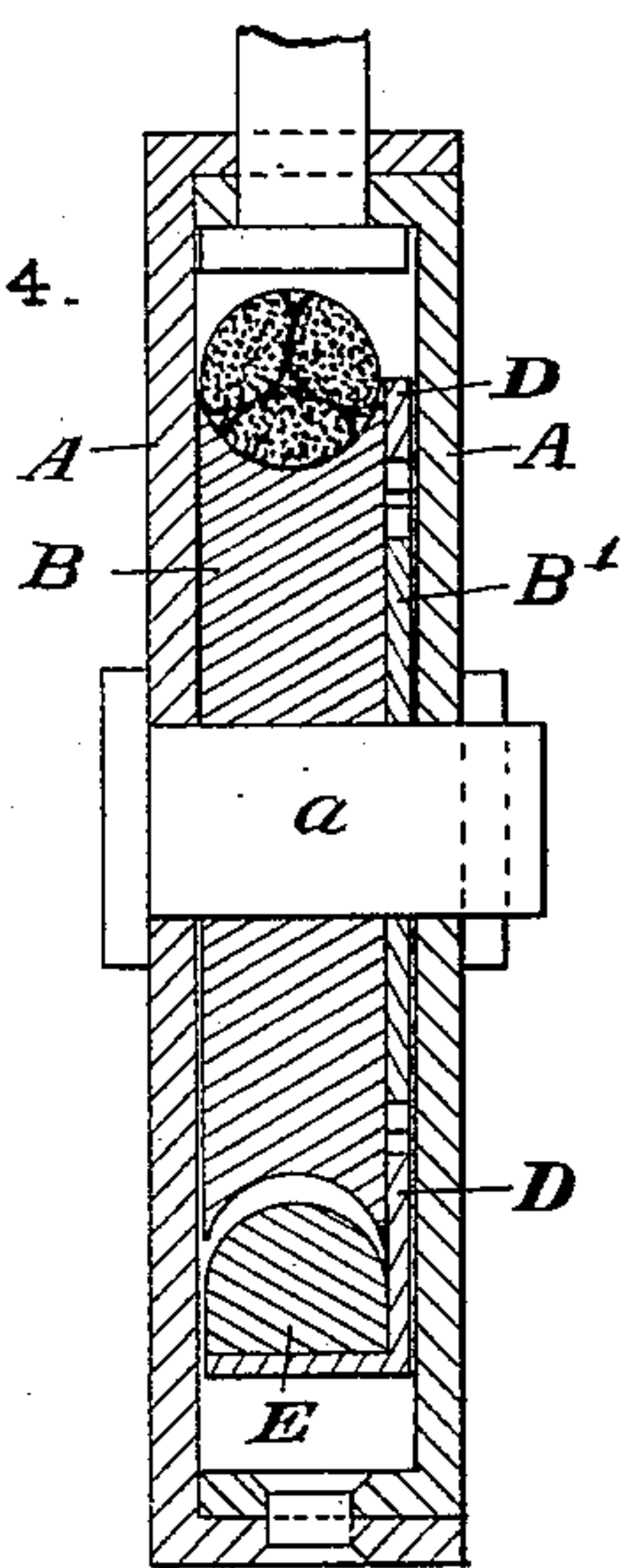
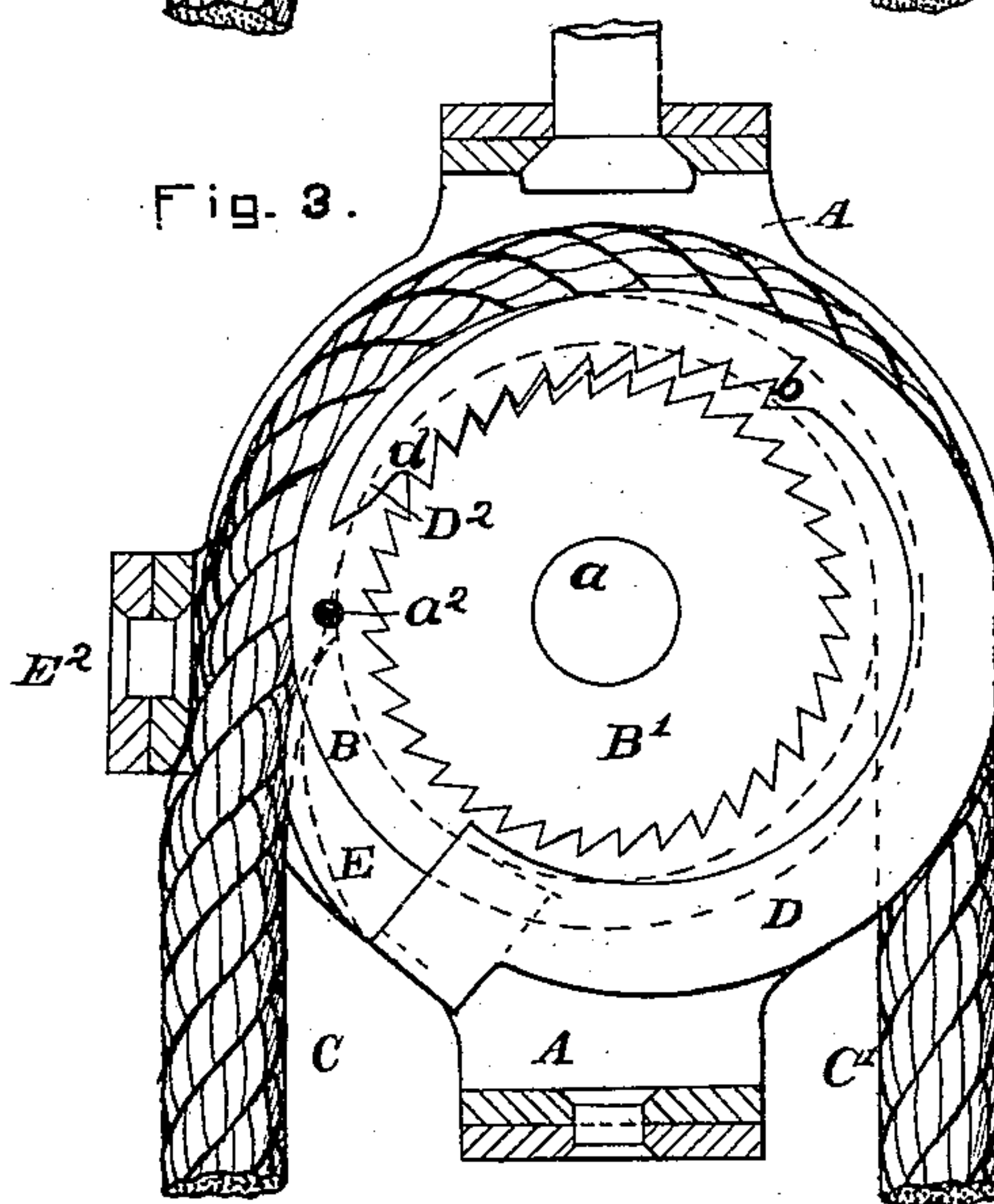


Fig. 3.



Witnesses.
A. M. Anderson.
Arthur H. Whitaker

Inventor.
John N. Starr
by H. L. Reynolds,
his atty.

UNITED STATES PATENT OFFICE.

JOHN N. STARR, OF SNOHOMISH, WASHINGTON.

AUTOMATIC CLUTCH-PULLEY.

SPECIFICATION forming part of Letters Patent No. 565,241, dated August 4, 1896.

Application filed October 21, 1895. Serial No. 566,324. (No model.)

To all whom it may concern:

Be it known that I, JOHN N. STARR, a citizen of the United States, residing at Snohomish, in the county of Snohomish and State of Washington, have invented certain new and useful Improvements in Automatic Clutch-Pulleys; 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 appertains to make and use the same.

My invention relates to those pulleys which may be operated when desired to automatically grip the cord or rope and prevent its return in one direction, thus holding what has been gained, but still may be operated so as to slack off the cord or rope.

The particular construction of my device will be seen by referring to the specification following, reference being had to the drawings, forming a part thereof, in which—

Figure 1 shows the pulley with the front face removed in the position which permits the rope to run back. Fig. 2 is a similar view showing the position of the parts at the beginning of the locking action. Fig. 3 is the same, showing the position of the parts when the rope has been grasped between the holding-blocks. Fig. 4 is a central section with the parts in the position of Fig. 1.

In the drawings, A represents the pulley-casing, B the pulley, and B' a ratchet-wheel fastened to one face of or made as a part of the pulley. This pulley turns on the pivot a . Lying against the face of the pulley B, in the same plane with and surrounding the ratchet-wheel B', is the circular operating arm, dog, or hook D. To one end of this is attached the wedge-block E by any suitable means. This wedge-block is made on its inner side to fit the outer surface of the pulley B. It is also as wide as the pulley. The shape of its inner surface would of course vary with the shape of the outer surface of the pulley. The outer surface of the toe or point of this wedge-block is made smooth, so that the rope will slip easily over it. The end C' of the rope is the end to which the weight or resistance is attached, while C is the free end or that which is held in the hand.

The free end of the dog or operating-arm D has a tooth or point D², which has a slop-

ing inner surface. Attached to the face of the pulley-case, which is removed in Figs. 1, 2, and 3, is a pin a^2 , which projects inwardly close to the surface of the pulley B' and where it will be engaged by the sloping inner surface of the tooth D². This pin is shown in Figs. 1, 2, and 3, although its supporting-plate is removed.

The inner surface of the arm D, for a short distance from its point, approximately quarter of the circle, is formed into teeth which match with the teeth on the ratchet-wheel B'. When the point D² is hooked over the pin a^2 , the arm D and the wedge-block E can swing slightly upon this support. In this position the weight of the dog or arm D and the wedge-block E are supported entirely upon the pin a^2 . The tendency of this weight is to swing the wedge-block against the side C of the rope. If the rope is held taut and straight, or a little in toward the center, as shown in Fig. 1, the rigidity of the rope, due to the slight tension upon it, will hold the block E over, so that the point D² cannot be disengaged from the pin a^2 . The smooth surface of the toe of the dog engages the rope, and as long as the rope is kept taut and pressing against the smooth toe of the wedge-block E the rope may run back, sliding freely over this smooth surface without disengaging the point D² from the pin a^2 .

The inner surfaces of the arm or dog D and of the wedge-block E are of such slightly larger circles than the outer surfaces of the ratchet-wheel and the pulley as to leave but little play between them. Consequently the dog or arm D cannot be lifted from the pin a^2 , except by rotating it about the pulley. This is prevented by the resistance of the rope against the smooth toe of the wedge-block. As soon, however, as the side pressure of the rope is removed, either by moving the rope sidewise or by slackening it sufficiently, the side swing of the block E, due either to gravity or friction against the revolving pulley, or both, swings the arm D, so that the teeth at b upon its inner surface engage the teeth of the ratchet-wheel. When the pulley turns backward, the point D² of the dog or arm D will be positively freed from the pin a^2 and the whole carried backward with the pulley. As it is freed from the pin a^2 and the toe of the wedge-

block E engages the rope, the wedge-block is forced into the groove of the pulley and the dog is swung or rocked upon the upper edge of the ratchet-wheel until the engagement is at the free end of the arm or at d . The intermediate teeth in the meanwhile retain the two locked together. The result is that the wedge-block E is temporarily attached to and rotated with the pulley B, thus forcing it between the rope and the pulley and carrying the rope out so as to wedge it tightly between the blocks E and E^2 , when it can no longer run backward, but is held firmly. It will thus be seen that the weight or resistance acting upon one end of the rope is, in effect, acting upon one end of a lever composed of the pulley and arm D, which has the wedge-block E upon the other end to wedge this block tightly between the pulley and the fixed block E^2 . The greater the pull upon the rope the more firmly it is held. The teeth upon the arm D secure the immediate and positive engagement of the arm and the ratchet-wheel and will not permit the rope to run backward more than the distance of a few teeth until it is clamped, unless it is held in the position shown in Fig. 1.

When the end C is pulled upon to raise the weight or overcome the resistance attached to the end C', the wedge-block E permits the rope to come readily and the arm D is carried about with the ratchet-wheel until the point D^2 strikes the pin a^2 . The arm is carried around still farther until the tooth or point D^2 rides upon the pin a^2 . By manipulating the rope as previously described the rope may be paid back as much as desired. The block E may be held over by hand, if desired, while paying back the rope.

This pulley will work perfectly to clutch the rope or to let it pay back, as desired, in any position, and whether for a vertical lift or a horizontal pull. Its manner of operation for a vertical lift has been described. For a horizontal pull with that edge up, which is shown to the right in the drawings, the center of gravity of the dog and wedge is to that side of the center which will tend to rotate it in the same direction as the pulley when it is running backward, and it will immediately grip the rope unless the wedge is held up by the rope. For a horizontal pull with the other edge up the friction of the pulley upon the dog and wedge-block is sufficient to throw it off the pin and engage the teeth with the ratchet-wheel.

For a horizontal pull with the pulley flat the friction between the pulley and the arm or dog D and between the groove of the pulley and the circular rib of the block E will secure the disengagement from the pin a^2 and the engagement of the teeth with the ratchet-wheel. When the pulley is placed upside down, the weight of the dog and wedge-block E will, through friction against the pulley, carry them around with them.

It will be seen that the starting of the

clutching action is caused mainly by gravity and sometimes by the friction of the parts and at some positions by a combination of both causes. As soon as the teeth engage the ratchet-wheel the wedge-block and arm D are positively engaged by the wheel and moved thereby.

The rope C', instead of being led away parallel to the rope C, may be led away at right angles or at any intermediate angle.

H is a hook or eye for attaching the pulley to any support.

The size of the rope used does not affect the gripping power, as it will grip a small cord as readily and hold it as securely as any rope within the capacity of the pulley to receive.

Although I have herein shown a number of teeth upon the inner surface of the arm D, the pulley will work very well with a single tooth, which should correspond in position with the tooth next the point D^2 . This will not work as satisfactorily in all cases as it would with more teeth, but will still make a very good clutch-pulley.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination with a pulley, and a fixed holding-block just outside of the pulley-rim, of a movable wedge-block located to bear against the under side of a hoisting-rope between the pulley and rope and means actuated by the backward rotation of the pulley for forcing the wedge under the rope so as to wedge the rope between the fixed and movable blocks, substantially as shown and described.

2. The combination with a pulley, a ratchet-wheel fixed to one side thereof, and a fixed holding-block just outside the pulley-rim, of a movable wedge-block lying in the pulley-groove beneath the hoisting-rope and adapted to bear against the under side of the rope, and a dog attached to the wedge-block by which said block may be engaged with the ratchet-wheel and forced under the rope, substantially as shown and described.

3. The combination with a pulley, a ratchet-wheel fixed to one side thereof, and a fixed holding-block just outside the pulley-rim, of a circularly-shaped arm or dog encircling the ratchet-wheel and having one or more teeth at one end to engage said ratchet-wheel, and a wedge-block attached to the other end and lying in the pulley-groove, substantially as shown and described.

4. The combination with a pulley, a ratchet-wheel fixed to one side thereof, and a fixed holding-block just outside the pulley-rim, of a wedge-block lying in the pulley-groove, a supporting and operating arm or dog therefor, and means for engaging and disengaging said arm or dog with the ratchet-wheel, substantially as shown and described.

5. The combination with a pulley, a ratchet-wheel fixed to one side thereof, and a fixed

holding-block just outside the pulley-rim, of a circularly-shaped arm or dog encircling the ratchet-wheel and having one or more teeth upon one end to engage the ratchet-wheel so as to be carried around thereby, a wedge-block attached to the other end and lying in the pulley-groove, and a pin fixed in the path of the toothed end of the circular dog so as to engage it and hold it away from the ratchet-wheel, substantially as shown and described.

6. The combination with a pulley, a ratchet-wheel fixed to one side thereof, a fixed holding-block just outside the pulley-rim, and a movable wedge-block between the pulley and the rope having a smooth toe adjacent to the rope, of a circular arm or dog attached at one end to the heel of and supporting the movable wedge-block and surrounding the ratchet-wheel, one or more teeth upon the other or free end adapted to engage the ratchet-wheel and thereby carry the wedge-block under the rope, and means operated by contact of the rope with the toe of the wedge-block to hold the tooth disengaged from the ratchet-wheel, substantially as shown and described.

7. The combination with a pulley, a ratchet-wheel fixed to one side thereof, a fixed holding-block just outside the pulley-rim, and a movable wedge-block between the pulley and the rope having a smooth toe adjacent to the rope, of a circular arm or dog attached at one end to the heel of and supporting the movable wedge-block and surrounding the ratchet-wheel, one or more teeth upon the other or free end adapted to engage the ratchet-wheel and thereby carry the wedge-block under the rope, a pin in the path of the free end of the circular arm or dog to disengage it from the ratchet-wheel, the toe of said wedge-block being adapted to be engaged by the rope so as to hold the tooth of the circular arm or dog thus disengaged while the rope is being paid out, substantially as shown and described.

8. The combination with a pulley, a ratchet-wheel fixed to one side thereof, a fixed holding-block just outside the pulley-rim, and a movable wedge-block between the pulley and the rope having a smooth toe adjacent to the rope, of a circular arm or dog attached at one end to the heel of and supporting the movable wedge-block and surrounding the ratchet-wheel, one or more teeth upon the other or free end adapted to engage the ratchet-wheel and thereby carry the wedge-block under the rope, a stop to limit the backward motion of the wedge-block, and means operated by contact of the rope with the toe of the wedge-block to hold the tooth disengaged from the ratchet-wheel, substantially as shown and described.

9. The combination with a pulley and a fixed holding-block located just outside the pulley-rim, of a wedge-block supported in the pulley-groove between the pulley and rope, and means for locking it to the pulley so as to be revolved thereby when desired, substantially as shown and described.

10. The combination with a pulley and a fixed holding-block located just outside the pulley-rim, of a wedge-block supported in the pulley-groove between the pulley and rope and having a tendency to be carried along by the backward rotation of the pulley and adapted to be held back by the side resistance of the rope when under tension, substantially as shown and described.

11. The combination with a pulley, a ratchet-wheel fixed to one side thereof, and a fixed holding-block just outside the pulley-rim, of a circularly-shaped arm or dog encircling the ratchet-wheel and having a number of teeth upon its inner surface extending from its free end and adapted to engage the ratchet-wheel, and a wedge-block attached to the other end of the circular arm and lying in the pulley-groove, substantially as shown and described.

12. The combination with a pulley, a ratchet-wheel fixed to one side thereof, and a fixed holding-block just outside the pulley-rim, of a circularly-shaped arm or dog encircling the ratchet-wheel and having a hook or sloping point on its free end, a pin attached to the casing and in the path of the said hook so as to engage it and support the free end of the arm clear of the ratchet-wheel, a series of teeth upon the inner surface of the curved arm or dog extending from the free end thereof approximately one-quarter of the circle, and a wedge-block attached to the other end of the curved arm and lying in the pulley-groove with its toe adjacent to the rope, substantially as shown and described.

13. The combination with a pulley, a ratchet-wheel fixed to one side thereof, a fixed holding-block just outside the pulley-rim, and a pin fixed to the casing and extending inwardly therefrom just outside the ratchet-wheel, of a curved arm or dog encircling the ratchet-wheel and having a series of teeth on its inner surface next the free end and a sloping point at the free end adapted to engage the said fixed pin and hold the extremity of the arm clear of the ratchet-wheel, a wedge-block lying in the pulley-groove and attached to the opposite end of the curved arm or dog, said curved arm or dog bearing normally upon the ratchet-wheel at that extremity of the said series of teeth farthest removed from the free end of the arm, and means controlled by the side pressure of the rope for lifting and holding the arm clear of the ratchet-wheel at all points, substantially as shown and described.

14. The combination with a pulley, a ratchet-wheel fixed to one side thereof, a fixed holding-block just outside the pulley-rim, and a pin fixed to the casing and extending inwardly therefrom just outside the ratchet-wheel, of a curved arm or dog encircling the ratchet-wheel and having a series of teeth on its inner surface next the free end and a sloping point at the free end adapted to engage the said fixed pin and hold the extremity of the

arm clear of the ratchet-wheel, a wedge-block
lying in the pulley-groove and attached to
the opposite end of the curved arm or dog,
said curved arm or dog bearing normally
5 upon said ratchet-wheel at that extremity of
the said series of teeth removed from the
free end of the arm, said wedge-block having
a toe adjacent the rope and adapted to be
engaged thereby to lift and hold the curved

arm clear of the ratchet-wheel at all points, so
substantially as shown and described.

In testimony whereof I affix my signature
in presence of two witnesses.

J. N. STARR.

Witnesses:

H. L. REYNOLDS,
ARTHUR W. HAWKS.