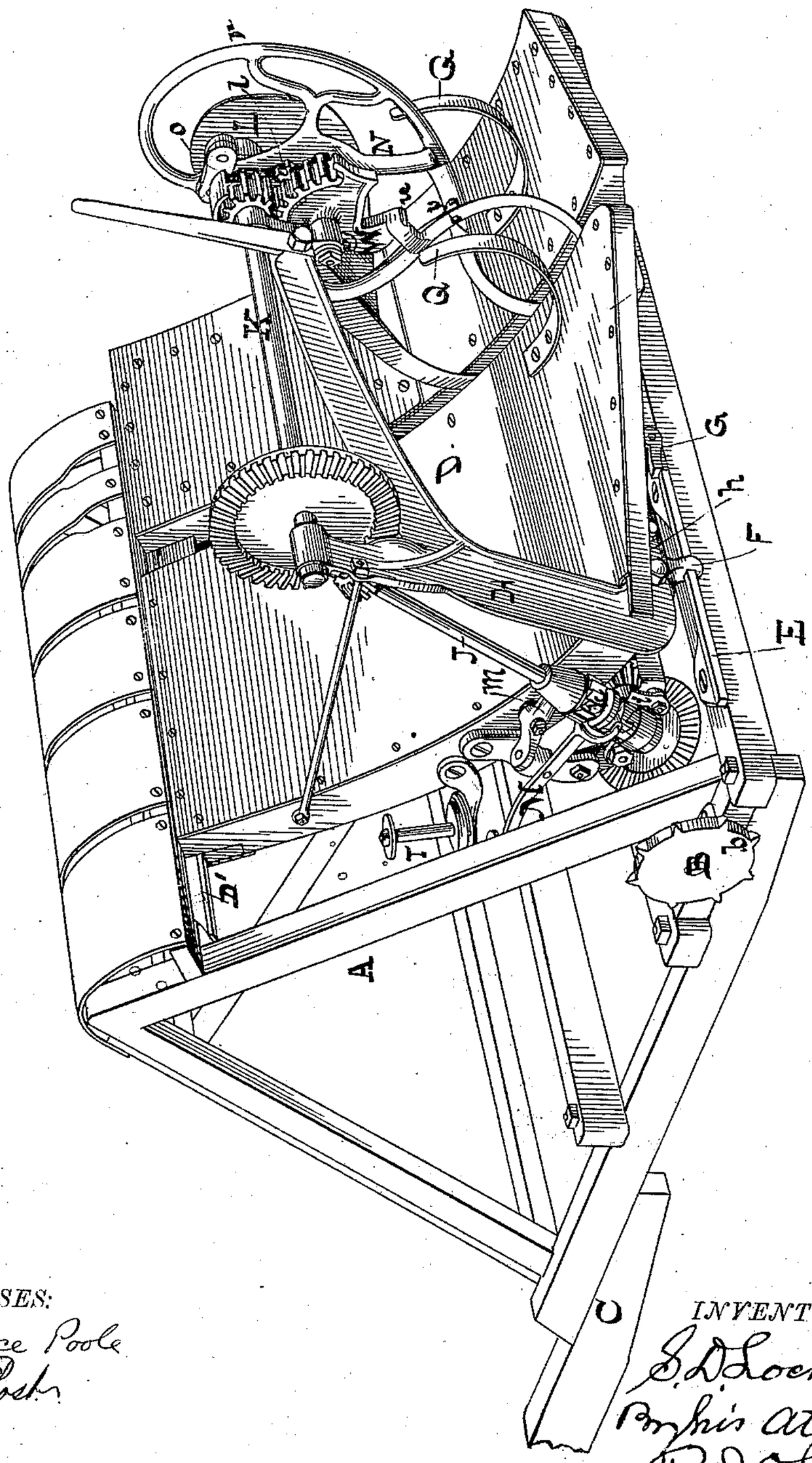
4 Sheets—Sheet 1.

S. D. LOCKE.
Grain-Binder.

No. 222,061. Patented Nov. 25, 1879.

Fig. 1



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4 Sheets—Sheet 2.

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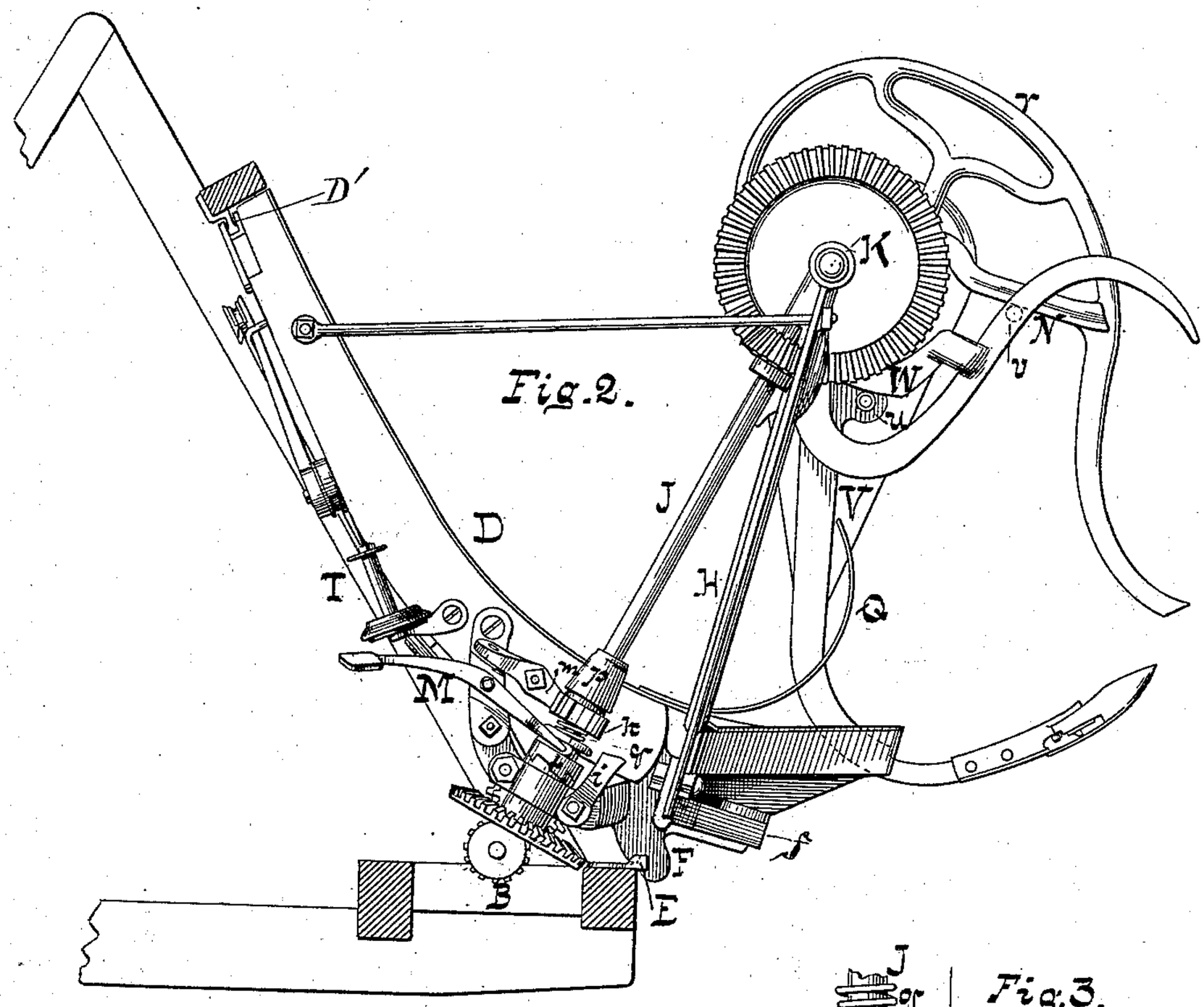

Fig. 2.

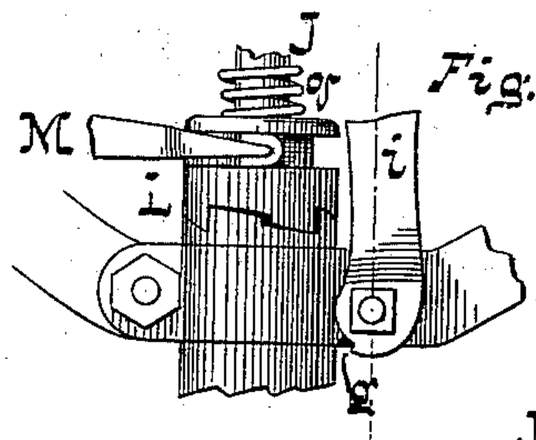

Fig. 3.

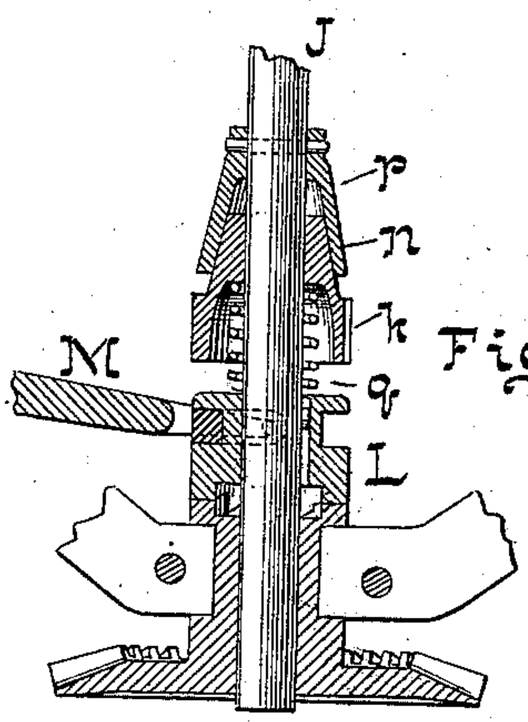

Fig. 5.

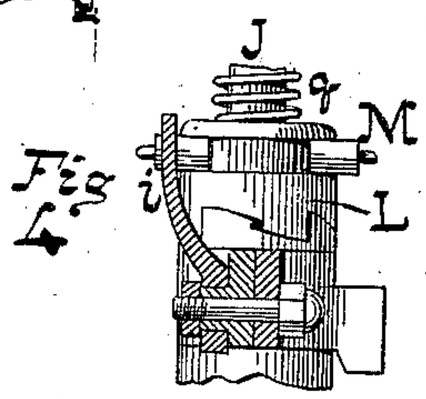

Fig. 4.

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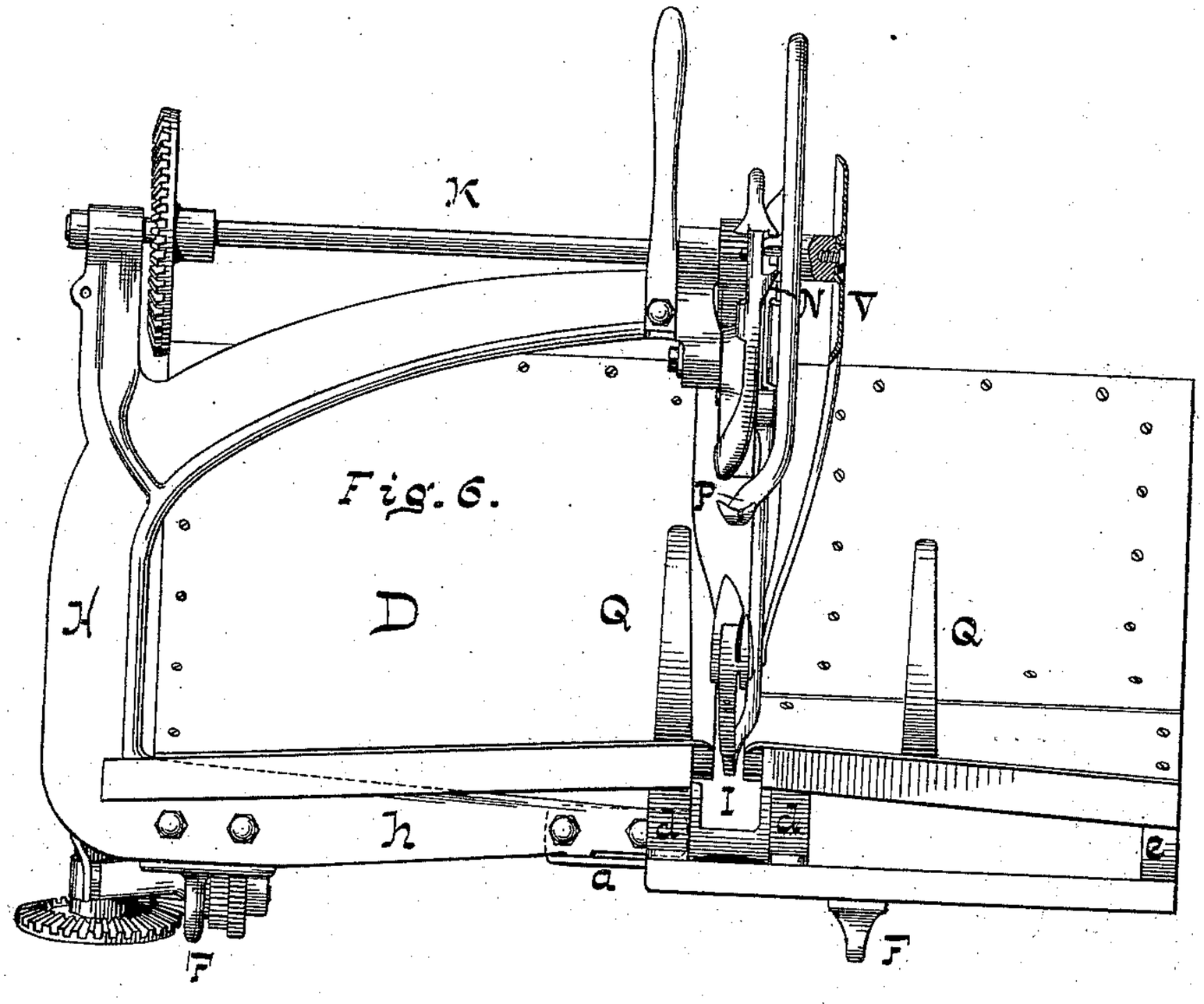

Fig. 6.

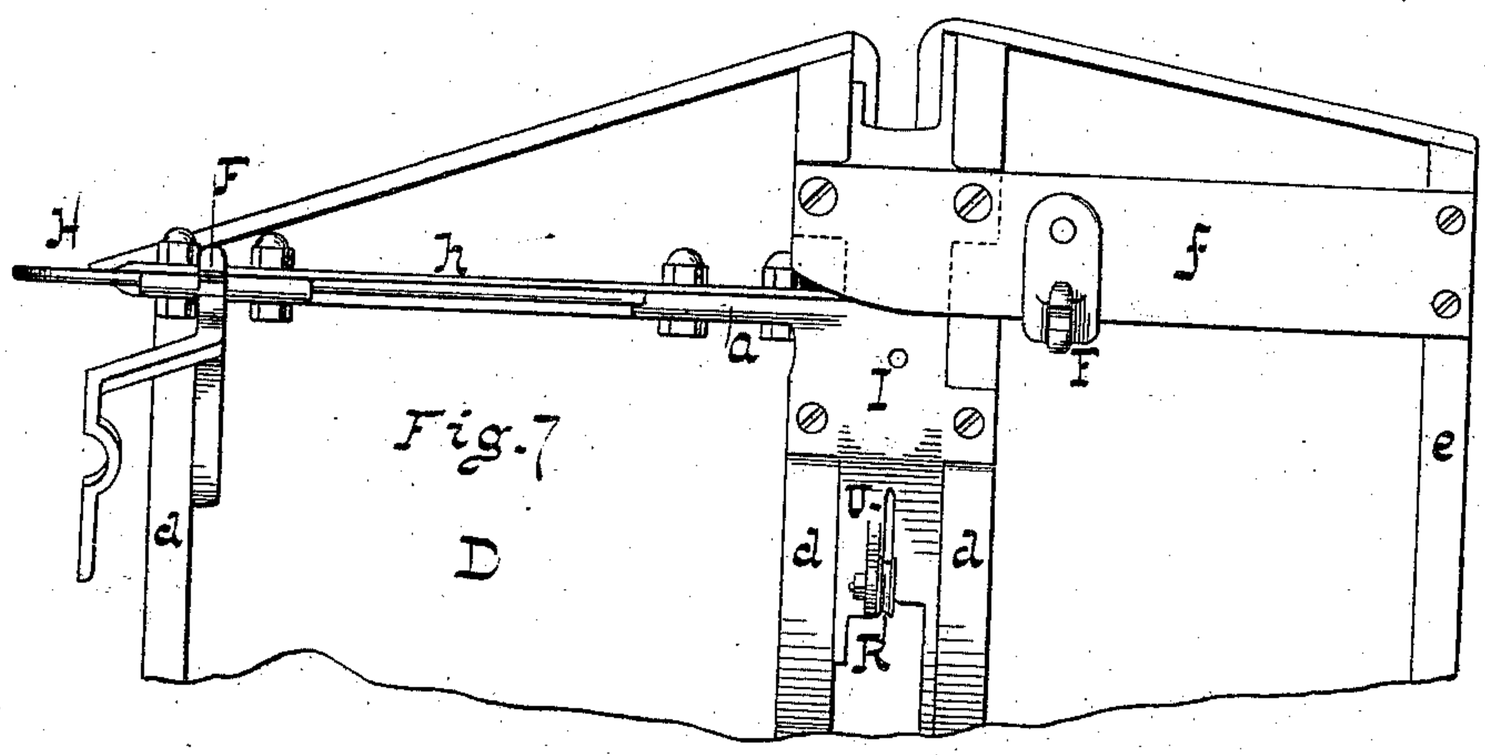

Fig. 7

D

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Grain-Binder.

No. 222,061. Patented Nov. 25, 1879.

Fig. 9.

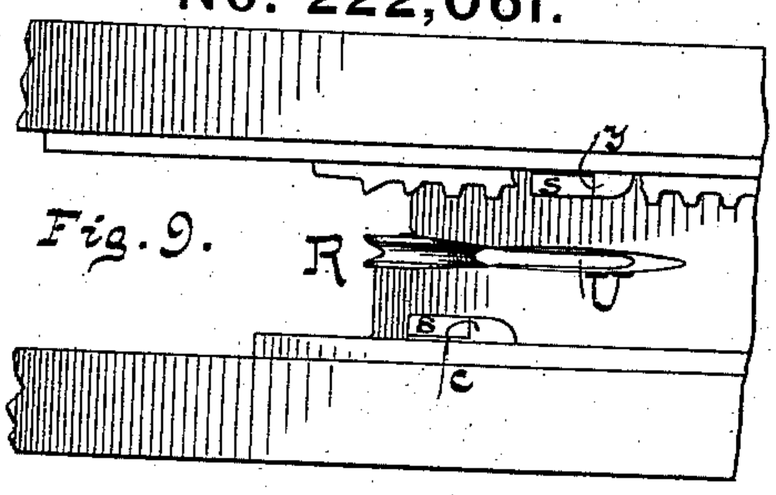


Fig. 8.

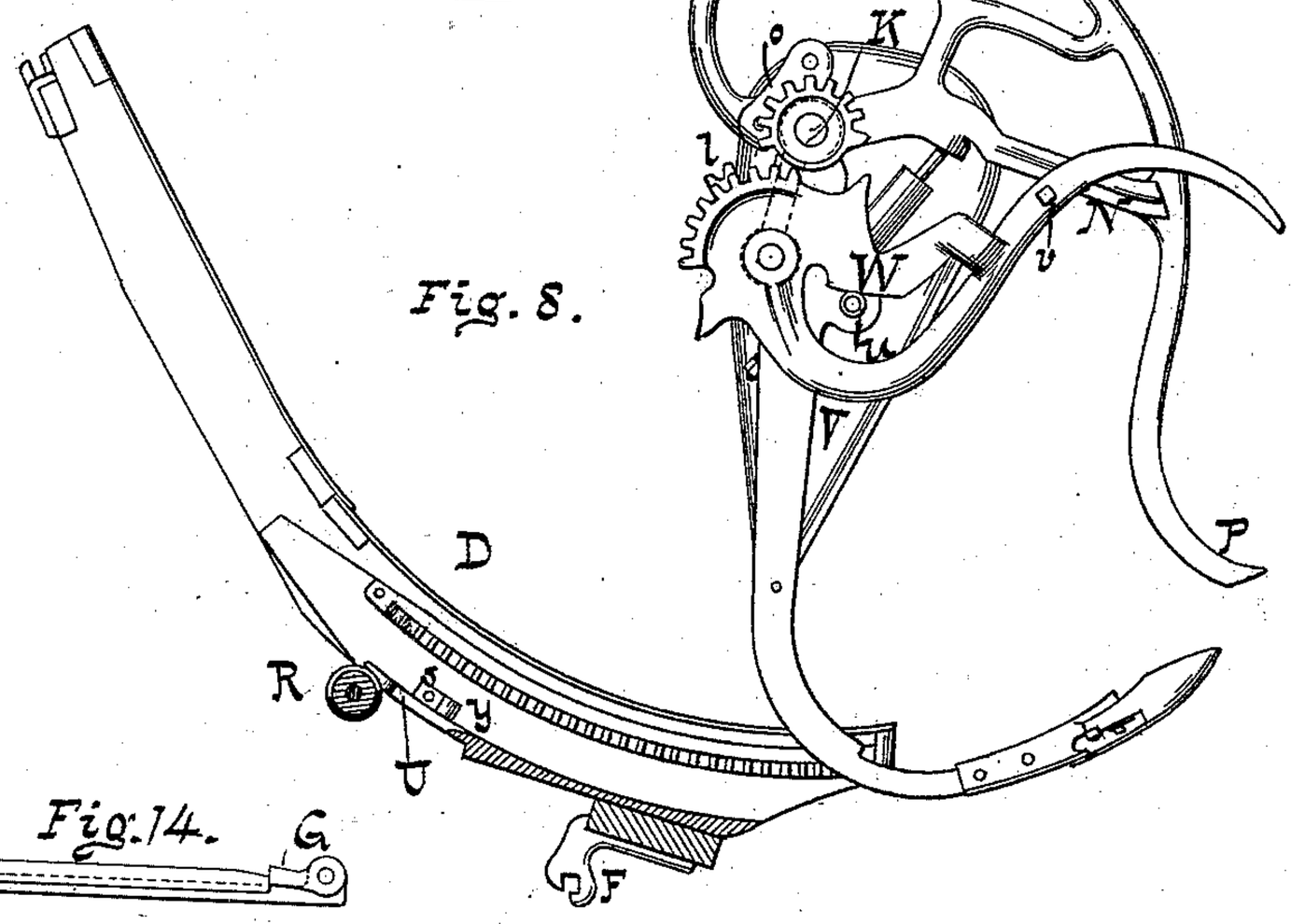


Fig. 14.

Fig. 13.

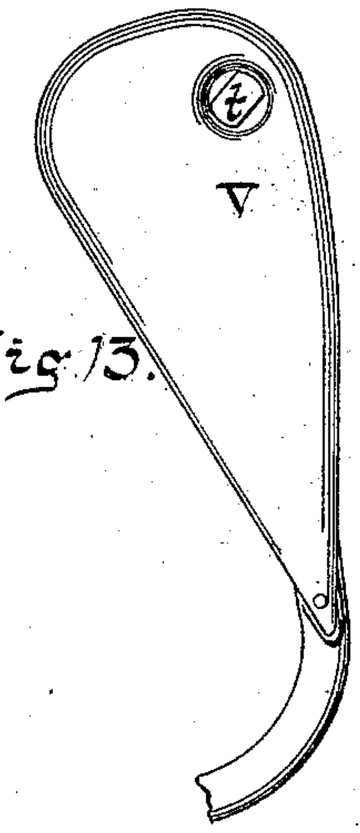


Fig. 12.

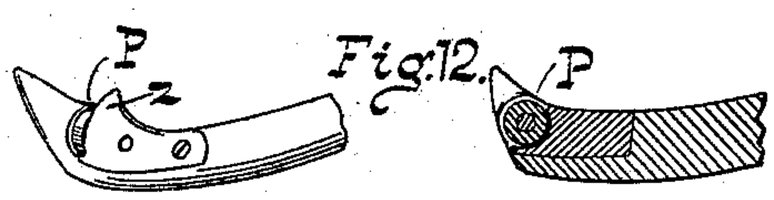


Fig. 10

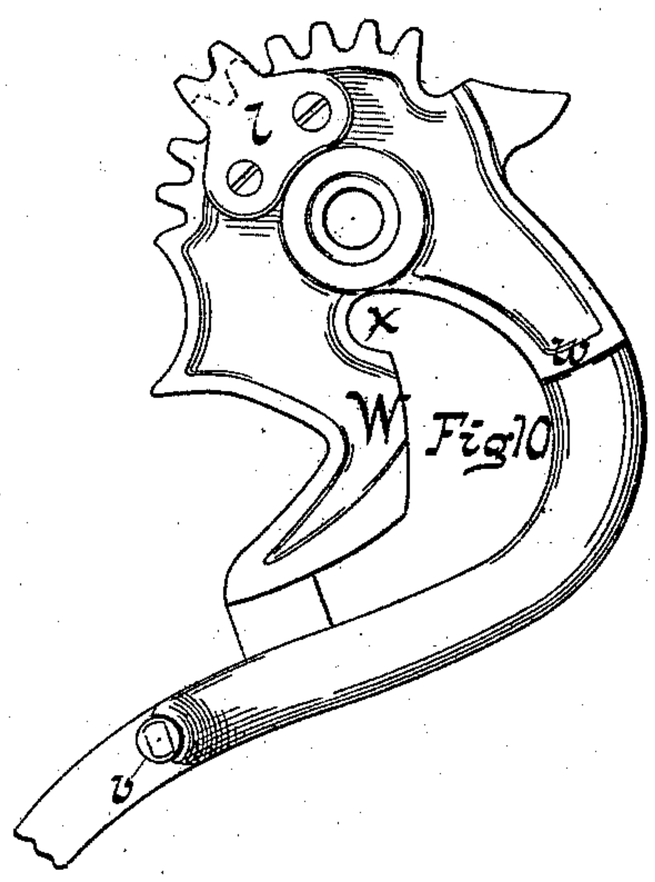
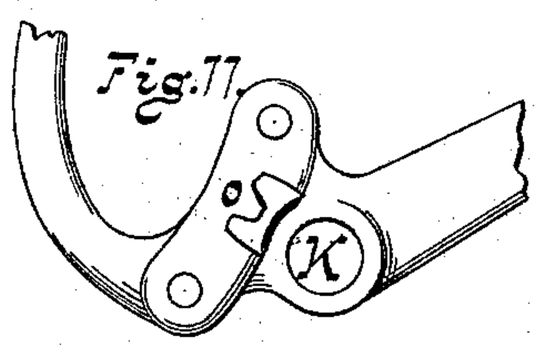


Fig. 11.



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UNITED STATES PATENT OFFICE.

SYLVANUS D. LOCKE, OF HOOSICK FALLS, NEW YORK.

IMPROVEMENT IN GRAIN-BINDERS.

Specification forming part of Letters Patent No. **222,061**, dated November 25, 1879; application filed April 19, 1878.

To all whom it may concern:

Be it known that I, SYLVANUS D. LOCKE, of Hoosick Falls, in the county of Rensselaer and State of New York, have invented a new and useful Improvement in Automatic Binders; and I do hereby declare that the following is a full and exact account of the same.

This invention relates to the class of rotary binders invented and heretofore patented to me; and it consists, first, in the device for holding the binding mechanism out of gear with the driving-shaft when it is desired that the binder shall not run; second, in a friction-gear interposed in one of the binder-shafts, whereby the binder may be stopped without stopping said driving mechanism; third, in detachable cam teeth on arms; fourth, in the compressing-arm constructed with shield or fender, whereby the independent fender-rod which obstructed the flow of grain is dispensed with; fifth, in a sheet-metal fender-shield on the arm; sixth, in the cam, whereby the discharger is carried in advance of the binder-head for a time until the bound sheaf is fully discharged; seventh, in a roller re-enforce in the end of the compress-arm; eighth, in housing over guide-roll in the rack-box; ninth, in swinging gates or latches to prevent accidental displacement of the binder.

That others may fully understand my invention, I will particularly describe it, having reference to the accompanying drawings, wherein—

Figure 1 is a perspective view of my binder. Fig. 2 is an end elevation of the same. Figs. 3 and 4 are elevations, showing the clutch-coupling and the latch for holding the same out of engagement. Fig. 5 is a sectional elevation, showing the friction-coupling. Fig. 6 is a side elevation of my binder. Fig. 7 is a bottom plan, showing the frame-connection to the rack-box. Fig. 8 is a section of the machine longitudinally with and through the rack-box. Fig. 9 is a plan of the front end of the rack-box. Fig. 10 is an elevation of the pivot end of the compressor-arm, showing cam and attached teeth. Fig. 11 is a similar view of the pivot end of the discharger. Fig. 12 represents, in perspective and section, the foot of the discharger with its roller. Fig. 13 represents the shield on the binding-arm. Fig. 14 is track-rail and swinging gate or latch.

A is the elevator-frame of the harvester, and B is the main driving-shaft on said frame. *b* is a sprocket-wheel on said shaft, whereby the elevator-belts are driven. C is the finger-bar of the harvester. D is the receptacle of the binder, into which the grain is constantly being discharged by the elevator.

The binder is mounted to slide upon rails D′ E, the former at the top and the latter at the bottom of the frame A.

First. The main driving-shaft B gears with a counter-shaft, J, which transmits motion to the main binder-shaft K, but it is sometimes necessary to stop the motion of the binding mechanism without stopping the harvester, and I therefore have heretofore provided an ordinary clutch-collar, L, and an operative foot-lever, M, whereby the driver can at any moment unclutch the shaft J, and cause the binding mechanism to stop; but it is not convenient to retain the foot upon the lever M for an indefinite time—as, for instance, while turning the corners sometimes, or in moving from one field to another, and I therefore pivot the latch *i* to the foot-bearing bracket, so that it may be turned down when desired to place its end under the ledge of the clutch-collar, and hold the clutch out of engagement. The latch *i* is constructed with a shoulder, *g*, which stops its backward motion and keeps it always in position favorable for immediate action.

Second. It will very often happen that when the binding apparatus is unclutched the binding-arms will be up and in such a position that they would run rapidly backward under the influence of gravity. The ratchet *k* is therefore placed on the shaft J, and a spring-pawl, *m*, is placed behind it, so as to prevent said backward movement. Nevertheless it is necessary sometimes to move the arms backward, and it cannot be effected without considerable trouble, because the pawl and arms are not easily within reach at the same moment. I therefore place the ratchet *k* loosely upon the shaft J, as shown in Fig. 5, and provide it with a conical top, *n*, which fits a hollow conical cap, *p*, which is rigidly secured to the shaft J. The spring *q* is placed between the loose

ratchet *k* and the clutch-collar L, so that the same spring serves to keep the clutch L and cone *n* in engagement.

The cones *n* and *p* constitute a friction-coupling between the shaft J and its holding pawl and ratchet, which permits it to be revolved backward when occasion requires without disengaging said pawl.

Third. The segment-teeth *lo* on the compressing and discharging arms, and which produce a movement of said arms toward each other to give the final squeeze to the bundle, have heretofore been cast integral with said arms, and were difficult of replacement when broken, as their exposed position and peculiar duty render them liable to be. I therefore construct these teeth upon plates separate from the arms to which they are to be attached, as shown in Figs. 10 and 11. The bolt-holes in both plate and arm are bored by templet, so that no adjustment is required, and a new plate may be put in position to replace a broken one by any ordinary mechanic without difficulty. The arms are also cast with seats for these plates, so that the holding-bolts are relieved from shearing-strains.

Fourth. Heretofore I have employed a curved fender-rod secured at one end to the outer end of the frame-post near to the outer box of the main shaft. From thence said rod curved outward and downward far enough to prevent the grain in the receptacle from rising up and entangling the gearing.

I prefer to make the discharger-arm with a protruding belly-rib, *r*, which protrudes far enough to serve the same purpose, and also to effect a mechanical compression of the grain as it moves over it. This effect was not produced by the previous structure.

Fifth. As the binding-arm revolves, carrying the end of the wire with it and drawing the same from the spool against the resistance of the take-up, the strained wire is caused to sweep over the outer surface of the binding-arm and over the end of the main shaft and gearing. It is necessary to provide a smooth surface over which it may pass or it will be liable to catch and be broken, or to cut into the obstructing surface.

I have used a sheet-iron shield heretofore, but have found the practical difficulties spoken of. The wire will catch on the least obstruction, and if the edge of the shield is exposed to the action of the wire it will in a very short time become serrated and worn in ridges, so that the wire can no longer traverse it. I therefore make the sheet-iron shield V with a rounded surface and edges turned over dishing, so that the wire cannot touch them. The point of the shield is fastened to the arm by a rivet, and is concealed behind a rib on the arm, so that the wire rides over onto the shield without touching its edge. The larger end of the shield is secured to the end of the main shaft, or thereabout, by a screw-bolt, *t*, the head of which is entirely below the general surface of the shield, concealed in a seat formed by a circular depression in said shield sufficiently deep to receive and conceal it, as set forth.

Sixth. Heretofore, as the binding-head left the rack-box the discharger advanced faster than the binding-arm and propelled the bundle forward to discharge it; but this forward movement was not maintained. The discharger paused almost immediately, and the advance of the binding-head was so rapid that the bound bundle would sometimes be caught upon its point, and much damage be committed. I remedy this difficulty, after much time and experiment, by a modified form of the cam W on the compressor, which is actuated directly by the roller *u* upon the binder-arm and the cam N upon the discharger, which is actuated directly by the roller *v* on the compressor. The roller *u* passes behind the compressor-arm below the shoulder *w*, and encounters the cam W, passing first to the notch *x* at the upper end of the same. As the binder-arm progresses the roller *u* traverses said cam from the notch *x* outward, and pushes the compressor-arm upward in advance of the binder and liberates the bundle, when the roller *v* encounters the cam N on the discharger-arm and pushes it also suddenly forward in advance of the binding-head. The form and position of the cams W and N have been changed since my former patents were issued, so that now the advanced position of the discharger shown in Fig. 8 is maintained sufficiently long to afford ample time for the bundle to be entirely detached and fall out of the road of the binding-head.

Seventh. When the binding-head has nearly completed its circuit the discharger advances for the purpose of pushing the wire forward into the twister and to compress the bundle. At this time the slack of the wire is also being taken up as it is drawn tightly around the compressed bundle, and it therefore moves under considerable tension over the foot of the discharger, and will rapidly cut into any metal which can be employed to re-enforce that point. I therefore insert an anti-friction roller, P, Fig. 12, and find it advisable to do so by means of a detachable plate and toe, *z*, on the side over which the wire is drawn before it assumes a position in front of the compressor-foot, so that when the exposed side becomes injured by the cutting effect of the wire it may be readily removed and replaced.

Eighth. When the binding-head enters the rack-box the holding and cutting devices receive positive movement by striking the permanent lugs *c y*. The constant repetition of the blow received upon the exposed faces of said lugs sometimes causes them to be broken, and thus disables the machine. I therefore face said lugs with plates S, of hardened steel, as shown.

Ninth. The band-wire passes from the spool T to the guide-roller R at the end of the rack-box, and is thereby held in position to be properly threaded in the binding-head as the latter passes into the rack-box. Convenience re-

quires that the wire may be pushed past said roller when it is first entered from the spool, and I therefore support its axis-pin at one end only, and thus leave a passage-way free at one side of the roller. The action of the machine will sometimes give opportunity for the wire to spring off from this roller, and if no provision was made to prevent it might jam in at the side or slip off entirely. I therefore construct the edges of the slot U so that they overhang the roller, as shown in Figs. 7 and 9, and thereby prevent the displacement of the wire in the manner described.

Tenth. The rail E has at its outer edge a flange, and the foot-bracket F is shaped so as to embrace this flange on three of its sides, so that it cannot be detached when once in position, and it can only be placed on the rail or removed therefrom by moving said foot to the end of the rail. This structure is well understood, having been fully set forth in patents heretofore granted to me.

Heretofore a pin has been employed to prevent the accidental displacement of the binder by slipping off from the end of the rail; but this has proved to be too weak under some circumstances, and, being a detachable part, it is liable to misplacement and loss. I therefore place at the end of the rail E a swinging gate or latch, G, which is not detachable and subject to loss, and presents a solid abutment against which the foot F may strike with any force possible, under ordinary circumstances, without disabling or breaking it. The gate G is also opened, when desired, more easily than the pin could generally be removed.

Having described my invention, what I claim as new is—

1. The clutch L on the binder driving-shaft, and the foot-lever M to control said clutch, combined with a latch, *i*, whereby said clutch may be locked open at will.

2. The pawl *m* and the ratchet *k*, fitted loosely upon the driving-shaft, combined with a friction-cap, *p*, substantially as described, whereby the said shaft is restrained from moving backward under ordinary circumstances, but under sufficient stress capable of backward motion without releasing the pawl.

3. The clutch-collar L, having a longitudinal movement on a feather projecting from the shaft J, and the loose ratchet *h*, in frictional contact with the friction-cap *p*, combined with the spring *q*, whereby the ratchet *h* and clutch-collar L are actuated in opposite directions, and both kept to duty.

4. The ratchet *k*, loosely fitted upon the shaft J, and provided with a conical head, *n*, combined with the hollow conical cap *p*, rigidly secured to said shaft and fitted to said head *n*, for the purpose of constituting a friction-coupling, as set forth.

5. The clutch-collar L, having a longitudinal movement on a feather projecting from its shaft, and the friction-cap *p*, rigidly secured to said shaft, combined with an interposed loose ratchet *k*, with surface for frictional contact with the cap *p*, a spring, *q*, whereby both clutch and ratchet are kept in position, a clutch-lever, M, and a latch, *i*, whereby when the clutch-collar is lifted out of engagement the friction-head of said ratchet is pressed into effective engagement with the cap *p*, and so maintained at the will of the operator.

6. The compressor and discharger arms of the binder, combined with detachable teeth *l o*, as and for the purpose set forth.

7. The discharger-arm of a rotary binder, constructed with belly rib or fender *r*, protruding in the plane of rotation to prevent entanglement of the grain with the gearing, as set forth.

8. The binder-arms and operative mechanism about the center of rotation of the same, combined with a sheet-metal shield, V, constructed with a sunken seat for the head of the bolt *t*, and flanged or dishing edges, as set forth.

9. The carrier, compressor, and discharger arms of a rotary binder, combined with rollers *u* and *v*, and cams M and N, located and operating in the manner and for the purpose specifically as described.

10. The carrier-arm, and the discharger-arm which also acts to push the wire into the twister, as set forth, combined with a friction-roller, P, set between the toes at the foot of said discharger-arm, as set forth.

11. Combined with the rack-box I, the lugs *c y*, faced with hardened-steel plates, as set forth.

12. The guide-roller R, mounted in the slot U at the end of the rack-box I, upon an axis-pin supported at one end only, so as to leave a clear passage past said roller at one side, as set forth.

13. The guide-roller R in the slot U in the rack-box 1, combined with the overhanging edges of said slot to prevent displacement of the wire, as set forth.

14. The swinging or pivoted gate or latch G on the lower rail, E, to close entrance to said rail and prevent an accidental displacement of the binder, and without the use of detachable parts.

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