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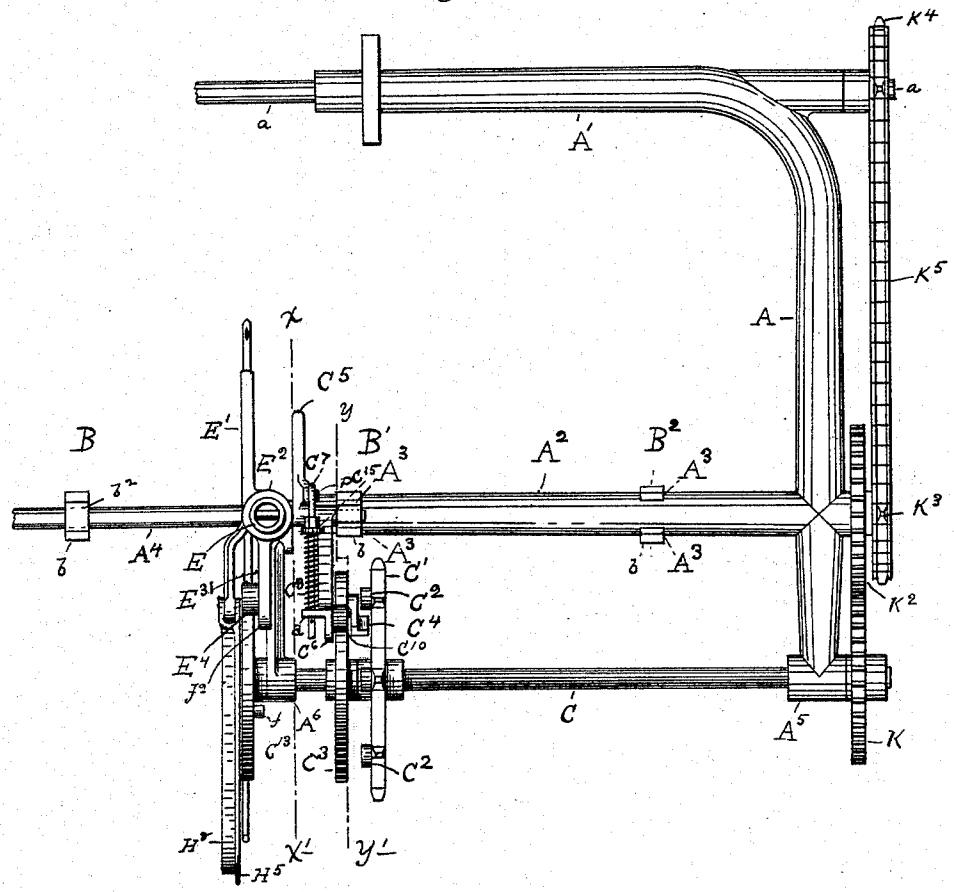
G. G. HUNT.

GRAIN BINDER.

No. 527,497. Patented Oct. 16, 1894.

Fig. 1.



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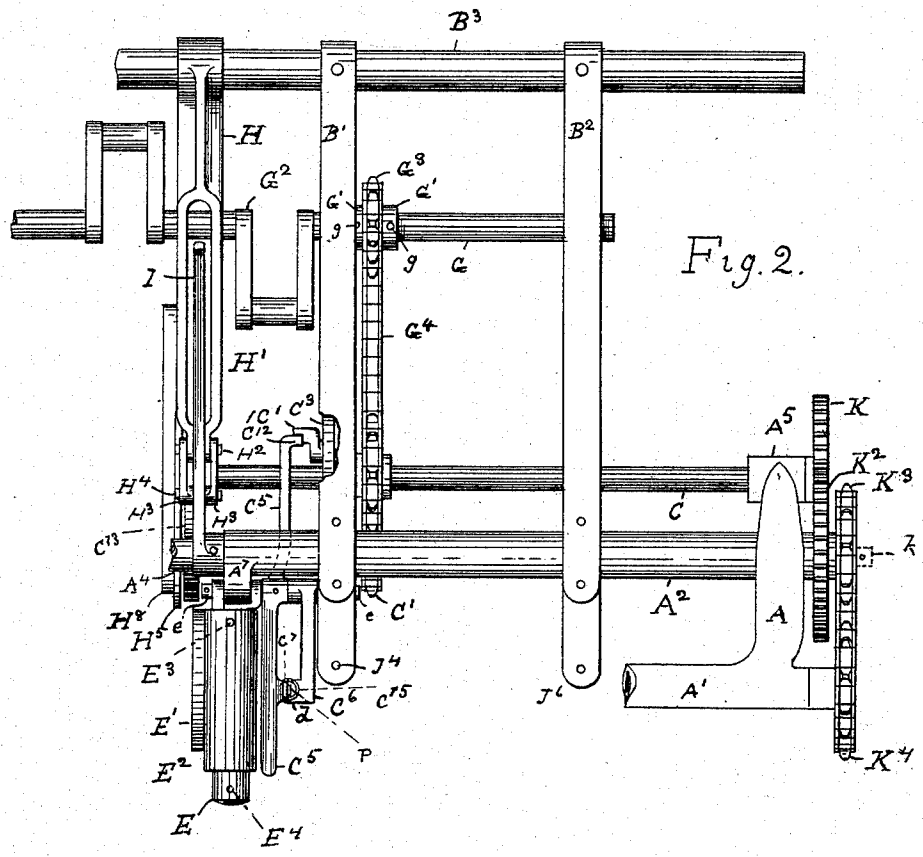

Fig. 2.

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GRAIN BINDER.

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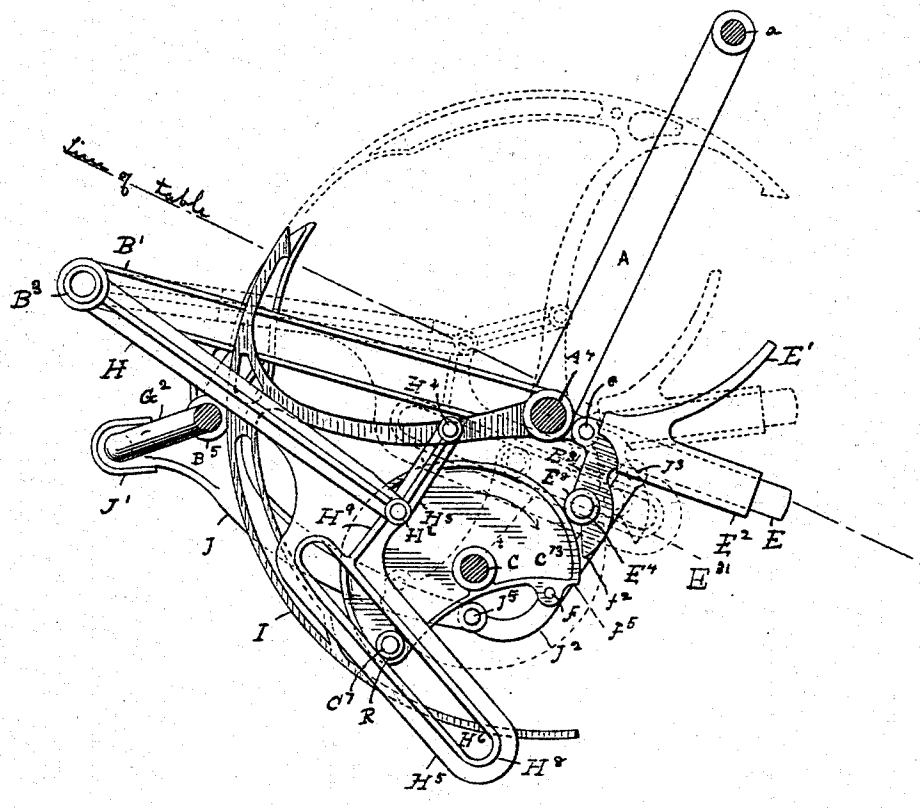
Fig. 3.



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GRAIN BINDER.

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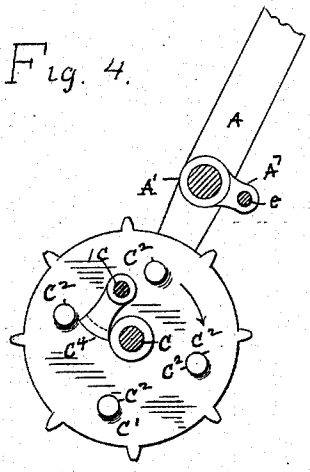
Fig. 4.



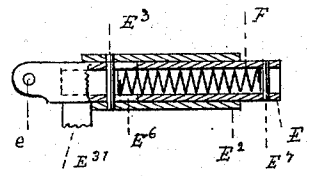


Fig. 7.

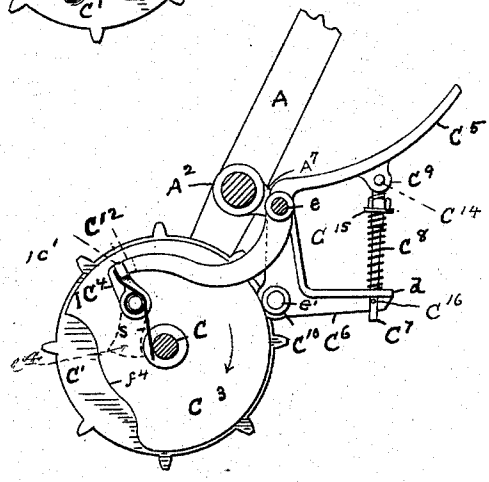


Fig. 5.

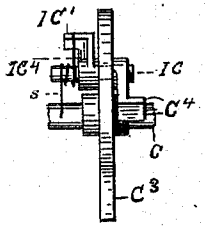


Fig. 6.

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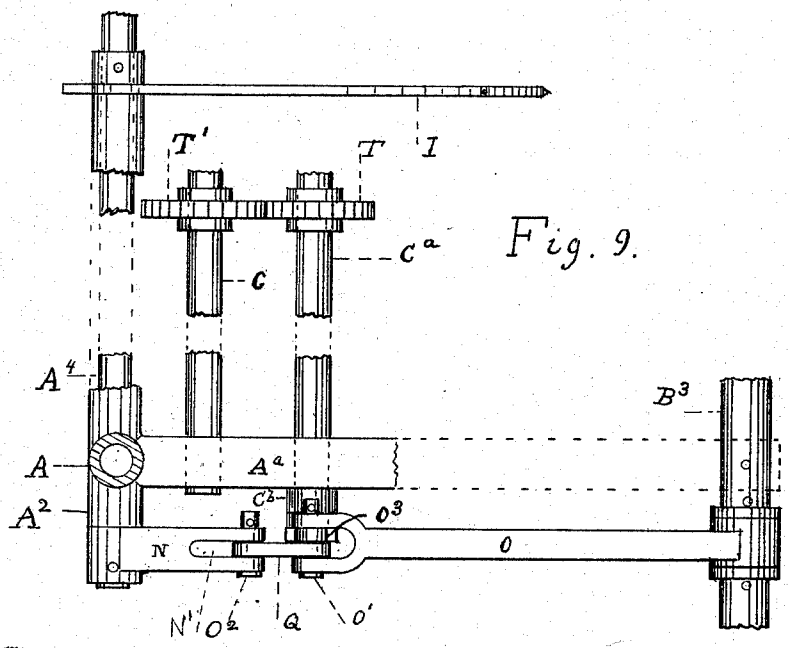

Fig. 9.

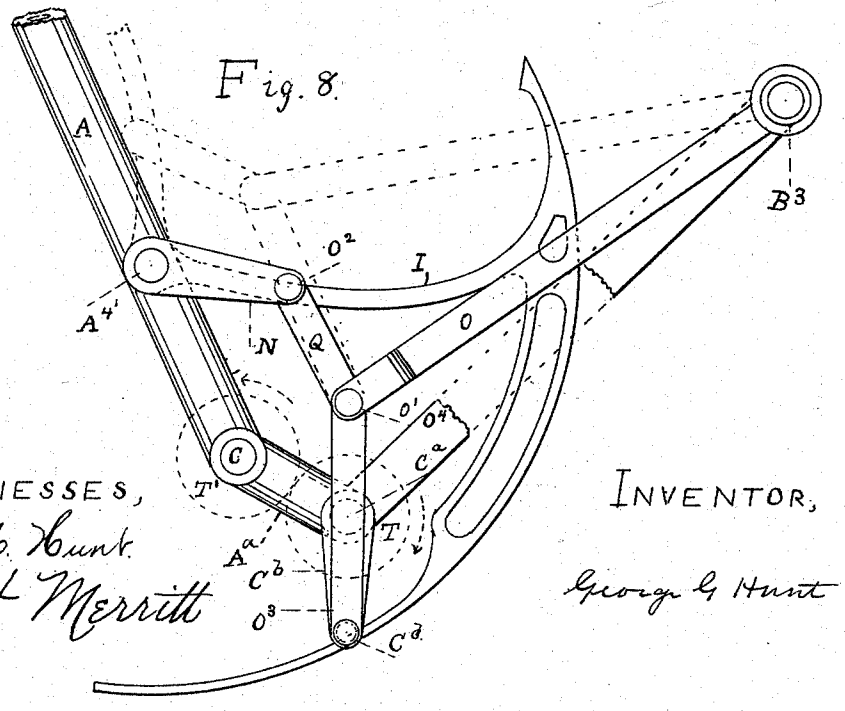

Fig. 8.

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UNITED STATES PATENT OFFICE.

GEORGE G. HUNT, OF BRISTOL, ILLINOIS.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 527,497, dated October 16, 1894.

Application filed December 16, 1893. Serial No. 493,816. (No model.)

To all whom it may concern:

Be it known that I, GEORGE G. HUNT, a citizen of the United States, residing at Bristol, in the county of Kendall and State of Illinois, have invented a new and useful Improvement in Grain-Binders, of which the following is a specification.

The object of my invention is to provide a method of operating the needle which will enable me to compress the bundle in such a manner that there is but little resistance to the movement of the driving wheel, whereby I am enabled to construct a lighter harvesting machine than heretofore wherein the ordinary method of operating the needle is used. I attain this object by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side view of my invention looking from the stubble side of the machine. Fig. 2 is a broken plan view of a portion of the machine. Fig. 3 is a section showing a front view of the working parts of my invention. Fig. 4 is a sectional rear view on the line *y*, *y'* Fig. 1 of a part of the binder frame with driving sprocket wheel mounted thereon. Fig. 5 is a sectional view from the rear on the line *x*, *x'* Fig. 1 showing the trip mechanism. Fig. 6 is a view of a part of the trip mechanism, looking from the stubble side. Fig. 7 is a longitudinal sectional view of the compressor body showing its interior. Fig. 8 is a modification showing a front view of those parts of my invention designed to operate the needle when mounted on a rock shaft driven from the front. Fig. 9 is a plan of parts shown in Fig. 8.

In the drawings from Figs. 1 to 7, inclusive the letters and characters of reference indicate like parts in the several figures.

In Figs. 8 and 9, similar letters and characters of reference indicate like parts in the two figures.

In my machine the frame is preferably tubular, and in form, of the type known as the Appleby, in which A is the upright part. A', is a horizontal part or arm, in which is mounted a shaft *a*. The end of the shaft *a* projects in front to allow a sprocket wheel K^4, to be rigidly attached thereto, and the rear end projects to allow the knotter head to be supported thereon.

The knotter head may be of any usual form and is not shown.

In a lower horizontal arm A^2, is mounted loosely but firmly the front portion of a needle shaft A^4. The rear portion of the needle shaft A^4, is supported in a bearing b^2, attached to the end of a cross bar B. The opposite end of the cross bar B, embraces a longitudinal tubular bar B^3, and is firmly attached thereto. Two other cross-bars B'—B^2, are similarly attached to the bar B^3, and, at their opposite ends are forked to embrace the lugs A^3 on the horizontal arm A^2. The three cross bars B,—B',—B^2, are identical in form, and cast from the same pattern. The lugs A^3, and forked part of cross bars B'—B^2, have corresponding holes to admit bolts which clamp the bars and frame firmly together.

The lower part of the forks *b*, of the cross bars B—B'—B^2 project stubbleward and are provided with bolt holes J^4, J^6 for the attachment of packer link pivots.

A needle I is rigidly attached to the shaft A^4, in close proximity to the rear end of the arm A^2. The shaft A^4, in this case, is subjected to no torsional strain, and may therefore be of only sufficient strength to serve as a pivot for the needle and to help support the outer end of the bar B, which supports the rear end of the deck or grain table.

The binder frame is provided with hangers terminating in bearings A^5,—A^6, in which is mounted a shaft C, to the front end of which is rigidly attached a gear wheel K, and, to its rear end a crank wheel C^{13}, is similarly attached. The crank wheel C^{13}, is provided with a crank pin C^7, upon its rear side, and upon its front side it has a short projecting pin F. The wheel C^{13} is cam shaped as shown in Fig. 3. Another wheel C^3, is rigidly attached to the shaft C, in the rear of, and in close proximity to the wheel C^{13}. The wheel C^3, is cut away as shown at f^4, (see Fig. 5) and is bored to receive the pin 1C, of a driving dog C^4, which is located on the front side of the wheel C^3, the hub of the wheel forming a stop against which the dog C^4 rests as in Fig. 5. The dog C^4 is firmly attached to the pin 1C, or it may be integral therewith.

Upon the pin 1C, at the rear side of the wheel C^3, is rigidly attached an arm or lever $1C^4$, terminating in a part 1C', bent to be at a right

angle to the body of the arm or lever $1C^4$. A light coiled spring S, embraces the pin 1C,—the ends of the wire forming the spring resting under tension as shown in Fig. 5; having one end against the part 1C′, of the arm $1C^4$, and the opposite end against the shaft C, thereby acting constantly to rock the dog C^4, away from the hub of the wheel C^3, into the path of a driving pin C^2, on the wheel C′.

A trip lever C^5, is pivoted near its center upon a pin *e*. The outer part of said lever is curved upward to allow the grain to be packed against it by the packers J. The inner portion extends downward and inward, terminating in an angular part C^{12}. An angular lever or support C^6, is pivoted at its upper end upon the same pin *e*, in close proximity to the front side of the lever C^5. The lower part of the lever C^6, lies a short distance below the lever C^5, and is provided with a rearwardly projecting flange *d*, upon which rests the lower end of a coiled spring C^8, which embraces a rod C^7. The rod C^7 fits loosely at its lower end in an aperture in the flange *d*, and is confined therein by a pin C^{16}. The upper part of the rod C^7 is threaded for the reception of a nut C^{15}, which presses against the upper end of the spring C^8. The upper end of the rod C^7 is pivoted to a lug C^9, on the lever C^5 by a pin C^{14}.

Near the angle of the lever C^6, and upon its rear side, is a pin *e′* upon which is mounted a roller C^{10}, that rests upon the periphery of the wheel C^3, thereby supporting the lever C^5.

The nut C^{15}, may be adjusted to cause more or less resistance to the pressure of the grain against the lever C^5, thereby allowing greater or smaller bundles to be made as desired.

The angular part C^{12}, of the lever C^5, when in its initial position, (see Fig. 5) lies in the path of the angular part 1C′ of the dog lever $1C^4$, so that as the wheel C^3 completes its revolution the part 1C′ engages or abuts against the part C^{12}, thereby forcing the dog C^4 into the position shown in Fig. 4, and out of engagement with the driving pin C^2, on the wheel C′.

In Fig. 4, the driving dog C^4, is not intended to be shown as a part of the wheel C′, but shows its relative position to wheel C′ and its driving pins C^2.

For imparting motion to the needle I, I use a toggle jointed lever H, the inner end being pivoted on the bar B^3, for convenience. The outer end H^5 is provided with a slot H^6, having a lateral flange or rib H^8 surrounding it for wearing surface and for strength. Two links H^3 connect the lever H, between its ends with the needle I, by pin joints H^2—H^4, and the outer end H^5, is connected by the crank pin C^7, and its roller R, in the slot H^6, to the wheel C^{13}. The inner part of the lever H, is provided with a slot H′ through which the needle I, vibrates in binding, and a rib H^9, connecting the flange H^8, with the body part of the lever stiffens the structure.

The compressor may be described as follows: A hollow cylindrical bar E, provided with a pendent lug E^{31}, and forked at its inner end to impart stability, is pivoted on a lug A^7, on the binder frame, a pin *e* passing horizontally through the lug A^7 and fork of the bar E. Upon the bar E, is mounted a hollow cylinder E^2 with open ends which is adapted to slide on the bar E. The cylinder E^2, is provided with an upwardly projecting curved arm E′, which is opposite to, and in the same vertical plane as the needle I. A pin E^3 passes through the parts E—E^2 from top to bottom, fitting tightly in the part E^2, and loosely in a slot E^6, in the bar E thereby allowing the pin to move therein and allow the part E^2, to slide on the bar E. The hollow bar E, contains a spring F having its inner end abutting against the pin E^3, and held under compression by a pin E^7, in the outer end of the bar E. Upon the rear side of the lug E^{31}, is a pin E^4 upon which is mounted a roller E^8, which rests upon the periphery of the crank wheel C^{13}. The lug E^{31} terminates in a tooth f^2, which lies in the path of the pin *f*, on the wheel C^{13}.

Upon a stud attached to the frame A is a gear wheel K^2, having the same number of teeth as and meshing with the wheel K. The wheel K^2, is secured to a sprocket wheel K^3,—the two wheels being preferably integral, or cast in one piece. The sprocket wheel K^3, and the sprocket wheel K^4, have an equal number of teeth, and are connected by a chain K^5, which transmits motion to the shaft *a*, and rotates it in unison with the shaft C.

A double crank G^2, for driving the packers is mounted in hangers B^5, (see Fig. 3,) integral with the bars B—B′.

A sprocket wheel G^3, is rigidly attached to the front end of the crank G^2, and connects it with a driving shaft G, the front end of which is supported by a hanger similar to those supporting the crank.

A chain G^4, connects the sprocket wheel G^3, to the wheel C′, and is thereby kept in constant motion.

A packer J, is connected to the crank G^2, by a box and strap J′. The tail of the packer J is connected to one end of a packer link J^2, by a pin joint J^5, and the opposite end of the said link is pivoted to the frame at the point J^3.

As the packers form no part of my invention they are only shown in Fig. 3, for the purpose of showing the form and relative position of the parts. A bolt hole J^4, in the member *b*, of the bar B′, is for the attachment of the packer link pivot for the front packer, and the same member of the bar B is similarly provided for the attachment of the rear packer link pivot.

The hole J^6, in the bar B^2 is utilized for the insertion of a bolt for confining the deck or grain table,—which forming no part of my invention is not shown.

If desirable to attach a third packer, then the hole J^6 may be used in a similar manner and for the same purpose as the correspond-

ing holes in the bars B B′, the same bolt serving for both purposes.

The operation of the mechanism described is as follows: The packers J, carry the grain little by little against the compressor arm E′, until the desired amount to form a bundle is in the receptacle, when the pressure against the arm C^5, overcomes the resistance of the spring C^8, and the arm C^5, yields, and, moving on the pin *e*, the part C^{12}, rises out of engagement with the part 1C′ of the lever $1C^4$, which, through the instrumentality of the spring *s*, carries the dog C^4, into the path of the nearest driving pin C^2, on the wheel C′. The dog C^4, instantly engages said pin, and motion is thereby communicated to the wheel C^3, which continues until one revolution has been made. As the wheel C^{13}, moves in the direction of the arrow, the crank pin C^7, slides in the slot H^6, but, at the same time carries the free part, or outer end H^5, of the toggle-jointed lever H, with it, and the needle I,—being connected as described—moving upward on its pivot, stops the inflowing grain. When one quarter of a revolution of the crank pin C^7, has been made, its position is at the end of the slot H^6 nearest the pivot B^3, and for this reason the movement of the toggle jointed lever H has been the most rapid; and as the crank pin C^7 continues its rotation and slides toward the outer, or opposite end of the slot H^6, the movement of the toggle jointed lever H and needle I, becomes slower in a geometrical ratio until the extreme forward movement (represented by dotted lines in Fig. 3) of the needle has been reached, and the crank pin has arrived at the point indicated by the dotted lines in the same figure. At this time the toggle jointed lever H is extended into nearly a straight line between its pivot on the bar B^3, and its connection with the needle I, and the force being applied upon the needle in nearly a right line toward the center of the bundle, the extreme forward movement of the needle has been reached with precision, and with little strain upon either crank pin or needle, whereby the troublesome "choking" of the binder, and consequent sliding of the drive wheel of the harvester is avoided. As the wheel C^{13}, moves from its initial position, its cam shaped rim, pressing against the roller E^8, moves the compressor arm E′, toward the bundle. At first the motion of the arm E′, is quite slow, and until the needle I, begins to press the bundle said arm need move but little. Then the arm E′, is designed to move in opposition to the needle with a motion as near similar in speed and force as the form of the rim or cam of the wheel C^{13}, can be designed for that purpose, in order that the bundle may remain stationary during the process of knot tying, thereby relieving the cord of an unnecessary strain. At the time the knot is tying, the compressor with its arm E′, is at the position shown by dotted lines in Fig. 3; but this position of the arm E′, may vary by so much as a large or small bundle moves the cylinder E^2, outward against the force of the spring F, during the compressing process At the time the needle, and other connected parts, have arrived at the position represented by dotted lines in Fig. 3, the bundle is nearly ready to be discharged, but in the form of cam shown in Fig. 3, the wheel C^{13}, must move a farther distance, (approximately that between the roller E^8, and crank pin in dotted lines) before the crank pin passes the roller and allows the latter to drop into the cut away part of the wheel C^{13}. As the arm E′, drops out of the way of the discharging bundle, its upper end is just beneath the table or deck, and the roller E^8, has moved about the center *e*, until said roller has passed a straight line *t*, connecting the centers of the shaft C, of the cam wheel C^{13}, and the pin *e*. When the roller E^8, is in the last mentioned position, the cam, or its shoulder f^5, can not readily engage with the roller E^8, to return it to its initial position, but the pin *f*, engages the part f^2, on the lug $E^{3\prime}$, and moves it outward past the aforesaid straight line *t*, when the shoulder f^5, engages with the roller, and moves it until the rim of the wheel C^{13}, moves under the roller, leaving it in its initial position as the wheel C^{13}, stops.

In Figs. 8, and 9, the upright part of the binder frame is marked A, in an arm A^2, of which is mounted the needle shaft $A^{4\prime}$.

To the rear end of the shaft $A^{4\prime}$, the needle I, is securely attached by a key and pin. Upon the front end of the shaft $A^{4\prime}$, a crank N, having a crank pin O^2, is also securely attached by a key and pin.

The outer end of the crank N, is, for convenience provided with a slot N′, in which one end of a link Q, is pivoted by a pin O^2. The opposite end of the link Q, is pivoted in the forked end of a vibrating lever or bar O, by a pin O′. The forked end of the lever also receives the upper end of a pitman O^3 upon the same pin O′.

The inner end of the lever or bar O, is for convenience pivoted on a bar B^3, which is attached to the frame of the harvester, but the position of the pivot may be changed within limits to meet a variation in form of binder.

The lower end of the pitman O^3, is attached to a crank C^b, by a crank pin C^d. A shaft C^a, to the front end of which the crank C^b, is securely attached, is mounted in the lower part A^a, of the binder frame, and securely attached to the shaft C^a, is a gear wheel T. Another gear wheel T′ having an equal number of teeth, is mounted on a shaft C, on the binder frame so that the gear wheels T,—T′, mesh together. The shaft C receives motion from a constantly running part as the packer shaft. As the movements of the toggle jointed lever have been already described, it is not considered necessary to describe the movements of the modified form contained in Figs. 8 and 9, above described.

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

1. In a grain binder the combination of the frame having a binding arm or needle pivoted to said frame and vibratable thereon, a lever pivoted at its inner end to the binder frame and having a slot in its outer portion for the reception of a friction roller and crank pin of a driving crank, a link hinged at one end to the body of the needle and its opposite end hinged to the lever between its ends, and a driving crank mounted on a driving shaft of the binder, said crank having its pin and friction roller in the slot of the outer part of the pivoted lever, all arranged in the manner as and for the purpose hereinbefore set forth.

2. In a grain binder the combination of a vibratable binding arm or needle pivoted by a shaft to the binder frame, the shaft itself lying in a fore and aft position, a lever pivotally connected to the needle by a link, the inner end of said lever being pivoted to the binder frame outside the needle or toward the elevating mechanism in such a manner that when the lever and link are not flexed, and the full force of the lever is exerted upon the needle to compress the bundle the three pivots connecting the lever to the needle and to the binder frame are in a right line or nearly so, a shaft mounted on the frame parallel with the needle shaft and driven from the motive power of the machine, and a crank mounted on said shaft and connected by suitable means to the lever whereby a vibratory motion is imparted to the lever and needle, at the same time yielding a compound leverage upon the needle by the crank passing its center at the instant the lever and its link are fully extended, all the parts being arranged substantially as hereinbefore specified.

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