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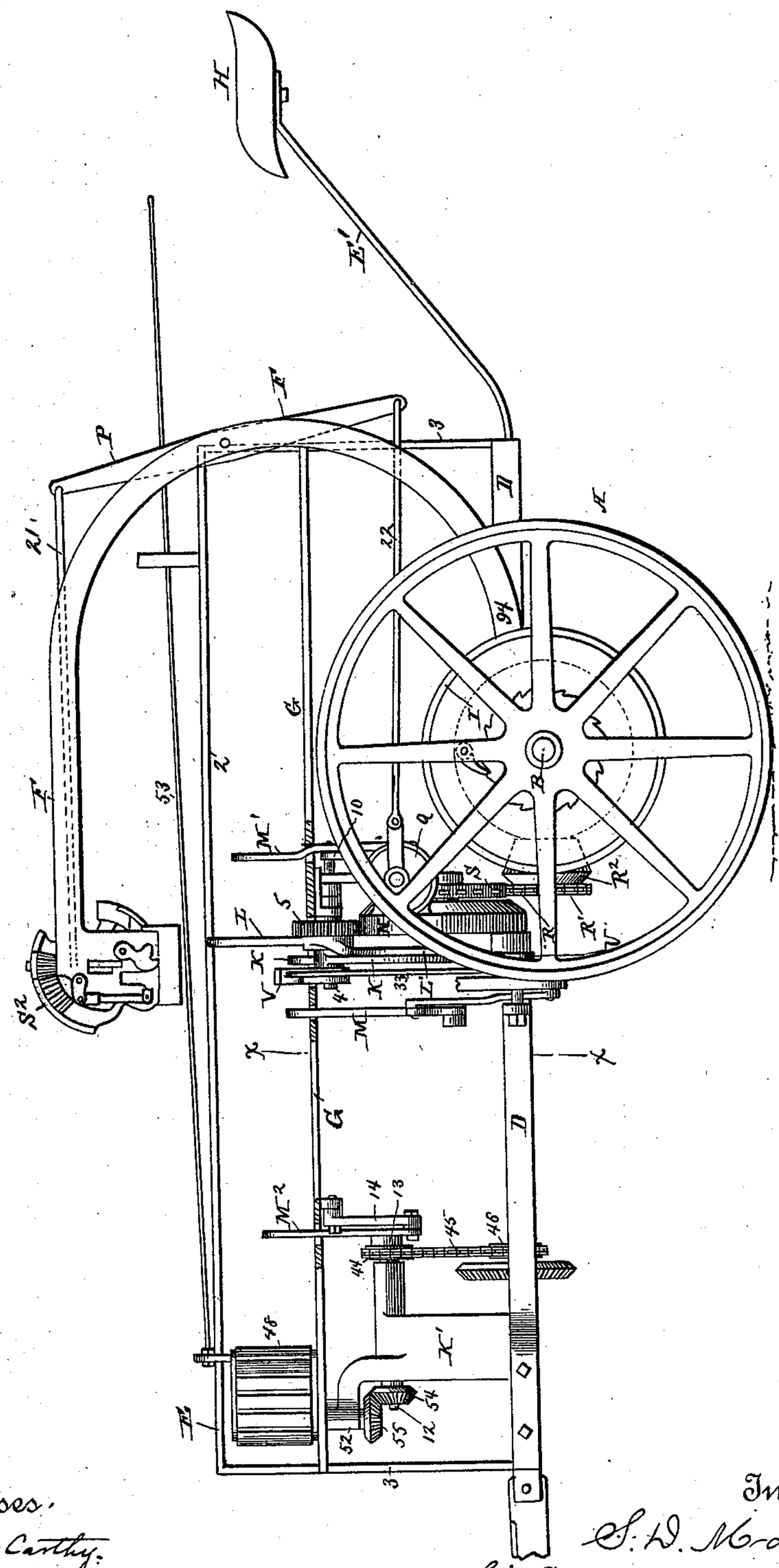
S. D. MADDIN.

HARVESTER.

No. 402,025.

Patented Apr. 23, 1889.

Fig. 1.



Witnesses.

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John V. Freeman

(No Model.) 8 Sheets—Sheet 2.

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HARVESTER.

No. 402,025. Patented Apr. 23, 1889.

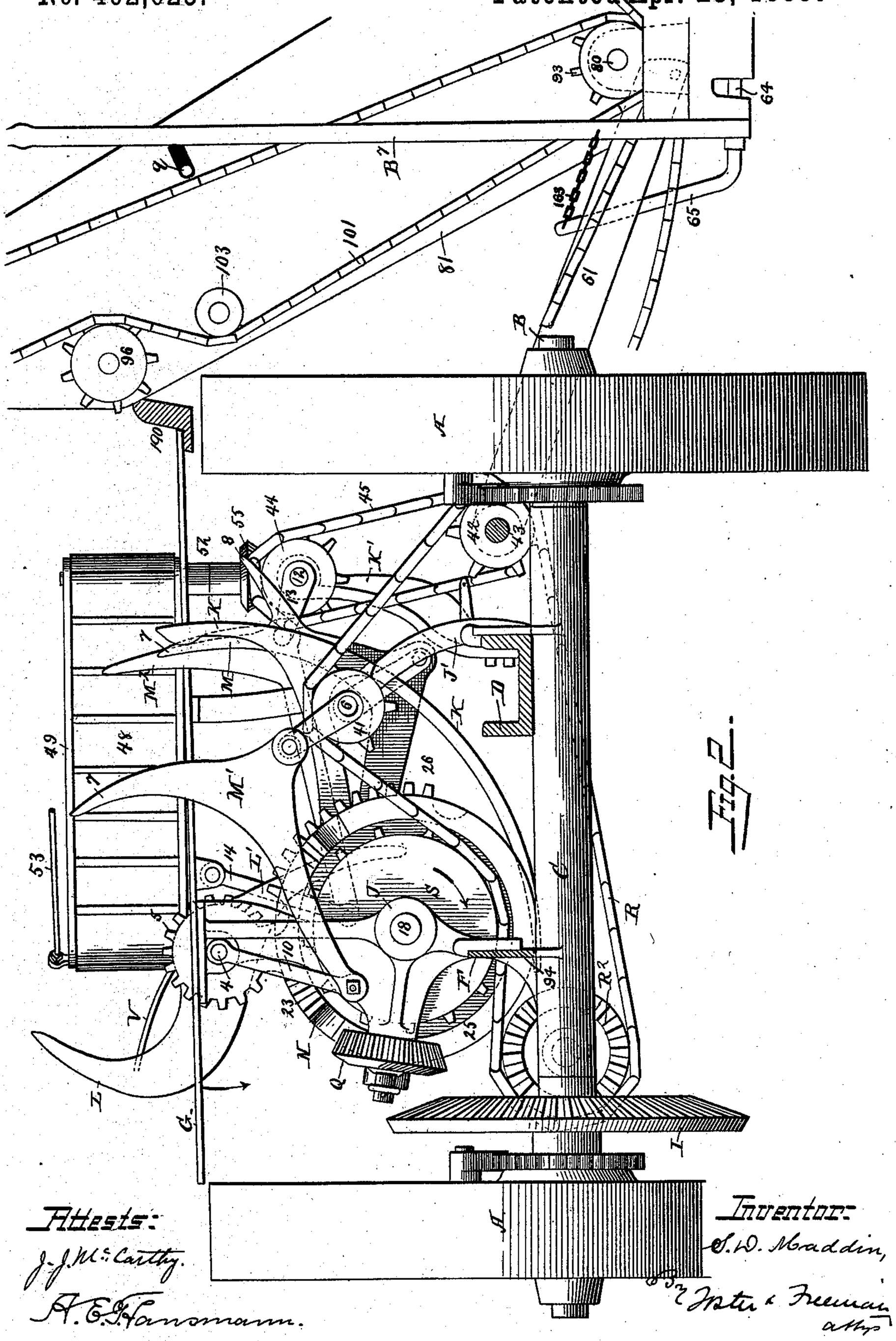

Fig. 2.

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(No Model.) 8 Sheets—Sheet 3.

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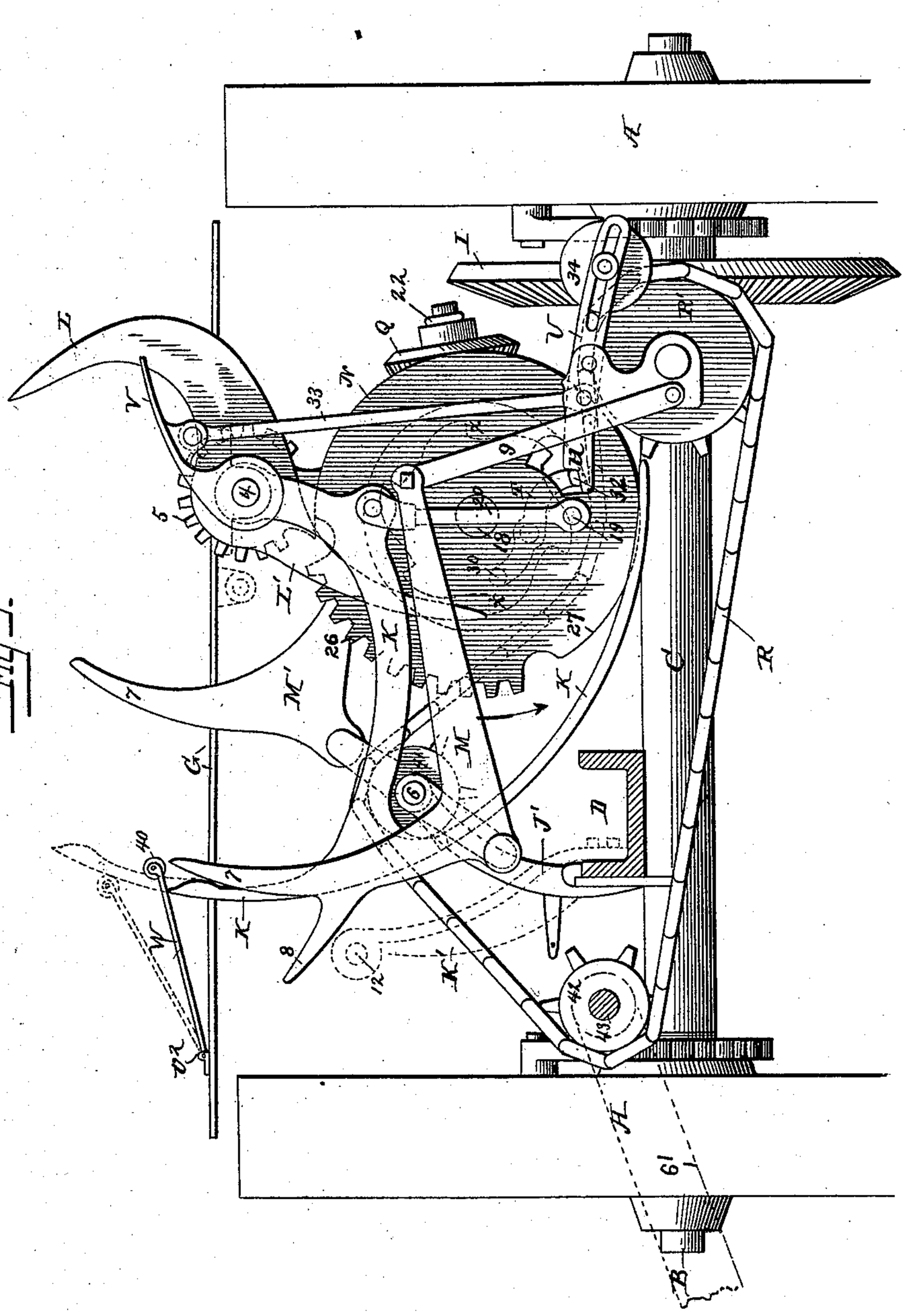
No. 402,025. Patented Apr. 23, 1889.

Fig. 3.



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(No Model.) 8 Sheets—Sheet 4.

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No. 402,025. Patented Apr. 23, 1889.

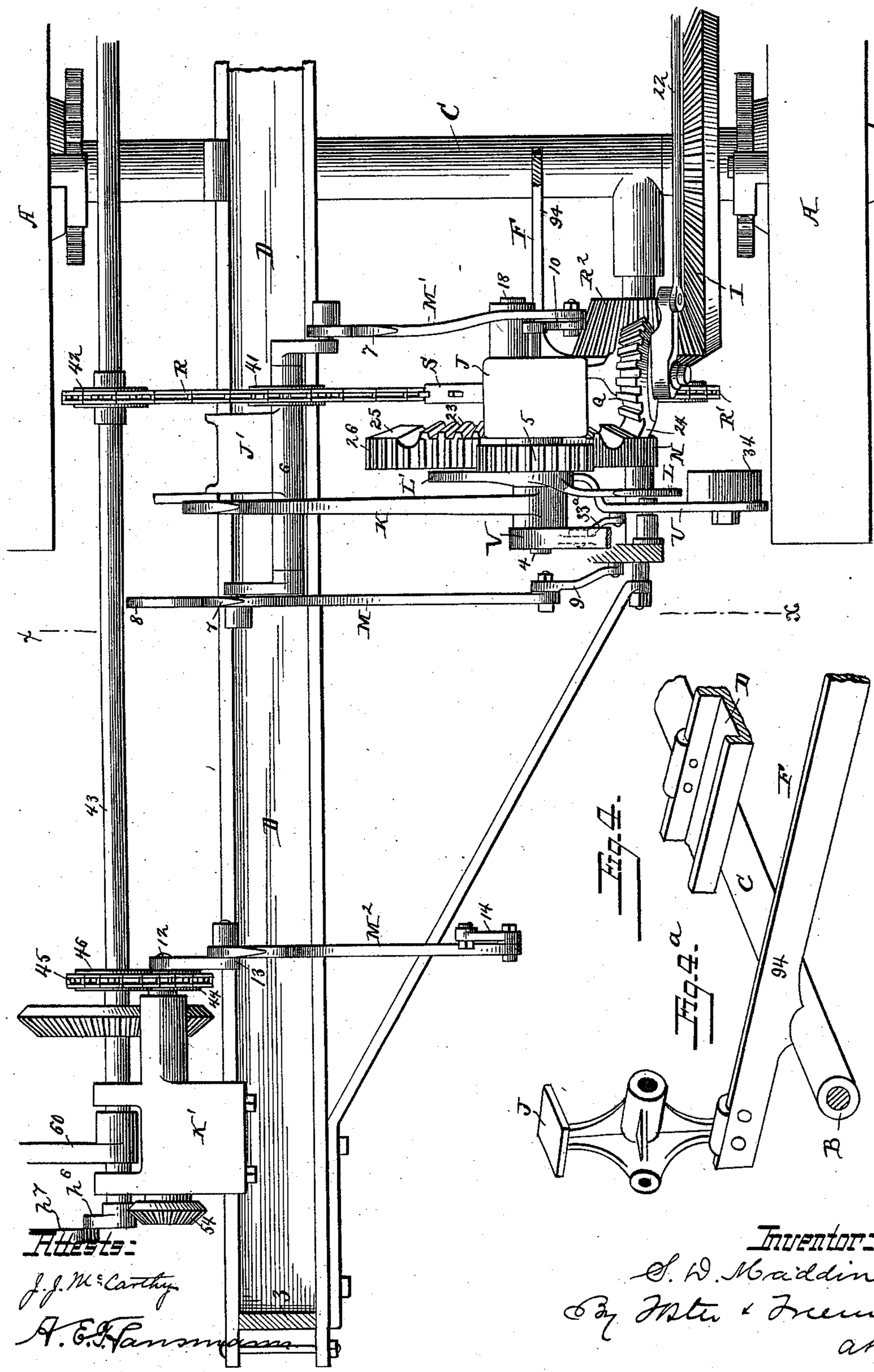

Fig. 4.

Fig. 4a.

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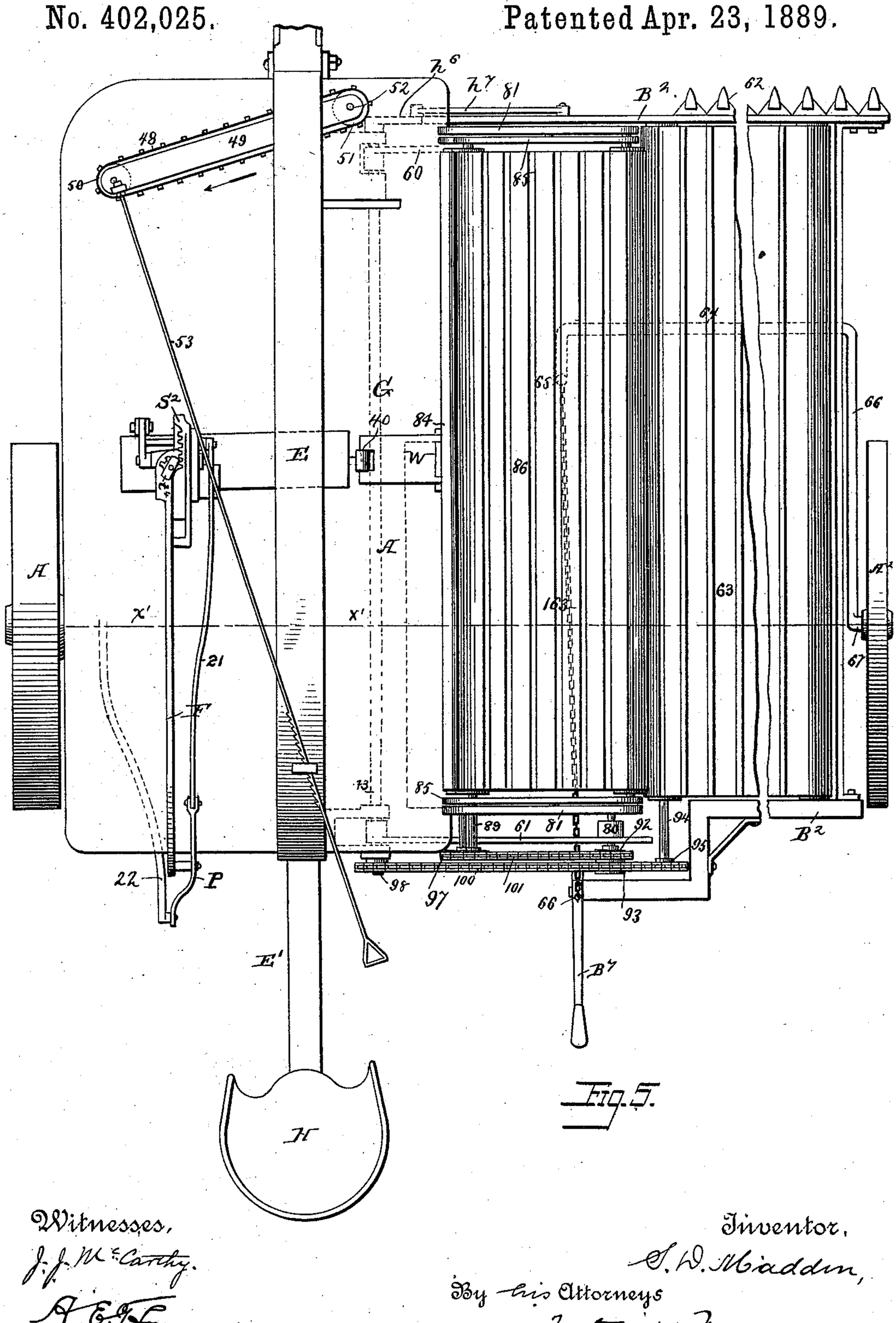

Fig. 5.

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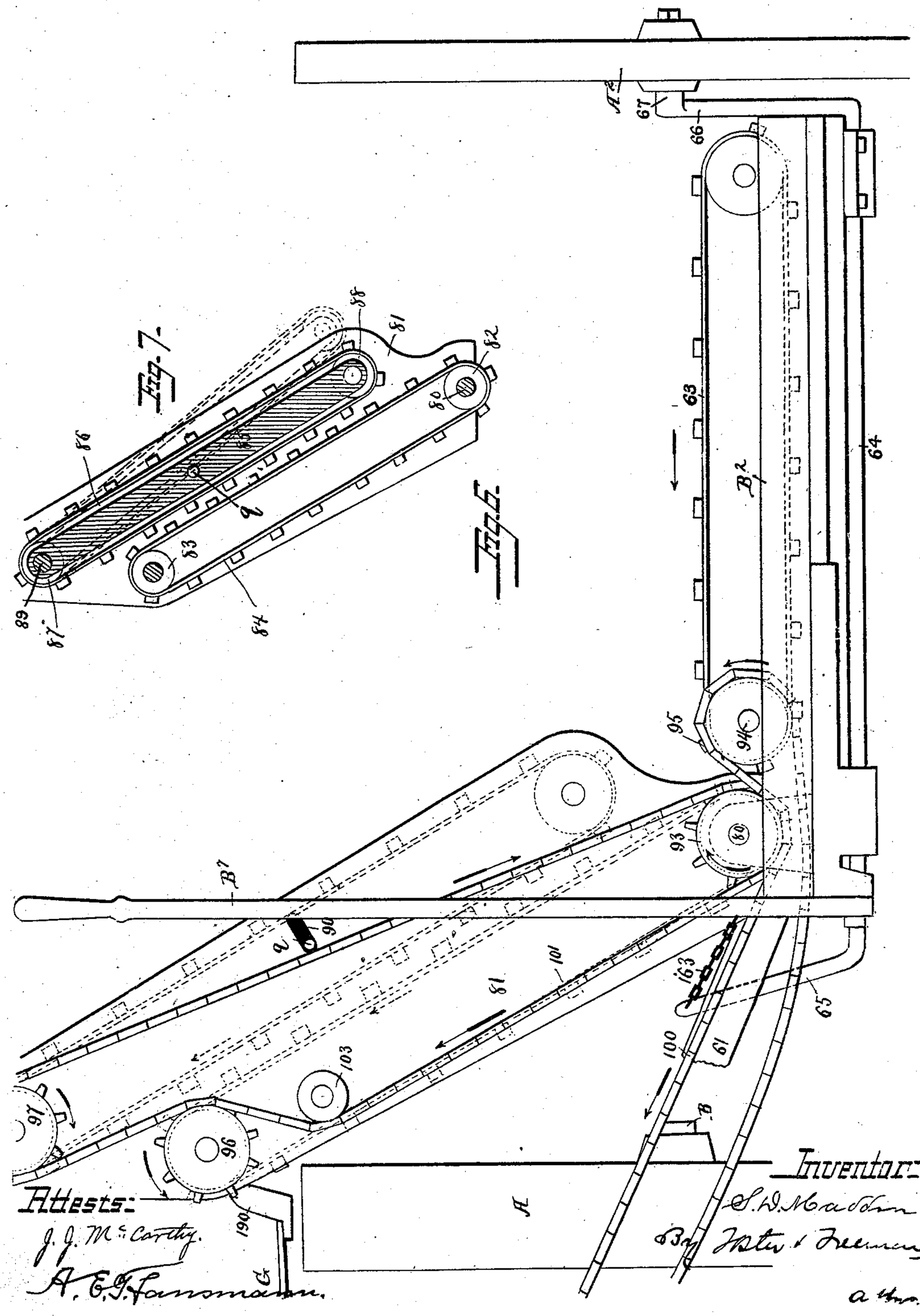

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No. 402,025. Patented Apr. 23, 1889.

Fig. 8.

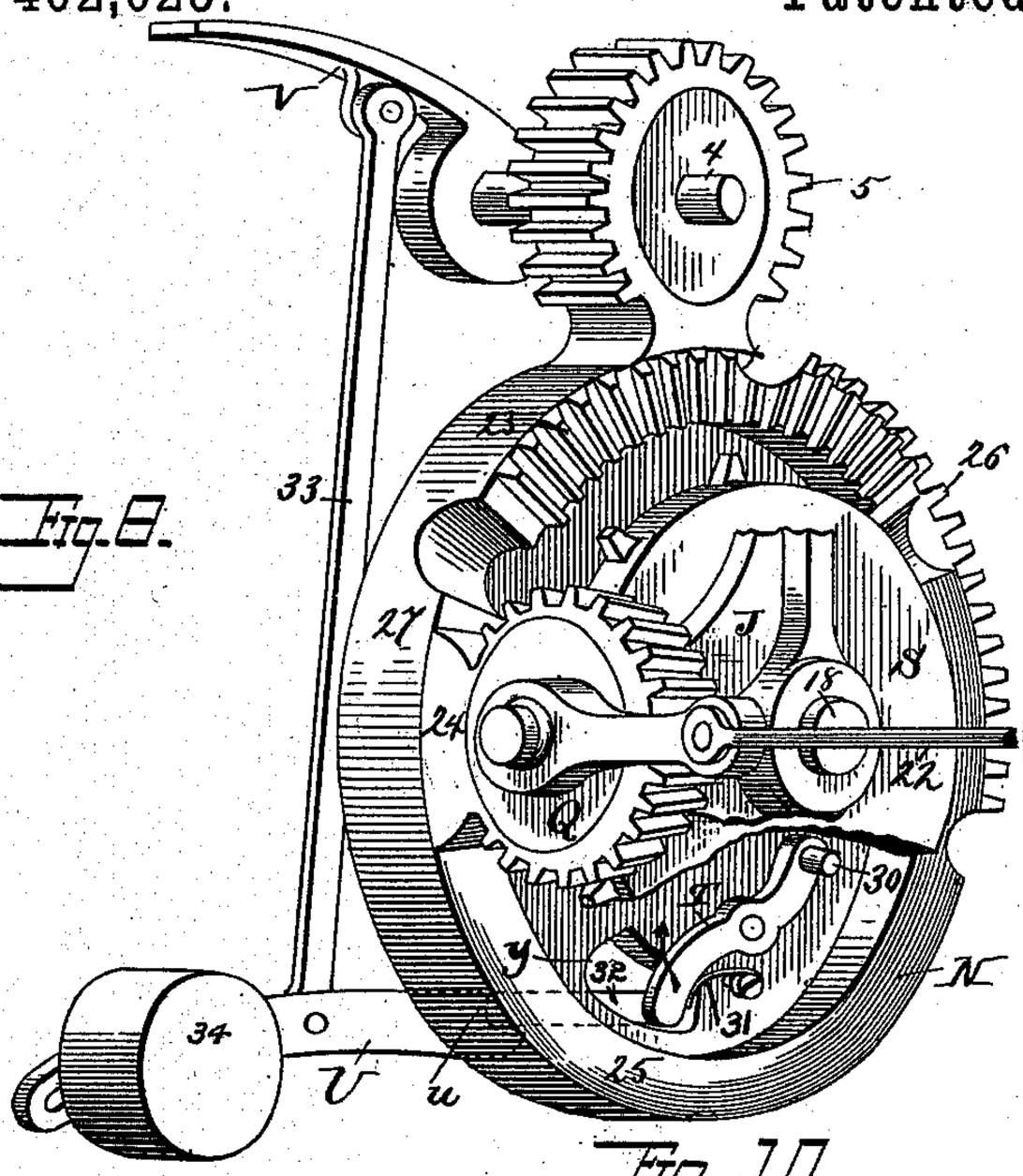


Fig. 9.

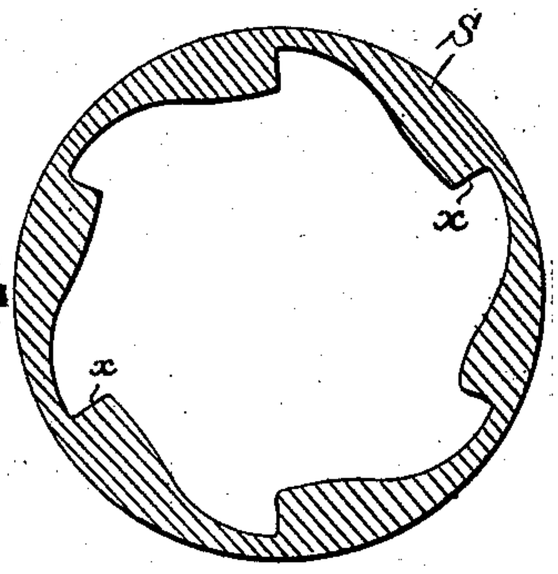


Fig. 10.

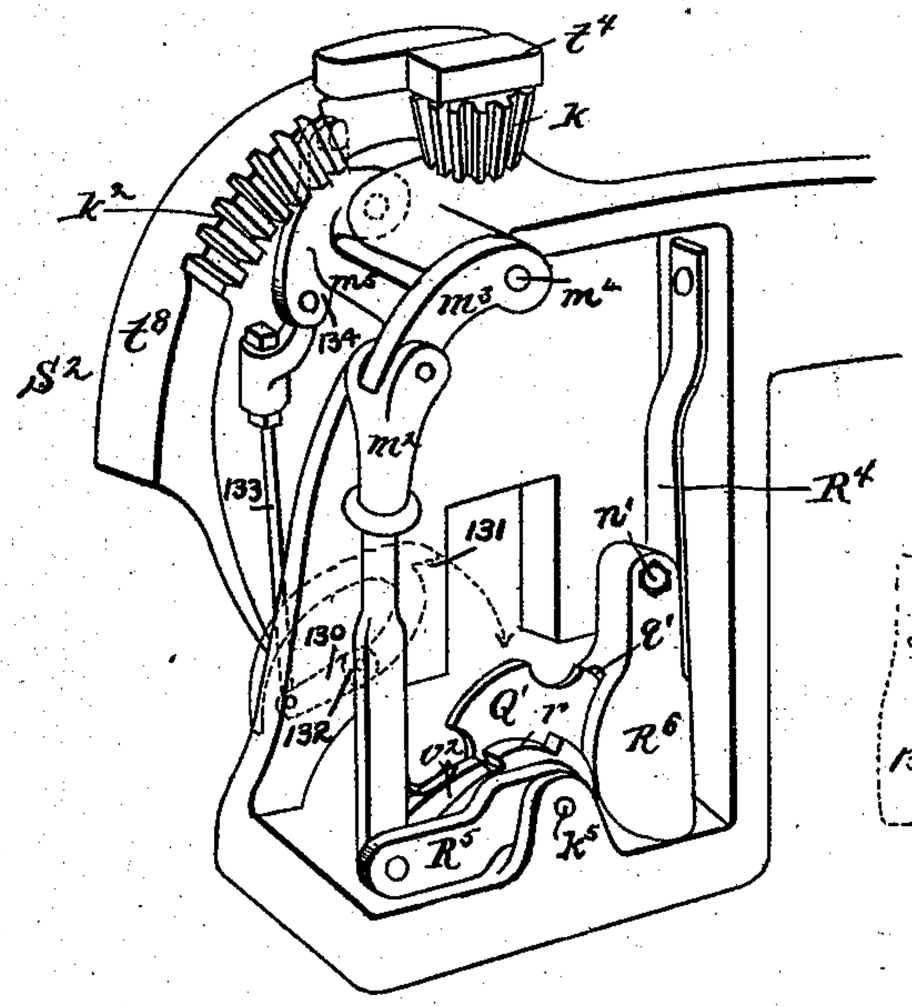
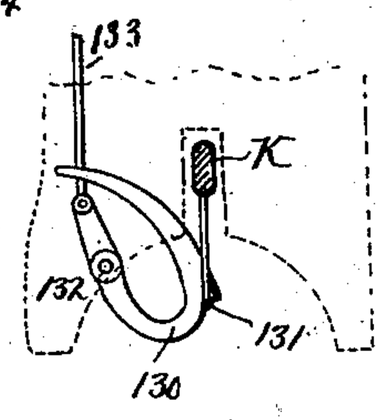


Fig 10a



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8 Sheets—Sheet 8.

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HARVESTER.

No. 402,025.

Patented Apr. 23, 1889.

Fig 11.

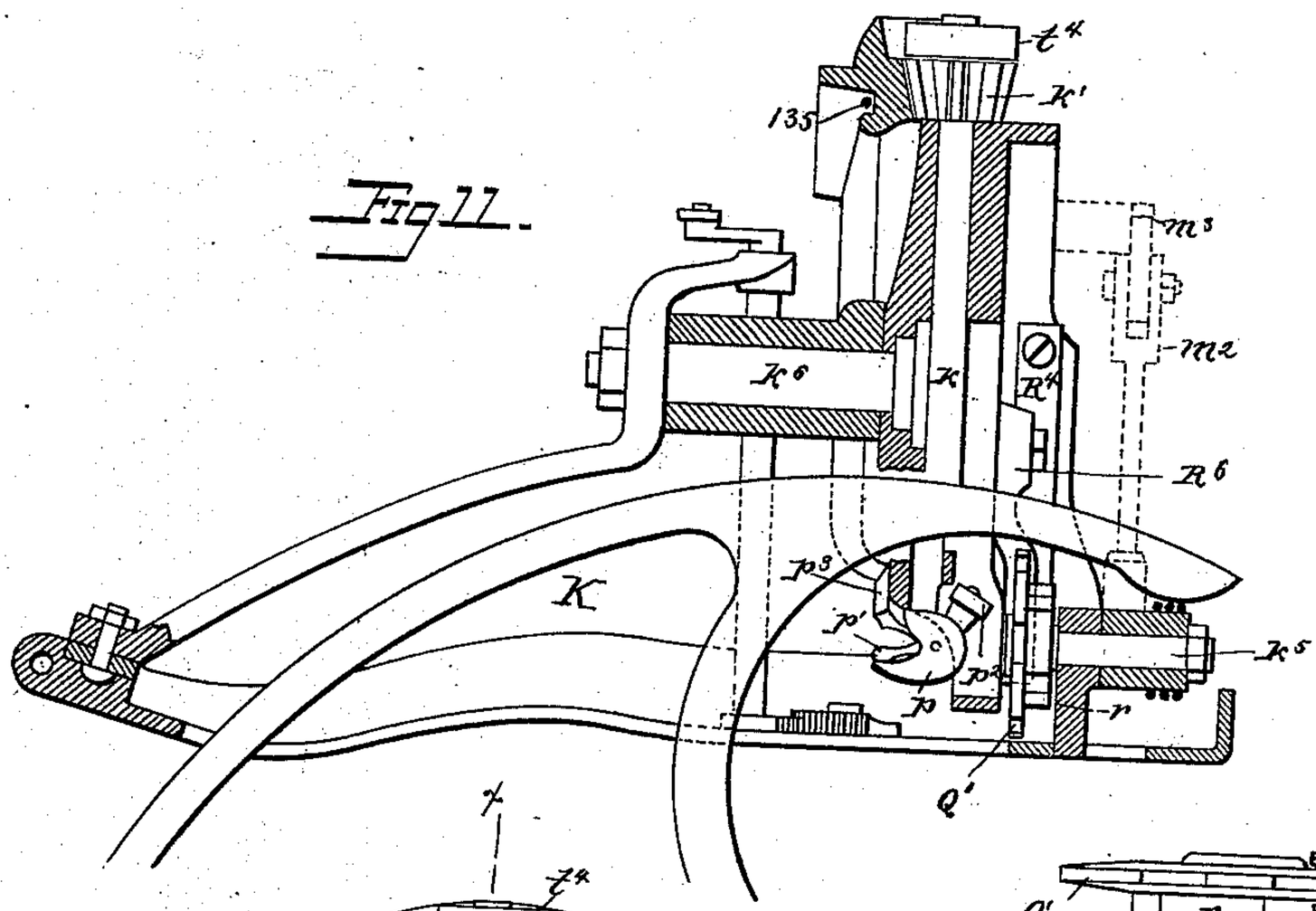


Fig 12.

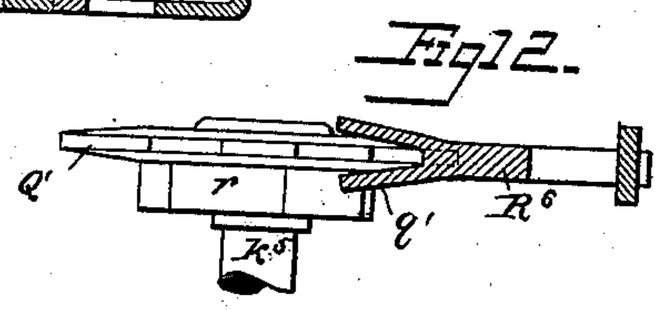


Fig 13.

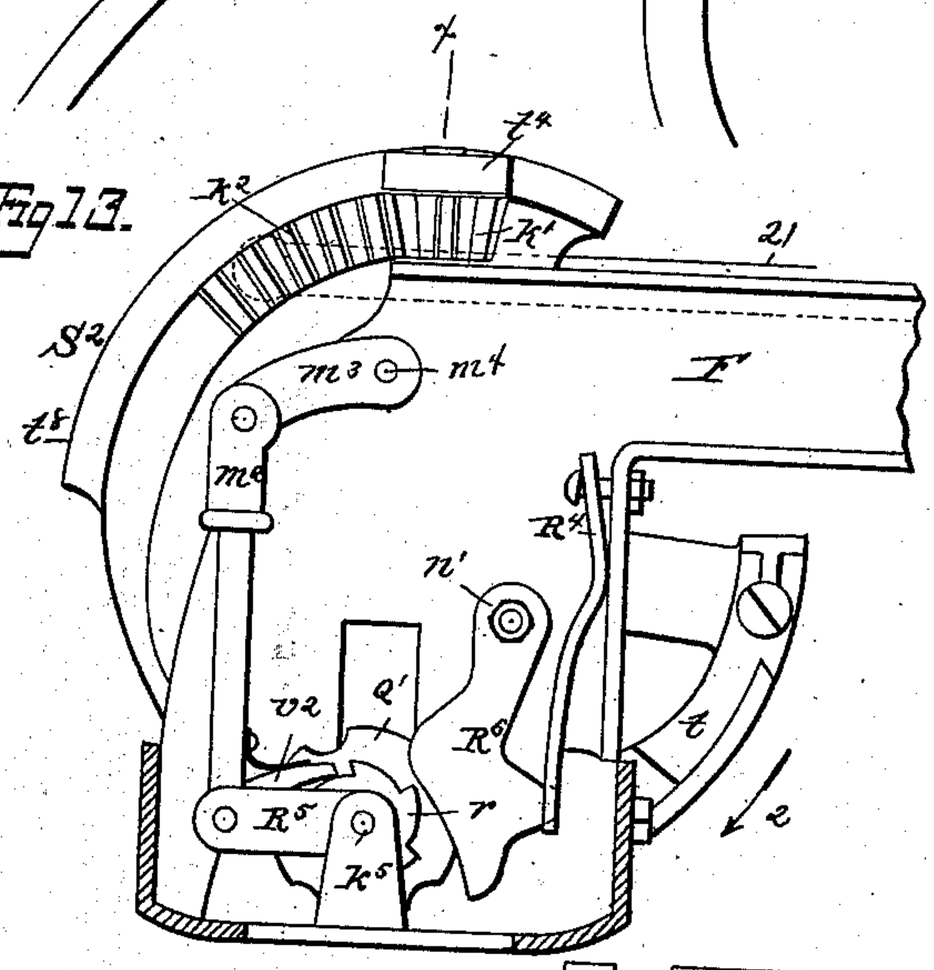


Fig 14.

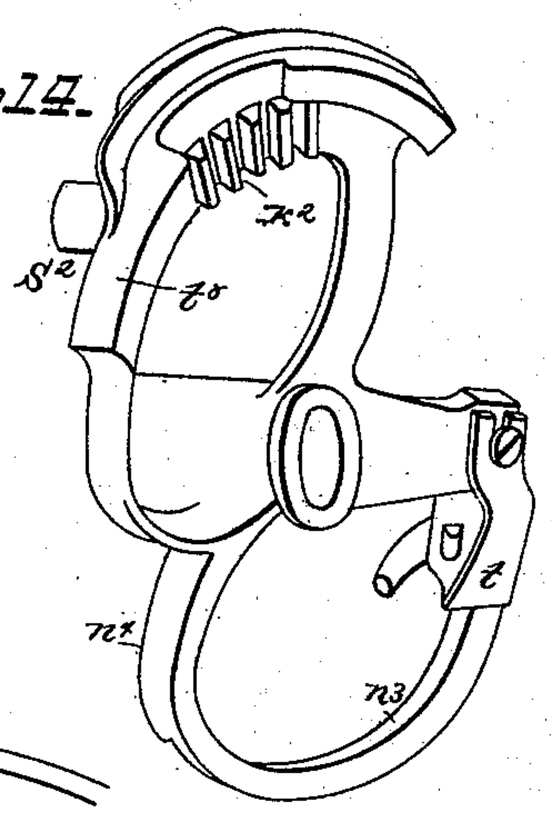
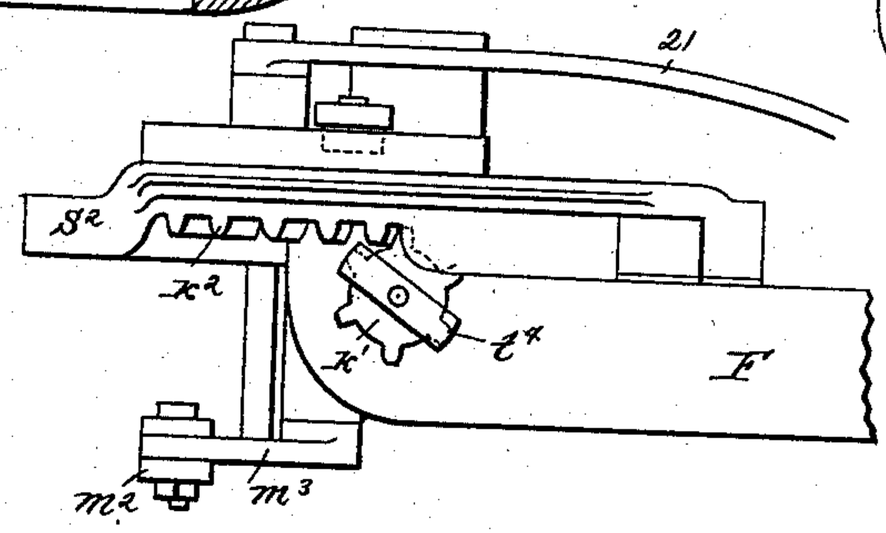


Fig 15.



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UNITED STATES PATENT OFFICE.

SAMUEL DOMINICK MADDIN, OF SARNIA, ONTARIO, CANADA, ASSIGNOR TO MARY MADDIN, OF SAME PLACE.

HARVESTER.

SPECIFICATION forming part of Letters Patent No. 402,025, dated April 23, 1889.

Application filed May 2, 1887. Serial No. 236,852. (No model.) Patented in Canada March 3, 1888, No. 28,617.

To all whom it may concern:

Be it known that I, SAMUEL DOMINICK MADDIN, a citizen of the United States, residing in the town of Sarnia, in the county of Lambton, Canada, have invented certain new and useful Improvements in Harvesters, (for which a patent has been granted in Canada, No. 28,617, and dated March 3, 1888,) of which the following is a specification.

This invention relates to grain-binders; and it consists in certain improvements thereon, as illustrated in the accompanying drawings and fully hereinafter set forth.

My invention has for its object, among other things, to simplify the construction of the operating devices, to secure increased certainty in the binding operations, and generally increase the efficiency of the machine.

In the drawings, Figure 1 illustrates by a side elevation the binder side of a harvester embodying the present improvements. Fig. 2 is a rear elevation thereof enlarged, showing particularly the grain-binder and a portion of the frame supporting the grain-elevating aprons, the knotter and its supporting-frame being removed. Fig. 3 is a sectional elevation of the grain-binder, taken on the lines *x x* of Figs. 1 and 4, looking from the front of the machine. Fig. 4 is a plan view of the grain-binder, the platform being removed for perspicuity's sake. Fig. 4ª is a perspective view of parts of the binder-frame on a somewhat smaller scale than the other figures. Fig. 5 is a plan view of the complete harvester. Fig. 6 is a rear elevation of the harvester portion proper and the frame supporting the elevating-aprons. Fig. 7 is a detail sectional elevation of the elevator-aprons. Fig. 8 is a perspective view of the wheel by which intermittent movements are imparted to certain devices, and also of its immediate connecting devices. Fig. 9 is a sectional elevation of one of the sprocket-wheels. Fig. 10 is a perspective view of the knotter detached from the machine. Fig. 10ª is a detached view showing the auxiliary cord-placing finger in a position different fron that shown in Fig. 10. Fig. 11 is a sectional elevation of the knotter, taken on the line *x* of Fig. 13, showing also a portion of the needle. Fig. 12 is a horizontal sectional elevation of the notched disk and holder-shoe. Fig. 13 is a side elevation of the knotter, its guard-plate being shown in section. Fig. 14 is a perspective view of the oscillating operating-wheel of the knotter, and Fig. 15 is a plan view of the knotter.

The binder portion of the machine is supported by two wheels, A A, both connected to drive the operative parts of the binder and turning with a transverse axle, B, and the latter supports the frame of the binder, consisting of a sleeve, C, mounted upon the axle, an angle-bar, D, extending across and secured to the sleeve, a strip or bar, E, bent to form a horizontal portion, 2, extending over the binder-platform, and two vertical arms, 3 3, which extend past the ends of the platform, to which they are secured, thereby supporting and steadying the same, the ends of the arms 3 being bolted to the angle-bar D′, and a bar or plate, F, of a U shape, is also provided, one arm, 94, being secured to the sleeve C and extending parallel to the bar D, while the remaining portion curves up parallel to the strip or bar E and overhangs the platform G, and supports at its end the knob-forming appliances hereinafter described.

The driver's seat H is secured to a support, E′, extending from the rear end of the bar D, and the pole, which is pivoted to the frame, projects forward from the opposite end of the frame, in a manner not necessary to here set forth.

The various operating parts of the binder are driven from a bevel-wheel, I, turning with the axle, said axle being driven through the medium of a pawl and ratchet, which permit the machine to be moved backward without driving the bevel-wheel. The platform G is supported between and above the wheels by brackets extending to and forming parts of the frame, and in one of these brackets J, Fig. 2, just below the platform, turns a shaft, 4, upon which swings the hub of the needle K, of the usual construction, and on said shaft is secured a mutilated cog-wheel, 5, to the side of which are fastened the compressor-arm L and the dischage arm or ejector L′.

In another bracket, J′, secured to the angle-bar D turns a double-crank shaft, 6, the crank-pins of which extend through bearings in the packers M M′, the packer M having two horns, 7 8, while the packer M′ has a single horn, 7, and the outer end of the packer M, Fig. 3, is connected to a link, 9, pivoted at its lower end to the frame, while the outer end of the packer M′ is connected to a link, 10, pendent from the rear end of the shaft 4. The bar D supports another bracket, K′, in which turns a shaft, 12, having a crank-arm, 13, for operating a supplemental packer-arm, M^2, set farther front than the usual packer-arms, in order to catch grain falling at the front of the platform, and the outer end of the packer-arm M^2 is suspended from a link, 14, jointed to a stud at the lower side of the platform.

The general operations of the parts above described are similar to those in ordinary well-known machines—that is, the compressor-arm L in the position Fig. 2 receives the grain which is packed against it as delivered to the platform by the operation of the packer-arms M M′ M^2 until the needle passes the cord around the bundle and the cord is tied and cut, after which the compressor-arm descends and the bundle is knocked off by the discharge-arm or ejector L′, and the compressor-arm then brought to its first position. These operations need not be further explained, and I will now describe what constitutes the main features of my invention—that is, the contrivances for imparting motion to the various operating parts. Before doing this, however, I will refer to the fact that the compressor, instead of vibrating from its upper to its lower position, as usual, moves around the axis of the shaft 4 as a center, in the direction of the arrow, Fig. 2, thus traveling in a circle, its movement being arrested as soon as it assumes a position to receive the grain packed against it by the packers. In like manner the discharge-arm L′ revolves instead of reciprocating, following the path of the compressor, and preferably connected thereto, as before described. By this mode of operation I not only simplify the character of the actuating devices and operate the compressor and discharge arm by a single action, but I also avoid the accidental catching of the finished bundle, which is apt to result occasionally when the compressor-arm, having a vibrating motion, returns to its position. Moreover, should the ejector or discharge-arm fail to completely throw off the bundle, the compressor itself, traveling outwardly, will act as a discharger to effect the desired result.

The reciprocating movements of the needle and the intermittent rotary movements of the compressor and discharge-arm, and also the movements of the knotter devices, are all effected from the rotation of a single wheel, N, located below the binder-platform in a plane by the side of the needle. This wheel N turns upon a shaft, 18, extending through the bracket J, and is provided at the outer side, Fig. 3, with a pin, 19, connected by a link, 20, with the needle at a point but a short distance from the fulcrum thereof, so that each revolution of the wheel N results in a complete vibration back and forth of the needle, which is thus operated directly from the said wheel, and the power is applied to the needle between its fulcrum and its point, thereby avoiding the strain which results from applying the power to the shaft upon which the needle is mounted, as heretofore has generally been done.

The knotter devices carried by the overhanging portion of the arm or bar F are all operated by the reciprocation of a rod, 21, Fig. 1, connected to a lever, P, pivoted to the arm F near its center, and this lever is vibrated by the movement of a crank-wheel, Q, the crank-pin of which is connected to a rod, 22, extending to the lower end of the lever P. The wheel Q revolves only during the formation of the knot and cutting of the cord, and is then held stationary during the other operation of the machine, for which purpose it is formed as a mutilated cog-wheel provided with teeth around part of its periphery adapted to a rack, 23, at one side of the wheel N, and with a delay-shoe, 24, which, during the time that the knotting devices are to remain stationary, is in contact with a plain face, 25, upon the side of the said wheel N. A similar mutilated wheel, 5, before described, operates in conjunction with a rack, 26, and a plain face, 27, upon the periphery of the wheel N, to impart the desired movements to the compressor and ejector arms and to lock them in position when the grain has been packed. The wheel Q lies in a plane at right angles to that in which the wheel N lies, so that I obtain a reciprocating motion in a direction parallel with the shafts of the other main operative parts of the machine for the reciprocating knotter-operating devices.

It will be observed that the wheel S, which drives the wheel N, is smaller than wheel N, so that the rack 23 and the face 25 are outside the periphery of wheel S, which permits the mutilated gear Q and the link 22, operated thereby, to pass wheel S without interference therefrom or from the chain driving it. By thus connecting the compressor and ejector arms directly to the wheel or pinion 5, gearing directly with the wheel N, and by operating the knotting devices directly from the pinion or wheel Q, also operated directly by the wheel N, I greatly simplify the construction of the machine, reduce the number of its parts, decrease its weight, and avoid the friction which results in ordinary machines where there are numerous intermediate connecting devices, while, owing to the direct connections, the lost motion is much less than usual. Further, the construction described enables me, in a machine of the character described, to mount the mechanism which drives the needle, compressor, packers, &c., low down and near the

main axle of the machine, while the knotting mechanism, which is mounted above the binder-platform, is intermittently operated by the simple link-and-lever mechanism shown without requiring the more or less complicated gearing heretofore in use at the end of the platform.

The wheel N is not operated continuously, as the compressor-arm and the needle and the knotter devices must all remain at rest while the grain is being packed against the compressor-arm. I therefore provide means whereby the wheel N may be driven from a continuously-moving chain, R, which operates the other parts of the machine, the movements of which are not to be interrupted. It is also important to start the wheel N in operation as soon as but not before the requisite amount of grain has been brought between the packers and the compressor-arm to form a bundle of the desired size. To effect this intermittent operation of the wheel N from a continuously-moving chain, and to start it in operation as soon as the requisite amount of grain has been accumulated, I use a sprocket-wheel, S, driven by the chain R, and an intermediate connection or catch depending upon the pressure of the grain against the compressor-arm and trip for its position, and serving to lock the sprocket-wheel S and the wheel N together when in one position and in another position to unlock them, so that the sprocket-wheel can continue its revolution without imparting movement to the wheel N.

Different intermediate locking devices may be employed, as well as different means for adjusting them according to the pressure of the grain against the trip-arm. In the drawings, Figs. 3 and 9, the wheel S is shown as recessed at one side to form a series of shoulders, x, and to the adjacent face of the wheel N is pivoted a lever, T, provided with a roller-stud, 30, and a spring, 31, tends to throw the lever T in the direction of the arrow, Fig. 8, and when so thrown the stud 30 is brought into a position to be struck by one of the shoulders x of the wheel S. When the wheel N is in such a position that the needle K is lowered and the compressor is at rest, a pin, 32, extending from the lever T through an opening, y, in the wheel N, will strike a weighted lever, U, pivoted to the frame of the machine, which will tilt the lever T to such a position as to carry the stud 30 away from the path of the shoulders x, so that the sprocket-wheel S will revolve without imparting motion to the wheel N.

To the shaft 4 is pivoted loosely a foot, V, connected by a link, 33, to the weighted lever U in such manner that the weight 34 tends to raise the inner end of the lever and lift the foot to the position shown in Figs. 2 and 3 and present a shoulder u of the lever U in position to be struck by the pin 32 of the lever T. The grain thrown toward the compressor-arm L also presses against the foot V, but does not affect the position of the latter until such an amount of grain has accumulated between the compressor-arm and the packers as to cause a pressure upon the foot sufficient to depress the same and lift the weight 34, and by changing the position of the weight the amount of pressure which will thus become necessary to move the foot may be varied as desired. When the foot is depressed, the inner end of the lever U is carried downward and away from the pin 32 of the lever T, which is then thrown to such a position that the succeeding shoulder x of the sprocket-wheel S will strike the stud 30, and thereby carry the wheel N around with the wheel S until a revolution is completed, when the pin 32 will again strike the lever U, which has returned to its upper position in consequence of the removal of pressure upon the foot resulting from the discharge of the grain.

In order to prevent the grain from being so freely fed by the packers after the needle begins to rise, I provide a light frame, W, Figs. 3 and 5, which is lifted as the point of the needle rises above the platform, and thereby holds the mass of grain in such a position as not to be caught by the packers. Such a frame may be differently arranged and raised and lowered in different ways. As shown in Fig. 3, it consists of a narrow plate pivoted at the rear end, v^2, to the platform G, and provided at the front edge with a roller, 40, and of such size as to extend over the point of the needle when the latter is down, so that when the needle rises it lifts the frame to the position shown in dotted lines, Fig. 3, thereby lifting with it the grain to such a height that the packers will take but slight hold upon the grain, thus avoiding packing the same against the rear edge of the needle. The sprocket-chain R passes around a sprocket-wheel, R′, forming part of the bevel-wheel R^2, meshing with the bevel-wheel I, and the said chain also passes against the under side of the sprocket-wheel S and around a sprocket-wheel, 41, upon the packer-operating shaft 6, and also around a sprocket-wheel, 42, upon a long shaft, 43, at the rear of and parallel to the angle-bar D, which shaft carries at the end a crank, h^6, connected with the usual cutter-operating pitman, h^7. The supplemental packer-shaft 12 is driven from the shaft 43 through the medium of two sprocket-wheels, 44 46, and a sprocket-chain, 45.

It is very desirable to sometimes shift the grain which falls upon the platform so as to throw its center as nearly as may be to a position to be encircled by the cord, and to effect this purpose I make use of a vertical endless adjusting-apron, 48, carried by two rollers, 50 51, in a swinging frame, 49, which may be swung around a vertical shaft, 52, carrying the roller 51, by means of an adjusting-rod, 53, extending to a position adjacent to the driver's seat. The band 48 travels in the direction of the arrow, Fig. 5, and when the frame is set to the proper angle the ribs

of the band catch upon the butts of the grain and gradually shove the latter backward on the platform to the desired position. The shaft 52 is driven from the shaft 12 through the medium of gear-wheels 54 55, as best shown in Figs. 1 and 4.

The platform-frame B^2 of the harvester part of the machine is connected to the frame of the binder by means of two arms, 60 61, bolted to the platform, (see Fig. 2,) and pivoted to the shaft 43, (see Figs. 4 and 5,) and this frame B^2 carries the cutter-bar 62 at the forward edge, and also carries the rollers around which travels the conveyer-belt 63, and the said frame B^2 rests upon a longitudinal bar, 64, bent up at one end to form an arm, 65, and at the opposite end to form an arm, 66, with an axle, 67, extending laterally from its end in line with the axle B and supporting a bearing-wheel, A^2, equal in diameter to the wheels A A. The longitudinal portion 64 of the rod is near the forward edge of the frame B^2, so that by turning or rocking the rod in its bearings the front edge of the frame, with its cutters, may be raised or lowered to cut to any desired height, and it will be seen that the frame of the whole machine, including both the harvester and the binder, thus rocks upon a line, x', Fig. 5, near the rear edge of the machine-frame, and so far from the front edge that the frame may be lifted at such front edge or depressed without imparting to it such an angle as results when the frame is supported upon bearings nearer the center. I thus secure a more extended movement without imparting to the frame so great an angle.

In order to rock the shaft 64, I connect the arm 65 by a chain, 163, to a hand-lever, B^7, in position to be readily reached by the operator.

The construction of the elevators may be best understood from Figs. 5, 6, and 7. To the frame B^2 are secured brackets, in which turns a shaft, 80, extending through side pieces, 81, of the elevator-frame, carrying a loose roller, 82, round which and round a roller, 83, extends the elevator-belt 84. Within the side pieces, 81, swings the frame 85 of the upper elevator-belt, 86, which passes round rollers 87 88, the roller 87 being carried by a shaft, 89, extending through the side pieces, 81, and the bearings of the roller 88 turning in the frame 85, so that the upper frame can swing down against the lower belt, thereby maintaining the two belts in contact, even when a small portion of grain is being lifted. The movement of the upper elevator-frame, 85, is limited by a pin, q, extending through a slot, 90, in one of the side pieces, 81. The side pieces, 81, rest upon a bar, 190, at the inner edge of the platform G, and slide over the latter as the harvester-frame is lifted and depressed, so that the delivery ends of the belts are always in position to discharge the grain onto the platform. On the end of the shaft 80 turn freely two sprocket-wheels, 92 93. On the end of the shaft 94 of the inner roller of the conveyer-belt 63 is a sprocket-wheel, 95, and on the ends of the shafts of the upper belt-rollers are sprocket-wheels 96 97. The sprocket-wheel 93 is driven by a chain, 100, from a sprocket-wheel, 98, on the end of the shaft 43, Fig. 5, and with the wheel 93 turns the wheel 92, carrying with it a sprocket-chain, 101, which passes around the wheel 92, around the wheel 97, and is held in contact with the wheel 96 by means of a guide-roller, 103. The chain 100 does not pass round the wheel 93, but is carried below the same and around the wheel 95 on the shaft 94, so that the chain 100 drives not only the belt 63, but also the elevators.

As the chain 101 drives only the upper rollers of the elevators and turns them in opposite directions, they are both effectually operated to elevate the grain, thus avoiding the use of a duplicate set of chains heretofore generally required.

Heretofore both elevator-belts have been driven by a single crossed belt passing around pulleys on the elevator-belt shafts; but this is impracticable with a sprocket drive-chain, all the parts of which must lie in substantially the same plane to work satisfactorily.

The knotter devices are supported at the end of the arm F, overhanging the table and having its standard nearest the rear of the machine, so that the knotter devices shall be directly in line between the driver's seat and the horses, and so that the driver without withdrawing necessary attention from the animals is enabled to maintain a constant watch upon the packing operations and instantly observe the breaking of the cord or any improper action of the parts.

Any suitable knot-forming devices may be used in connection with the parts already described; but I prefer to employ those illustrated in the drawings, consisting, mainly, of a revolving knotter provided with two jaws, a cord-holding disk and plate, and a cutter.

The stationary jaw p of the knotter, Fig. 11, is secured to a shaft, k, turning in bearings in the head of the overhanging arm, and the movable jaw p' is pivoted to the jaw p, and extends beyond the heel of the same and is provided with a friction-wheel, p^2, a cam projection being so arranged upon the head as to be struck by the wheel p^2 to open the jaw p' at the proper time.

The shaft k is provided at its upper end with a pinion, k', adapted to engage with a reciprocating rack, k^2, whereby the knotter is rotated a complete revolution first in one direction to seize and knot the cord, and then in the other to release the cord.

Heretofore the knotter, when above the table, has been generally rotated from a shaft carried by the overhanging arm or frame and driven by gears or otherwise from a shaft below the table. This arrangement has resulted in considerable friction and lost motion, and necessitates heavy gearing, all of which

I avoid by transmitting the power through the medium of the lever P, pivoted to the side of the arm F, vibrated from below the platform.

The rod 21 is connected with the rack k^2, which rack may be a portion of a wheel, S^2, as shown, the reciprocation of the rack resulting in the rotation of the pinion k' first in one direction and then in the other.

The usual notched disk, Q′, is arranged at the side of the knotter in position to permit the end of the needle to pass above the same, so as to lay the cord in one of the notches, and the revolution of the disk carries the cord into the slot q', Fig. 12, of a plate, R^6, hung to a screw-pin, n', extending from the head of the arm and pressed toward the disk Q′ by a flat spring, R^4, bolted to the head.

In order to insure the bending of the cord around the jaws of the knotter as it is laid thereon by the passage of the needle, I provide an auxiliary finger, 130, Figs. 10 and 10^a, carrying a hook, 131, at its end, adapted to take the cord stretching from the needle and press it downwardly to one side of the jaws of the knotter, and thus the catching of the cord by said jaws is insured. This auxiliary finger is pivotally mounted at 132 to the knotter-head, and has an arm to which is connected a rod, 133, carried by one arm of a bell-crank lever, 134, that is pivoted to the upper part of the knotter-head. The other arm of this lever 134 is provided with a friction-roller extending in operative contact with a cam, 135, formed in the front face of the reciprocating segmental wheel S^2, which acts to rock said lever at the proper times and thus vibrate the finger 130, for the purposes before described.

In order to secure sufficient force to carry the cord with certainty when doubled around the edge of the disk into the slot q' of the plate R^6, I mount the disk upon a stud, k^5, Figs. 11 and 13, and provide the disk at one side with a ratchet-wheel, r, and hang a lever, R^5, to the stud, and connect a pawl, v^2, to the lever, so as to engage with the ratchet r by the pressure of a spring, and I vibrate the lever R^5 so as to rotate the disk with a step-by-step motion. By applying the power to the end of the lever R^5, I am enabled to apply sufficient force to turn the disk easily and prevent its movement from being arrested by the jamming of the cord in the recess of the plate R^6. A rod, m^2, is connected to the end of the lever R^5, and connected to any moving part of the machine to reciprocate the lever. In the construction shown the rod is connected to an arm, m^3, pivoted upon a shaft, m^4, Figs. 10 and 13, and secured to the bell-crank lever 134 through a connection, m^5, and is thus moved in unison therewith.

Upon a stud, k^6, projecting from the head of the overhanging arm, rocks the wheel S^2, provided with radial arms, between two of which is carried the curved rack k^2, and between the opposite arms extends a guard, n^3, one of the arms constituting or carrying a guide plate or shield, n^4, Fig. 14, and the other carrying a knife, t, so arranged that as the wheel rocks in the direction of its arrow 2 the said knife will be carried close to the inner side of the disk Q′ and will sever the cord between the disk and the knot.

The plate n^4 has a curved edge which occupies a position back of the knotter during the time the knot is being formed, and prevents the cord from slipping off of the knotter-hook, and the guard n^3 carries a finger which is brought in contact with the knot after the latter has been formed and while the cord is held in the jaws of the knotter, and thereby draws and tightens the knot upon the cord, after which a projection carried by the guard n^3 passes beneath the lower jaw of the knotter and along a curved recess therein, and, catching upon the loop, carries the latter off of the knotter as the cord is severed.

It will be evident that while I have shown one form of knotter and knotting devices different mechanism may be employed for making and severing the knot in connection with other of the improved devices and arrangement of devices which I have described, and that some of said improvements may be used separately from the others.

It will of course be evident that the knotter devices may be supported by any suitable frame extending over the platform of the binder, instead of by the overhanging arm F.

In different parts of my improved machine I have used and described connections which, while effective to communicate motion between certain of such parts, may be replaced by other connecting devices. I therefore do not limit myself to those shown, as different forms will occur to any one skilled in the art.

I do not in this application make claim to the knotting devices herein shown and described, since the novel features thereof are claimed in another application of mine, Serial No. 292,130, filed November 28, 1888.

I claim—

1. The combination, with the two supporting-wheels and axle of a grain-binder, of a sleeve on the axle, a frame supported on the sleeve, a platform supported by the frame, and a U-shaped bar, F, supported by the frame below the platform and extending above the same, and a knotter supported by the bar F above the platform, substantially as described.

2. A binder-frame supported upon two wheels and an axle, and consisting of a sleeve, C, mounted on the axle, a bar, D, arranged transversely across the sleeve to which it is secured, a grain-platform supported upon brackets rising from said bar and sleeve, and a U-shaped bar or plate supported at one end upon the frame below the platform, and having the other end extending above the same where it carries a support for the knotter, substantially as described.

3. A binder-frame provided with a longitudinal bar, D, brackets rising from said bar, a binder-platform supported on said brackets, and a strip or bar, E, extending above the platform and having downwardly-extending arms secured to the frame and supporting the platform at the ends, substantially as described.

4. The combination, with a continuously-rotating wheel, S, and the needle, of an intermittently-rotated wheel mounted below the binder-platform in a plane beside the needle and actuated from the wheel S, and provided with a crank-pin, and a link mounted on the said pin and connected directly with the needle, substantially as described.

5. The combination, with the knotter devices, the compressor, the ejector, and the needle, of the intermittently-rotated wheel N, mounted below the binder-platform in a plane beside the needle, and having a crank-pin connected by a link directly with the needle, and provided with separate racks, and mutilated pinions driven by the racks and driving, respectively, the knotter devices and the compressor and ejector, substantially as described.

6. The combination, with the compressor, the ejector, the needle, and the knotter, of an intermittently-rotated wheel, N, adjacent to the needle and connected directly therewith, gears between the compressor and the ejector and the wheel N, a bevel-wheel, Q, gearing with wheel N, and link-and-lever connections between the wheel Q and the knotter, substantially as described.

7. In a grain-binder, the combination, with the needle and the ejector supported upon the needle-shaft, of an intermittently-moving wheel, N, which drives the needle, mounted below the binder-platform in a plane beside the needle, and a gear-wheel, 5, connected with the ejector and driven directly by said wheel N, substantially as described.

8. In a grain-binder, the combination, with the needle and the compressor and ejector, both mounted upon the needle-shaft, of a wheel, N, arranged below the binder-platform in a plane beside the needle, but below the needle-shaft, and connected to drive the same, and a wheel, 5, to which the compressor and ejector are secured, driven directly by the wheel N, substantially as described.

9. In a grain-binder, a frame supporting the binder devices, located between two drive-wheels of equal size, which are both connected to drive the operative parts of the binder, a binder platform or table mounted on said frame extending over the said wheels, and an elevator supported by pivoted links from the said frame and resting loosely at its upper end upon a bar at the grain or receiving end of the binder-platform, substantially as described.

10. The combination of the packers M M′, projecting through the binder-platform near the central portion thereof, cranked shaft 6, driving the same, a supplemental packer, M^2, projecting through the platform near the front edge thereof, a shaft, 43, parallel with the main packer's shaft, and a short shaft, 12, parallel thereto connected to drive the supplemental packer and driven from shaft 43, substantially as described.

11. The combination, with the platform, sleeve C, packers, needle, compressor and ejector arms, and knotting mechanism, of a bracket, J, carried by the sleeve and supporting the devices connected to drive the needle, compressor and ejector arms, packers, and knotting devices, substantially as described.

12. The combination, with two supporting-wheels, of the binder and the intermediate sleeve rocking upon the axle, of the packer, binder, discharge and knotter operating devices arranged above, close to, and forward of the sleeve, and the driver's seat in rear of said sleeve, substantially as described.

13. The combination of the frame of the binder supported upon two wheels, the platform-frame B^2, rocking together with the binder-frame on a line in rear of its center, arms connecting said frame to the binder, a shaft, 64, bearing against the under side of the platform-frame near its front edge, having arms at the ends, one having an axle for the grain-wheel in line with the axes of the wheels of the binder, and means for rocking the shaft 64, substantially as described.

14. The combination, with the harvester-frame rocking with the binder-frame on a fulcrum in rear of its central line and flexibly connected to the binder-frame and traveling therewith, of a longitudinal bar located near the forward part of said harvester-frame and having a rearwardly-extending arm and axle for a grain-wheel with its journal about in line with the journals of the binder-wheels, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SAMUEL DOMINICK MADDIN.

Witnesses:

WM. J. HANNA,

N. MACKENZIE.