(No Model.)

4 Sheets—Sheet 1.

H. E. PRIDMORE.

CORD KNOTTING DEVICE.

No. 604,337. Patented May 17, 1898.

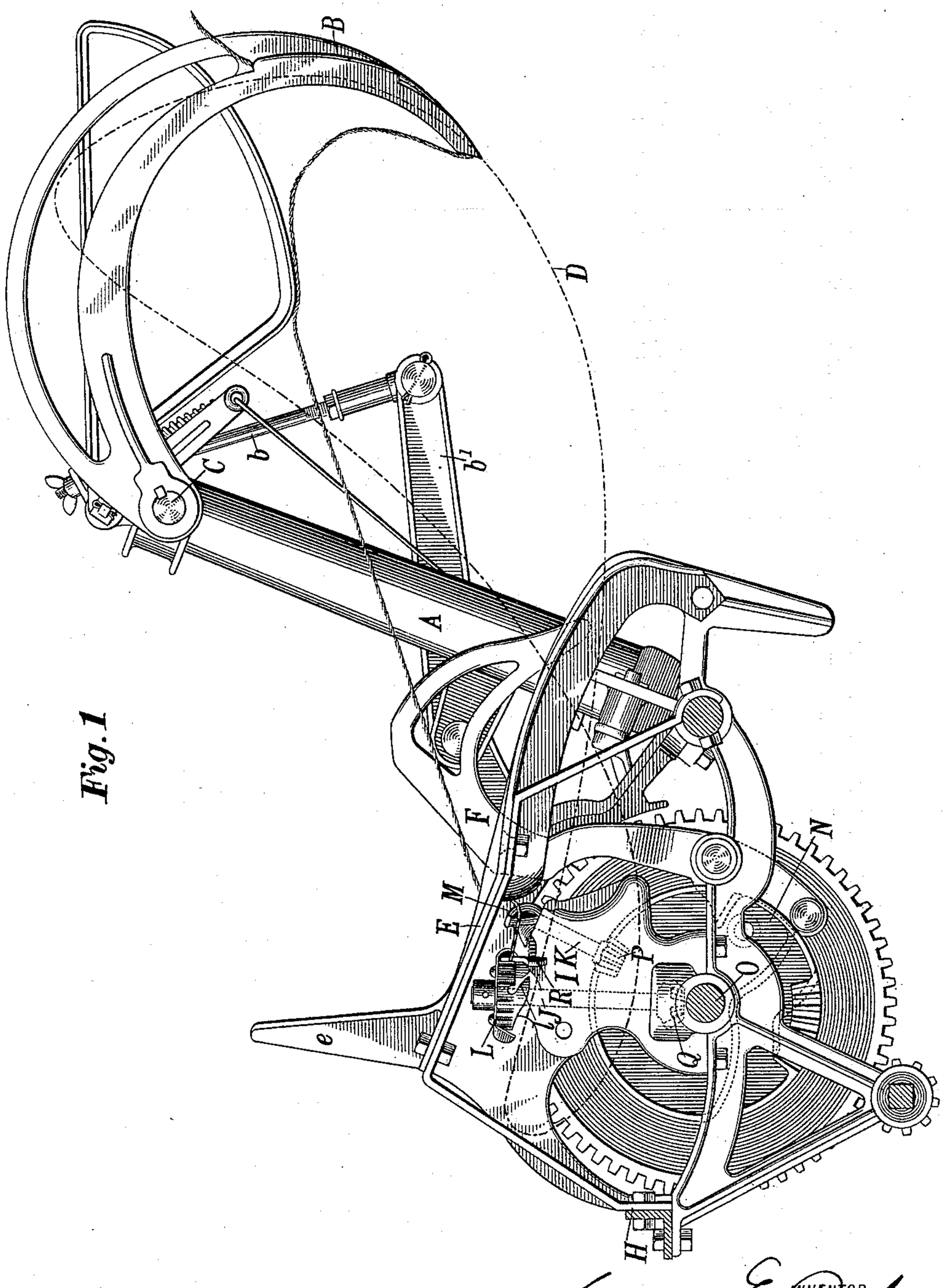

Fig. 1

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Fig. 2

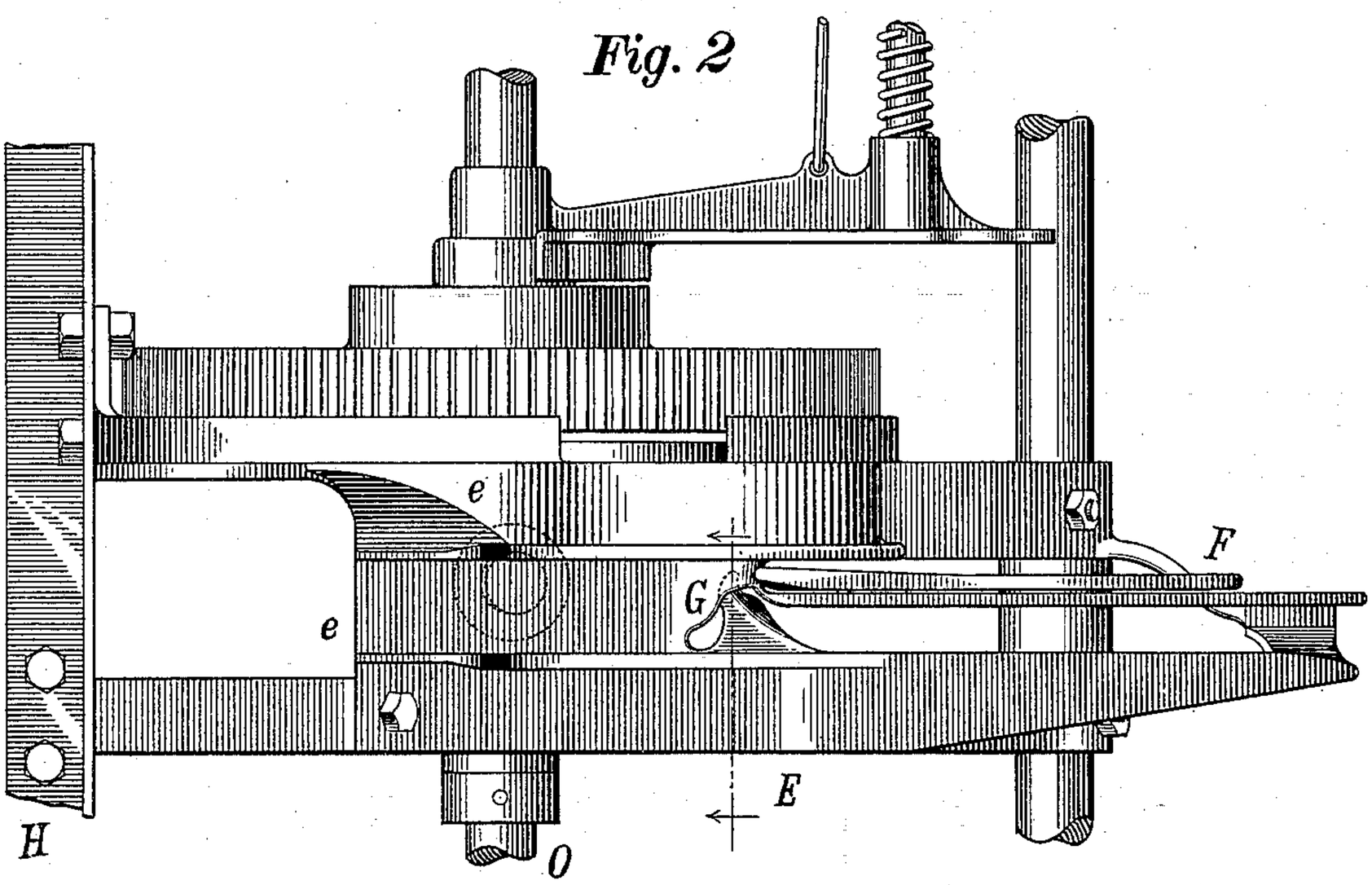

Fig. 3

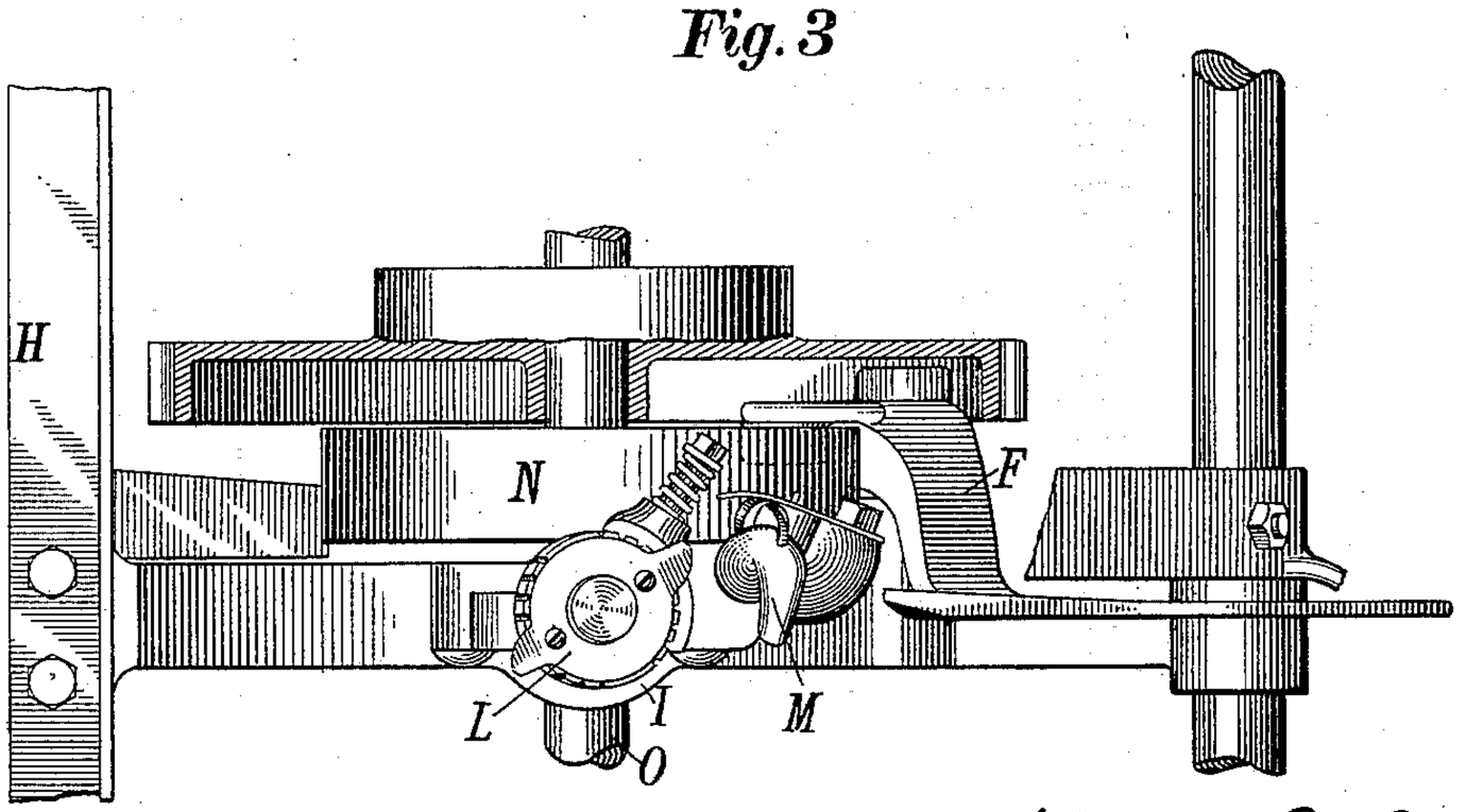

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Fig. 4

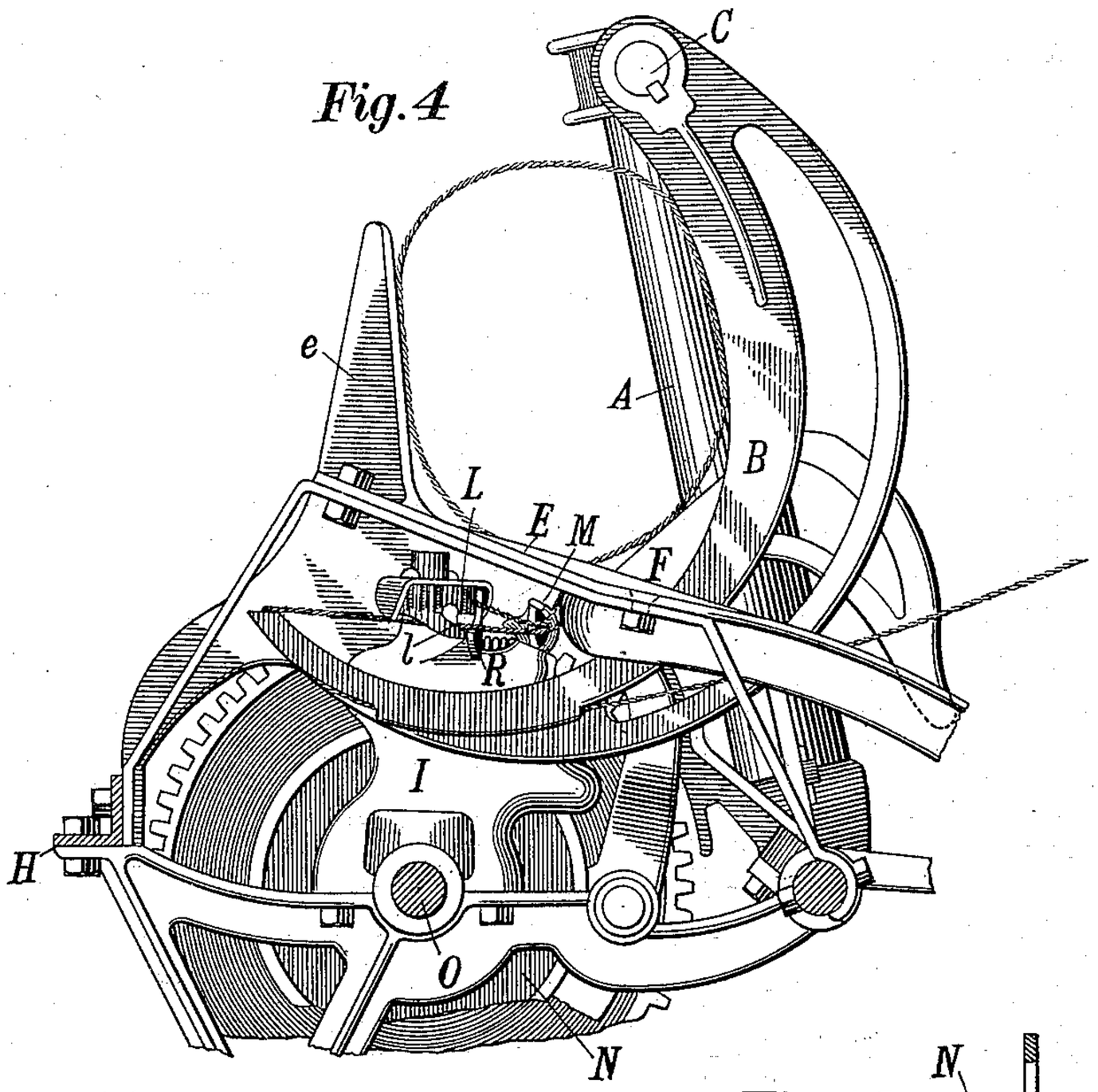


Fig. 11

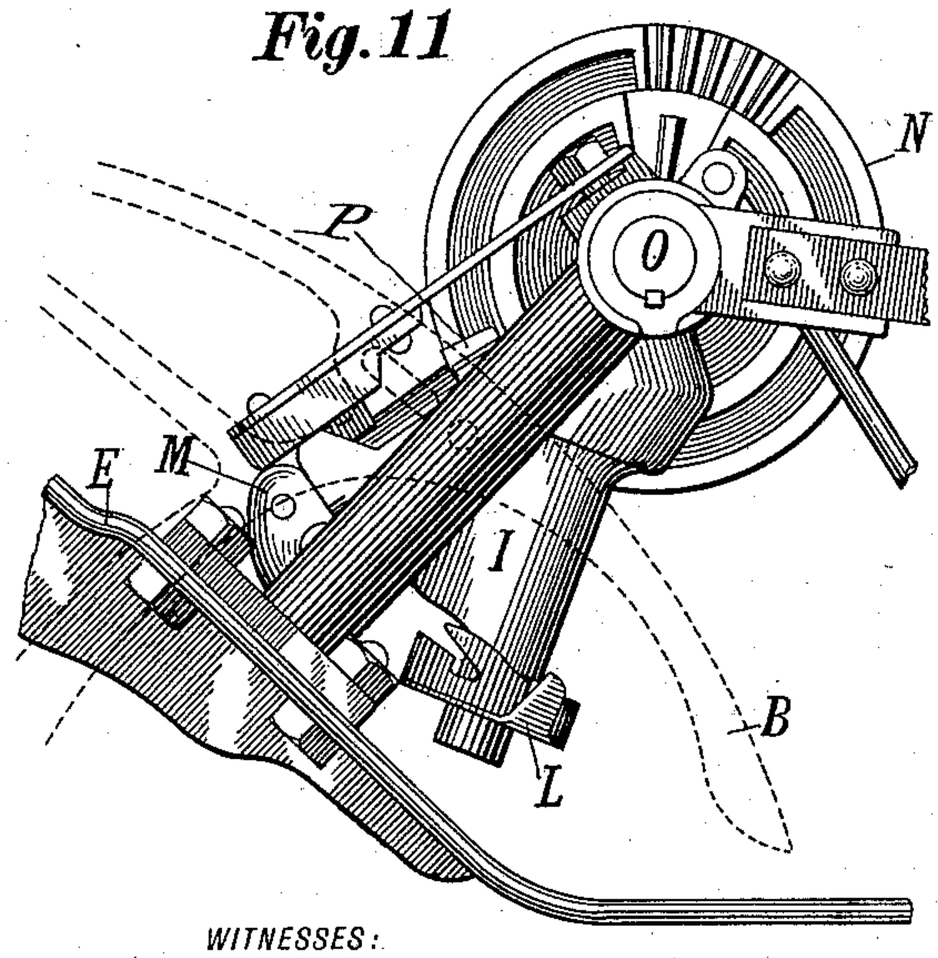
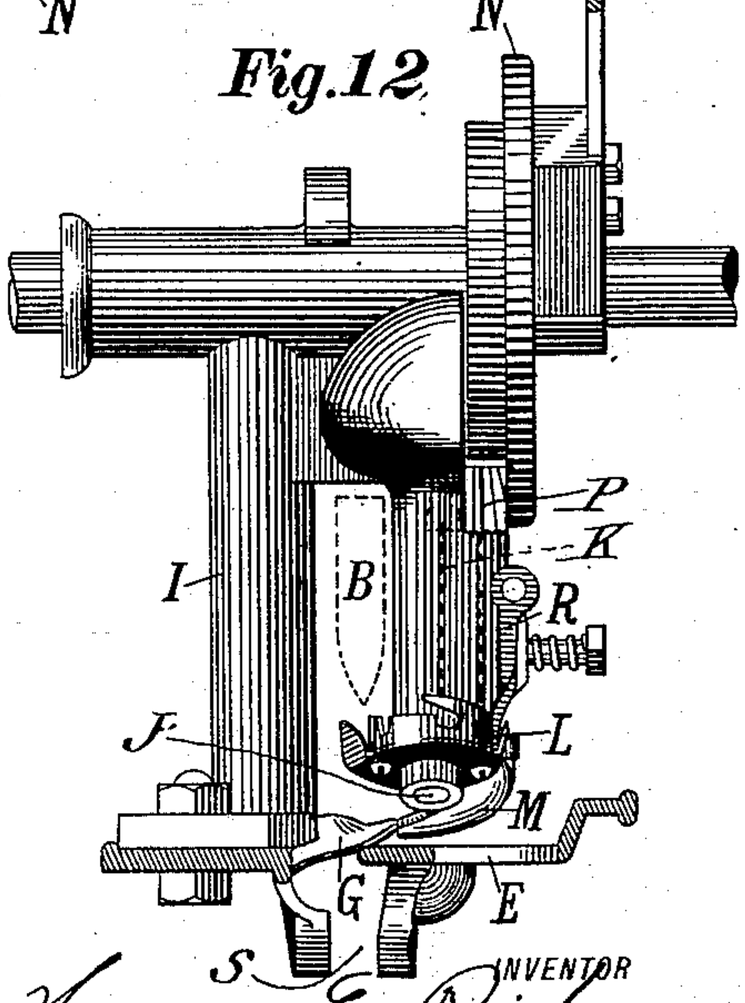


Fig. 12



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CORD KNOTTING DEVICE.

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Fig. 7

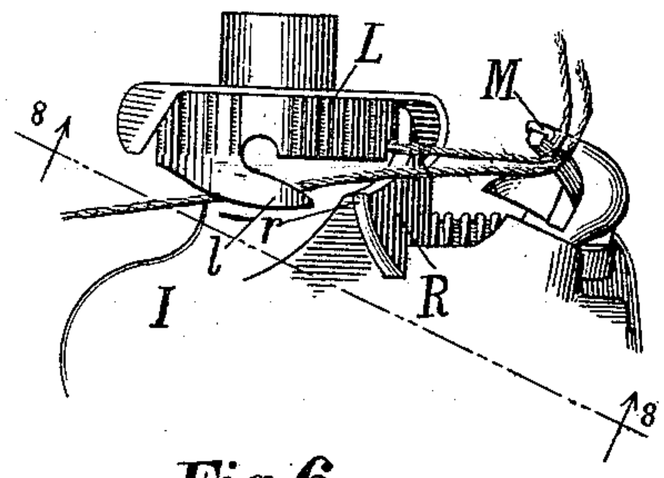


Fig. 6

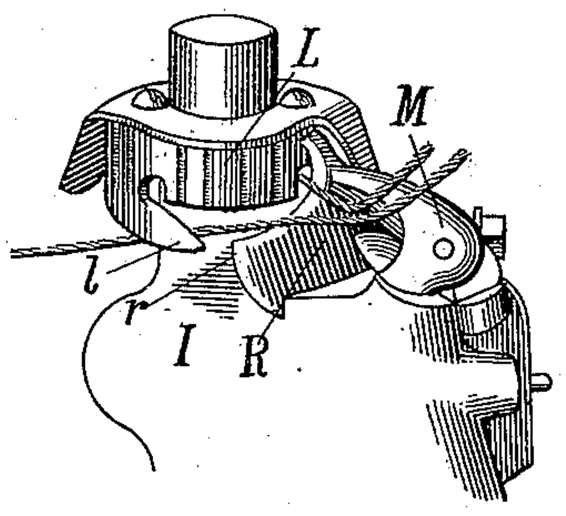


Fig. 5

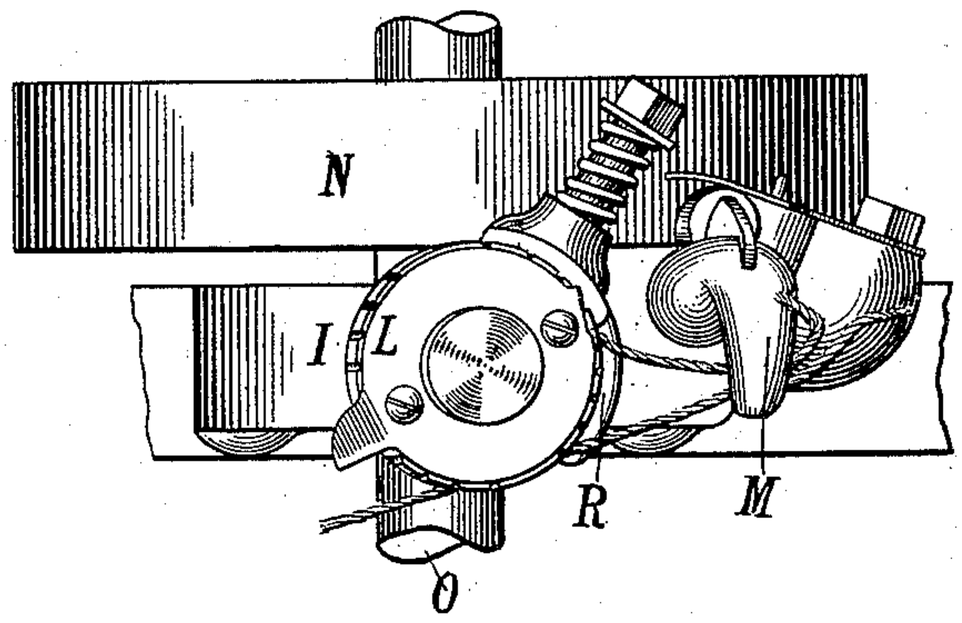


Fig. 8

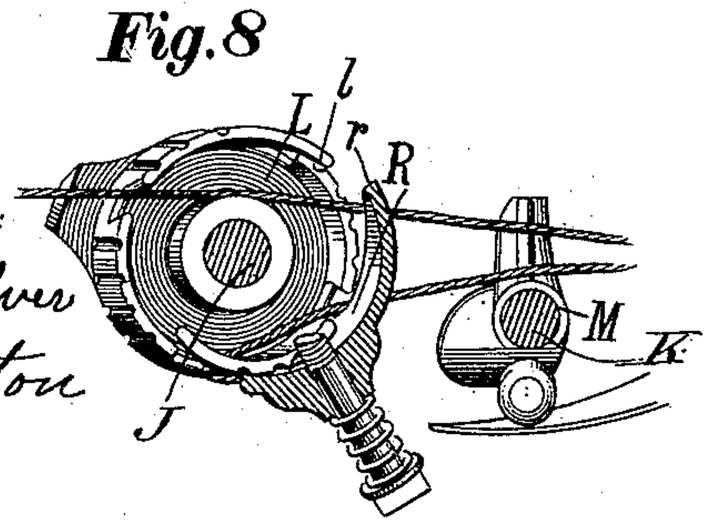


Fig. 9

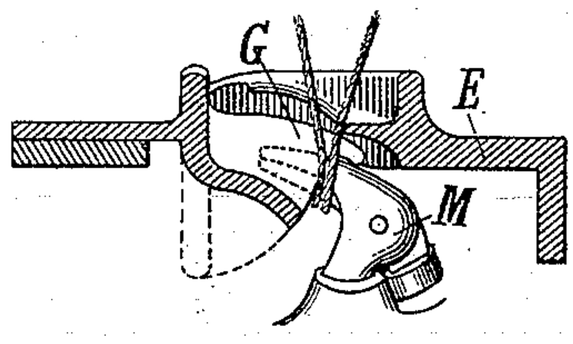
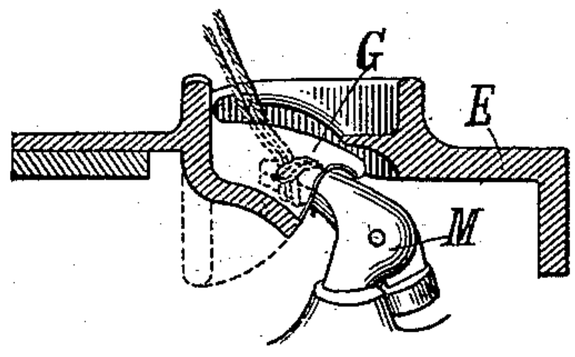


Fig. 10



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UNITED STATES PATENT OFFICE.

HENRY E. PRIDMORE, OF CHICAGO, ILLINOIS.

CORD-KNOTTING DEVICE.

SPECIFICATION forming part of Letters Patent No. 604,337, dated May 17, 1898.

Application filed February 23, 1895. Serial No. 539,327. (No model.)

To all whom it may concern:

Be it known that I, HENRY E. PRIDMORE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Cord-Knotting Mechanisms for Self-Binding Harvesters, of which the following is a specification.

My improvement relates to cord-knotting devices and mechanisms for giving motion thereto, and is particularly applicable to the type of knotter invented and patented by me and shown in Letters Patent No. 442,544, dated December 9, 1890.

In knotters of the type shown in this patent, in which the looper and holder shafts are actuated from a common cam-wheel and the loop is stripped from the looping-bill by the pull on the bundle in its discharge, it has always been found necessary whenever these shafts are on the same side of the needle's path to keep the looper-shaft as far forward toward the plane in which the needle reciprocates as possible in order that the jaws of the looping-bill be enabled to grasp the strands of cord as it makes its revolution. In the construction shown in the Patent No. 442,544 the looper and holder shafts are in the same plane, which is parallel with the plane of the path of the needle and very close to it. This necessitates that both these shafts be of sufficient length, so that the needle in its sweep will pass between the pinions which drive the shafts and the looper and holder. The cords are therefore placed by the needle close to the shank of the looper-bill and well over the holder, insuring their grasp at the time of the knot formation by both the looper-bill and the holder. In this construction, however, the looper and holder shafts are necessarily of such length that the knotter looks large and unless made of malleable iron—a costly material—is too heavy, and even then gives the whole binder a heavy appearance. There is also a type of binders in which the point of the needle's path is not the same on its forward and backward strokes. A binder of this description is shown in the patent of James R. Severance, dated May 19, 1891, No. 452,460. In adapting the before-mentioned knotter to this type of a binder the peculiar characteristics of my invention are readily seen, and as it has to do with the construction and arrangement of the parts which allow the needle a larger sweep at its point it is peculiarly adaptable to machines of the Severance type. It also permits the reduction to a smaller size of the Pridmore type of a knotter on binders of the ordinary kind, all of which will be more clearly pointed out in the specification and shown in drawings, in which—

Figure 1 is an end view, partly in section, of a binder of the Severance type provided with a knotter of the Pridmore type. Fig. 2 is a top view showing the breastplate and the needle-slot provided with a stop and cord-guiding finger of the type shown in the patent of George L. Phelps, No. 474,708, granted April 4, 1893, also the gear and cam wheels and the shipping-clutch. Fig. 3 is also a top view, the breastplate being removed. Fig. 4 is an end view similar to Fig. 1, but with the knotter and binder-frame in the position they would occupy during the binding of a bundle. Fig. 5 is a top view of the holder and looper and their cam-wheel, one of the knives on the holder being broken away to more clearly show the construction of the parts. Fig. 6 is a perspective view of the knotting device, showing the looping-bill and holder with cords in the positions that they would be immediately before the formation of a knot is begun. Fig. 7 is an enlarged elevation of the looper and holder with attendant parts. Fig. 8 is a view intended more particularly to show the holder and its plate and made from a plane at right angles with the looper-shaft looking into the cup of the holder. Fig. 9 is a view in section of the breastplate, looking toward the discharge side of the binder, showing the stop and guiding finger and the end of the breastplate-slot. Cords are shown across the looping-bill and against the stop-finger as they would be at the time of knot formation, while the point of the looping-bill is shown in dotted lines, it being behind the stop and guiding finger. Fig. 10 is a view of the same parts as in Fig. 9, but made at the period of knot formation when the loop is being drawn from the looping-bill by the discharge of the bundle. The loop is in dotted lines, it being behind the stop-finger. Fig. 11 is an end view of a knotter of the Pridmore type, containing

my improvement, showing in dotted lines the needle thrown forward, while Fig. 12 is a front view of the same, the end of the breastplate being broken away.

Similar letters refer to similar parts throughout the several views.

Referring to the drawings, A represents the main piece of the binder-frame of a self-binding attachment, and B the needle mounted on the needle-shaft C, that has its bearing in the binder-frame A and which is actuated by means of the needle-pitman *b* and the binder rock-lever *b'*. Rotary motion imparted to the rock-lever *b'* in the way common in binders of the Severance type will cause the needle to move in its cycle on the path shown by the dotted line D in Fig. 1. The breastplate E, with its finger *e*, against which the bundle is forced for compression by the needle B, the slot *s*, and the compressor F are of the usual construction in binders of the Severance type, except that the breastplate-slot has the guiding stop-finger G interposed in the slot, against which the cord is brought and on which it is held until it is removed during the knot formation.

Positioned beneath the breastplate E and with its main bearing upon the binder-sill H is the knotter-frame I, journaled in which are the radial shafts J and K, on which are mounted, respectively, the holder L and the looping-bill M.

The cam-wheel N, mounted on the main binder-shaft O, has segments of gear and delay surfaces, by which the pinion upon the shafts J and K are rotated for forming and tying the knot and holding the cord during the operation of bundle discharging and forming. These radial shafts J and K, with the pinions which actuate them and the cam-wheel which gives them motion, are of the ordinary type in the Pridmore knotter. It will be observed, however, by reference to Fig. 1 that the speed of the radial shafts J and K is not the same, the shaft K being a shorter shaft and actuated by the segment of gear near the periphery of the cam-weeels, while the shaft J is actuated by a segment near its center. The pinion P on the radial shaft K is thus brought within the limits of the stroke of the point of the needle B, as shown in Fig. 1, while the pinion Q on radial shaft J is outside of the plane of the sweep of the needle's point; or, in other words, the holder, with its parts, can be brought into a plane in closer proximity to the plane of the point of the needle's path without being struck by the needle than can the looper. This looper-pinion P thus forces the looper, with its attendant parts, to be carried farther away from the vertical plane of the needle's path in order that the point of the needle may pass by the pinion P without striking it.

In practical operation to insure certainty in knot formation it is necessary that the cords shall be brought over the bill of the looper in order that the looper may in its rotation form a loop in both cords. The problem has therefore been to bring the cords on to the looping-bill with certainty when this bill is removed sufficiently from the plane of the path of the needle, so that the needle will pass by its actuating-pinion without striking it. I accomplish this object by the form which I give to the guiding stop-finger G on the breastplate E and by the peculiar form of the holder L and its shoe R.

The guiding stop-finger G extends across the cord-slot in the breastplate E at a point slightly in advance of the looping-bill M, so that the looping-bill in its sweep will gather the cords that rest on the finger and carry them around its end into the path of the breastplate beyond the finger. It is plain that such a construction of the finger as will cause the cords to slide down it toward its point will bring them more nearly over the looping-bill M. I therefore form the side of the finger with a downwardly-hanging flange that trends inwardly toward the knotting-bill and toward the point of the finger and then trends upwardly, as shown in Figs. 9 and 10, so that any strain upon the cords as the bundle is brought into the bundle-receptacle and carried against the finger *e* will tend to push the cords along the deflected edge of the stop-finger G toward its point. This feature I patented December 9, 1890, No. 442,544. It will be noticed that the outer or holder cord will be carried back by the incoming bundle, so as to be drawn over the finger G, while the incoming or needle strand will be assisted by the compressor F, which advances ahead of the needle, as shown in Fig. 4, thus forcing this strand along the deflected edge of the finger G to its point which is on the side of the needle-slot toward the looping-bill.

As thus far explained, the cords would not be sufficiently within the path of the looping-bill M to be grasped by it with certainty as it makes its rotation, and it therefore becomes necessary to carry the holder and needle-cords out of the plane in which they are received toward the looper. This I accomplish by the rotary cup-shaped holder S, which is located in a plane close to the path of the needle's point, so that the cord in the needle is brought within its sweep on each forward advance of the needle.

In binders of the Appleby type, where the needle is given a forward and backward movement in the same arc by means of a crank, there is a period when the crank is passing over its center that the needle-point remains nearly at rest, and it is possible to so time the looper that it shall begin its movement just before or at the time the needle has reached the limit of its forward movement and form the loop before the needle-strand has become grasped by the holder. The holder, starting at the instant that the looper has practically formed its loop, can thus with certainty grasp the cord before the needle re-

tracts sufficiently to get beyond its sweep. Machines of the Severance type, upon which I have shown my improvement positioned, however, have no such delay-point for the needle, it beginning to drop away from the holder before it reaches the forwardmost limit of its stroke. It thus becomes necessary for the holder to grasp the cord immediately; but as slack is needed for the looper to form the loop it is not desirable that the holder shall clamp the cord, but that the slack of the needle-strand shall be drawn through the needle from the spool. I have accomplished these objects by extending from the holder L a downwardly and forwardly extending lip or point *l*, and have so timed the holder that it shall immediately the cord comes safely within its reach start its rotation and gather the cord onto the lip or point *l*. The necessity of carrying the cord so far as to get it within the grasp of the looper, however, was a problem still to be overcome, and I discovered that by swinging the holder-shoe R farther to that side of the holder away from the plane of the needle and by extending and cutting away its holding-surface that is on the side toward the looper I am able to form a guide and, in conjunction with the lip *l*, to form a way for the cord, so that it can be drawn through when the looper is forming the loop and still be kept hold of while the needle is on its return downward and upward path. I cut the holder-shoe away, as shown in Figs. 7, 8, and 9, forming the point *r*, and continue this cut-away part to such an extent as will allow the holder-strand of the cord to pass through one of the notches in the holder on its upward passage. The cord is thus clamped, as in the Pridmore knotter, between the shoe and holder, passing around one of the segments of the disk, backwardly through another notch in the disk, and across the looper. The forward movement of the holder thus releases the grasp upon the cord as it is required for the loop and takes a secondary grasp upon it when sufficient cord has been taken up to form the loop.

In Figs. 11 and 12 I have shown a knotter of the Pridmore type mounted upon a machine of the Appleby type, in which the needle makes its reciprocations in the same arc. In this view the knotter has been so reduced in size as to bring the pinion upon the looper-shaft into the plane of the path of the needle. The problem here encountered of how to get the cords within the sweep of the looper is solved, as in the drawings and descriptions heretofore given. The applicability of my invention to this construction is thus more plainly seen.

Having now described my invention, what I claim is—

1. In a cord-knotting device, the combination with the cam-wheel, of the holder and the looper, the shafts of said holder and looper being substantially radial to the cam-wheel and parallel with the face of the wheel and located between it and the plane of the needle, the looper-shaft being set back from the needle's plane farther than the holder-shaft, and the holder-pinion being driven by a gear tooth or segment on the side of the cam-wheel in a plane set out farther from the face of the wheel than the segment that drives the looper-pinion.

2. In a cord-knotting device, a rotary flanged disk cord-holder, the cord-receiving notches of which are provided with lips that project from the flange of the disk, a clamping-shoe, a guide projecting from the shoe toward the lip of the flange and that with the lip of the disk forms a support for the cord and guides it into the notch as the holder is rotated.

3. In a cord-knotting device, in combination a holder mounted upon a radial shaft and driven directly from the cam-wheel, a looper also mounted upon a shaft driven from the same cam-wheel, the looper being positioned in a plane farther from the plane of the path of the needle than the holder, the holder receiving the cord on its side toward the needle in a notch formed with a lip projecting from the same in the direction of movement of the holder, a cord-holding shoe having a guide-finger projected beyond its holding-surface in a reverse direction to the movement of the holder, in the same horizontal plane with the lip on the holder, whereby the cord is prevented from escaping the notch in the holder, as the holder continues its rotation.

4. In a cord-knotting device, in combination substantially as set forth, a holder and looper on the same side of the plane of the path of the needle, and actuated directly from a common cam-wheel, the looper being set back from the plane of the path of the needle farther than the holder, a cord-guide on the breastplate on the side of the looper toward the bundle, against which guide the incoming grain forces the holder-strand of cord, a compressor moving forward against the formed bundle and lifting it away from the guide whereby the needle-strand of the cord is permitted to slide down the guide to its point within the path of the rotation of the looper.

5. In combination in a cord-knotting device, a holder located on one side of the looper, a cord-guide located on the other side; the holder adapted to carry the cord in its rotation toward the looper, the cord-guide formed with a cam or boss along which the cord slides toward the looper and a compressor independent of the needle to force the formed bundle from the cord-guide, substantially as and for the purpose specified.

HENRY E. PRIDMORE.

Witnesses:
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E. E. CLINTON.