(Model.) 4 Sheets—Sheet 1.

J. J. DEWEY.

AUTOMATIC GRAIN BINDING HARVESTER.

No. 342,287. Patented May 18, 1886.

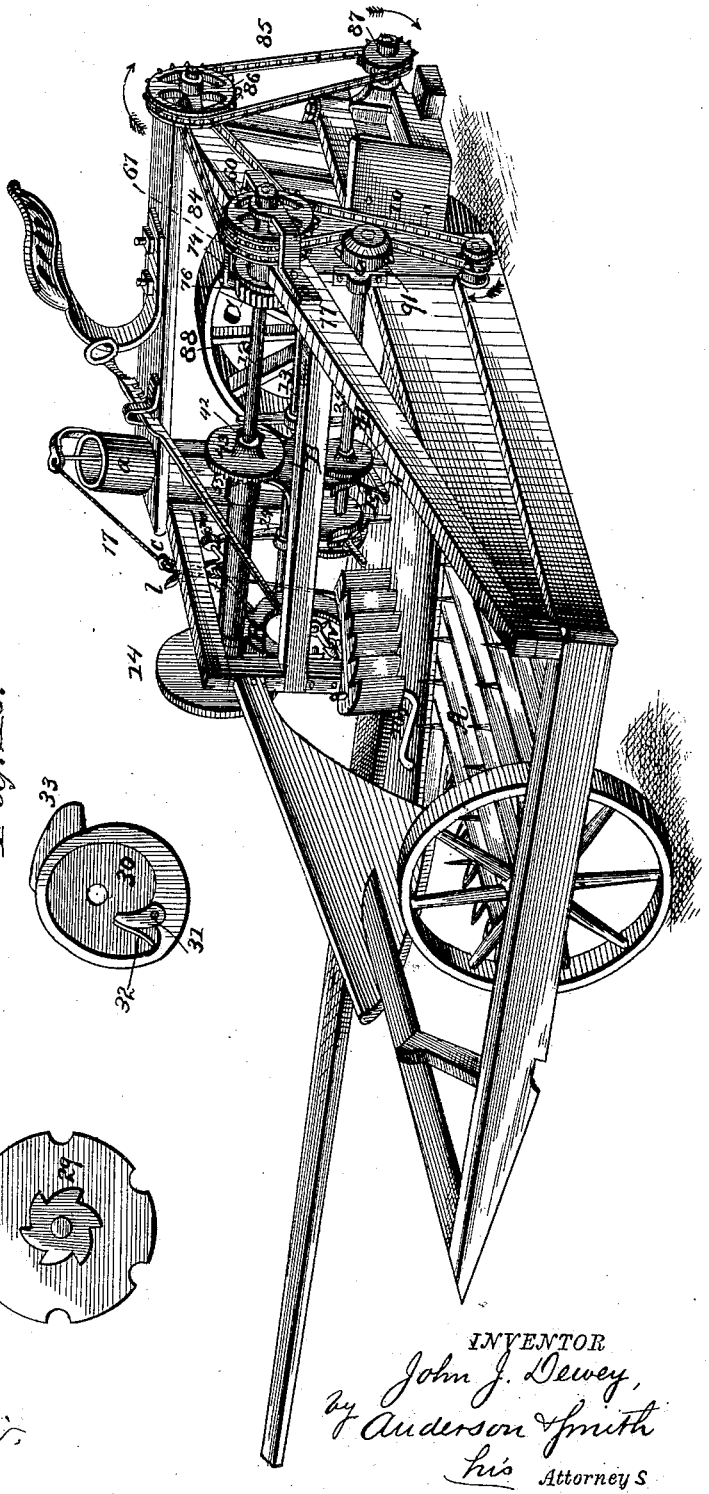

Fig. 7.

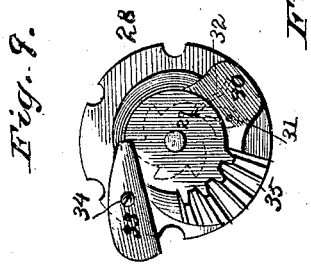

Fig. 9.

Fig. 10.

Fig. 8.

WITNESSES

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his Attorneys

(Model.) 4 Sheets—Sheet 2.

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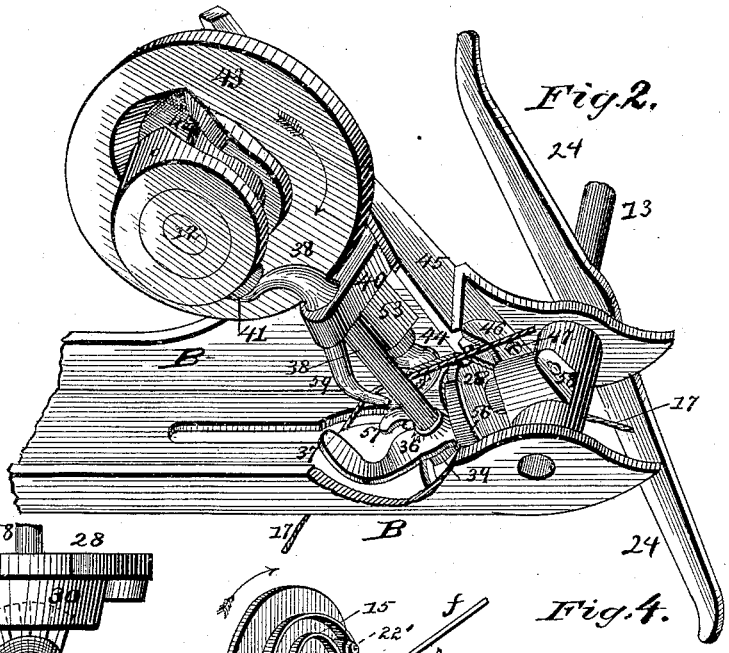
AUTOMATIC GRAIN BINDING HARVESTER.

No. 342,287. Patented May 18, 1886.

Fig. 2.



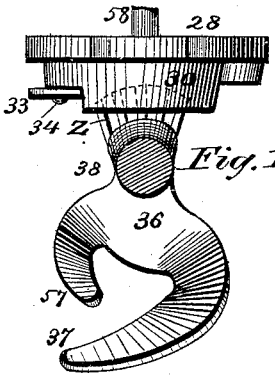


Fig. 14.

Fig. 4.

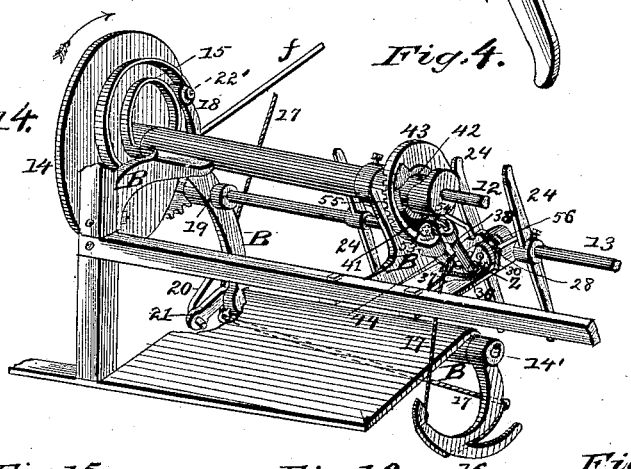


Fig. 15.

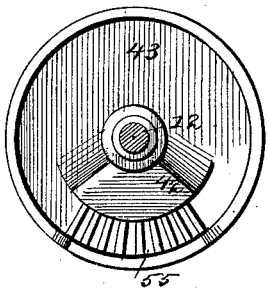


Fig. 16.

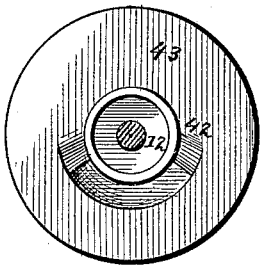
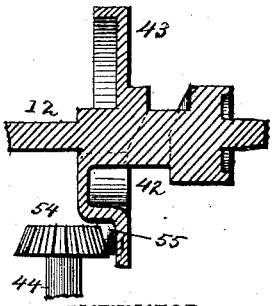


Fig. 11.



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(Model.) 4 Sheets—Sheet 3.

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AUTOMATIC GRAIN BINDING HARVESTER.

No. 342,287. Patented May 18, 1886.

Fig. 7.

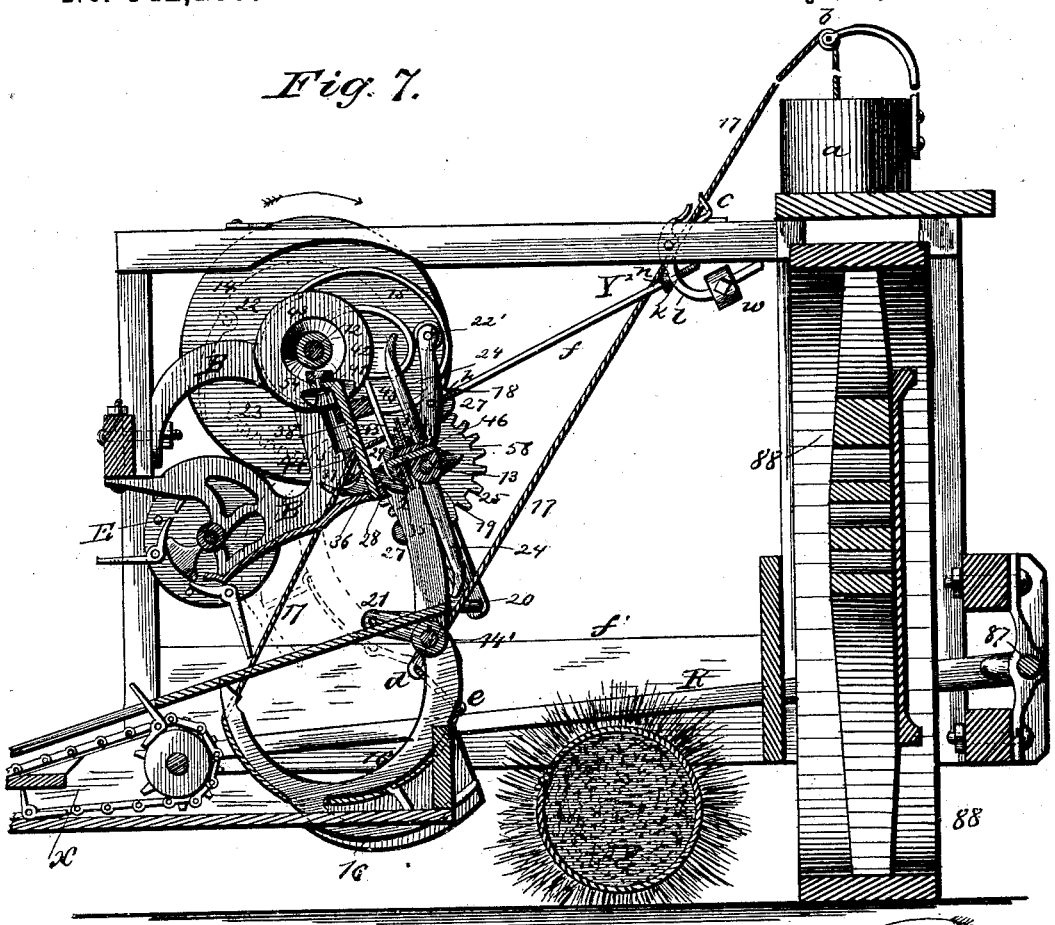


Fig. 11. *Fig. 12.* *Fig. 13.*

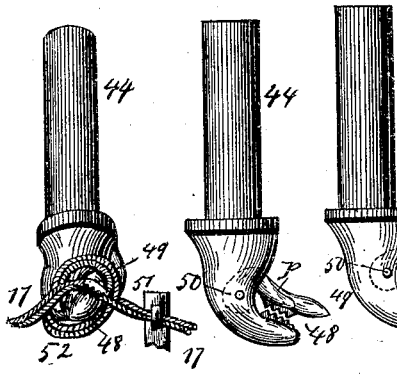
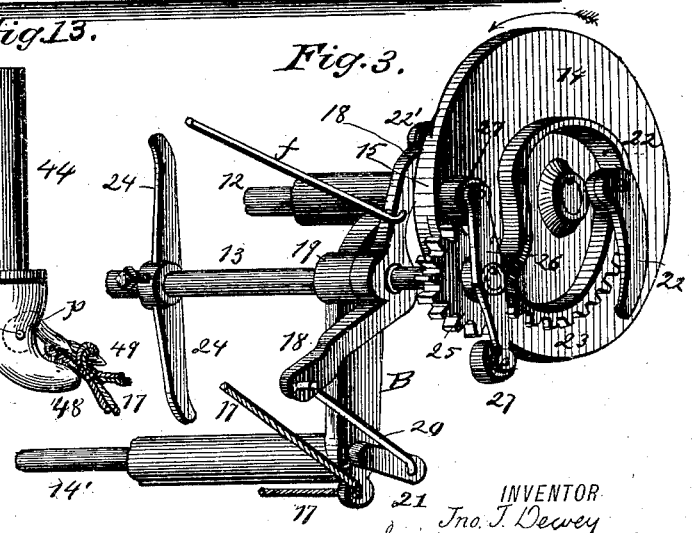


Fig. 3.



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4 Sheets—Sheet 4.

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AUTOMATIC GRAIN BINDING HARVESTER.

No. 342,287. Patented May 18, 1886.

Fig. 5.

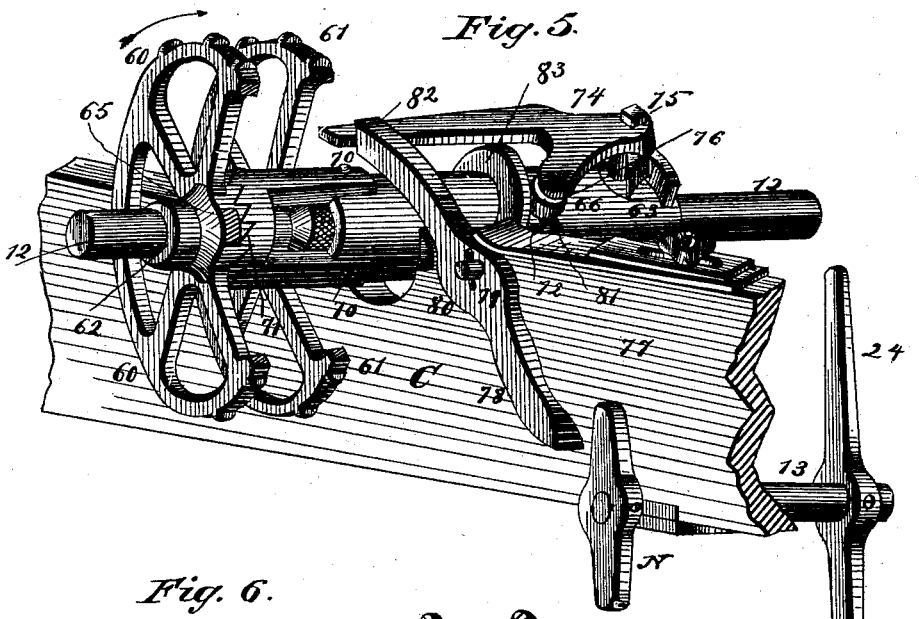


Fig. 6.

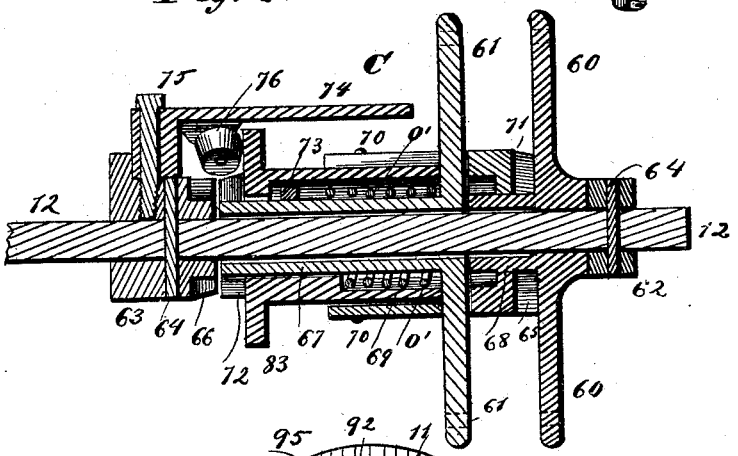
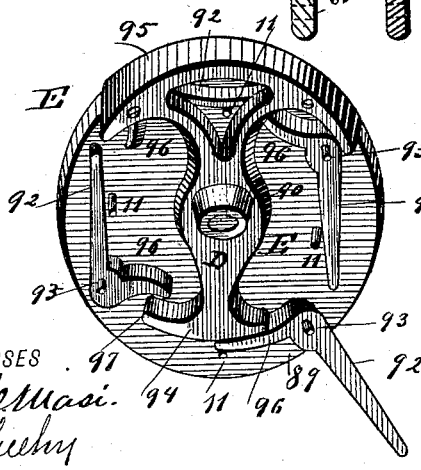


Fig. 18.



WITNESSES

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UNITED STATES PATENT OFFICE.

JOHN J. DEWEY, OF ST. PAUL, MINNESOTA, ASSIGNOR OF ONE-HALF TO JAMES B. BEALS AND ISSACHAR E. NORTON, BOTH OF SAME PLACE.

AUTOMATIC GRAIN-BINDING HARVESTER.

SPECIFICATION forming part of Letters Patent No. 342,287, dated May 18, 1886.

Application filed March 31, 1884. Serial No. 126,160. (Model.)

To all whom it may concern:

Be it known that I, JOHN J. DEWEY, a citizen of the United States, resident at St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Automatic Grain-Binding Harvesters; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

Figure 1 of the drawings is a perspective view of the harvester. Fig. 2 is a detail view in perspective of the binding-head. Fig. 3 is a perspective detail from the front end of the binder. Fig. 4 is a perspective view, from the rear, of the binder mechanism. Fig. 5 is a perspective view of the automatic trip. Fig. 6 is a longitudinal section of the same. Fig. 7 is a transverse section of the binding portion of the harvester. Fig. 8 is a side view of the cord-holding disk. Fig. 9 is a side view of the same, showing the cup-piece and knife. Fig. 10 is a view showing the rear of the cup-piece. Figs. 11, 12, and 13 are views of the knotter in perspective. Fig. 14 is a top view of the bracket, the holding-disk, and the cutter. Fig. 15 is a side view of cam-wheel 43, showing the cog-segment. Fig. 16 is a view of the opposite side of this wheel, showing the cam. Fig. 17 is a sectional view of this cam-wheel. Fig. 18 is a perspective view of one of the packer-wheels.

This invention has relation to harvesters; and it consists in the construction and novel arrangement of parts constituting a novel, simple, and durable machine for harvesting grain and binding the sheaves with cord, all as hereinafter set forth and pointed out in the appended claims.

In the accompanying drawings, the letter A designates the platform-carriers; B, the binder; C, the automatic trip.

The main frame of the binder B is made of cast-iron, and is formed with bearings for the journals of three shafts, 12, 13, and 14', whereof the shaft 13 is midway between the shafts 12 and 14', as shown. The shafts 12 and 13 are represented in Fig. 4 as broken away, but they extend to the rear of the machine, and are there provided with the parts composing the automatic clutch mechanism C, as shown in Figs. 1, 5, and 6, and as will be more fully explained further on. To the forward end of the shaft 12, which is the main drive-shaft of the binder mechanism, is secured the wheel 14, which, when the binding mechanism is in operation turns in the direction indicated by the arrow. On the inner surface of the wheel 14 is an eccentric cam-track, 15, designed to operate the needle 16, to place the cord 17 around the sheaf, which it accomplishes by means of the lever 18, pivoted at 19 on the shaft 13, and connected by the link 20 with the crank 21 on the end of the needle-shaft 14'. The upper end of the lever 18 is provided with an anti-friction roller, 22', adapted to engage the cam-track 15, before referred to. On the outer surface of the wheel 14 is an eccentric cam-track, 22, and a segment-gear, 23, provided for the purpose of operating the shaft 13, having the arms 24, designed to compress the bundle while being formed and to discharge the sheaf after it is bound. These results are accomplished as follows: On the outer end of shaft 13 is firmly secured the pinion 25 and the arm 26, having the anti-friction rollers 27, as shown in Fig. 3. When the binder is set in motion, which is done by the pressure of the grain against the arms 24, as hereinafter more fully described, the shaft 13 is turned in its bearings sufficiently to bring one of the rollers 27 against the cam-track 22. The wheel 14 now commences to turn in the direction indicated by the arrow, and the cam-track 22, being made concentric for a short distance, has no effect on the shaft 13 until the needle has placed the cord around the grain by the operation of the cam-track 15 on the opposite side of the wheel 14, as before explained. At this point the track 22 begins to diverge from the center and approach the rim, and as it turns against the roller it drives the arm 26 outward, powerfully compressing the bundle while the knot is being tied in the cord. When the wheel 14 has turned far enough to allow the roller 27 to pass off the end of the track 22, thus leaving the shaft 13 free to turn on its bearings, the segment-gear 23 engages the

pinion 25, giving it a half-revolution, and causes the bound sheaf to be discharged from the binder. The wheel 14 having now made one complete revolution, the binder is brought to rest by means hereinafter explained. A portion of the track 22 at its outer end is made separate, as shown, and is pivoted to the wheel 14, so that it is free to open outward a little to allow the rollers 27 to pass when the shaft is revolving.

28 indicates the disk for fastening and holding the cord. It is provided on its inner surface with a little ratchet-wheel, 29. In a cup-shaped piece, 30, is seated a dog, 31, which is provided with a spring, 32, and is adapted to engage the ratchet-wheel 29 on the disk. In Fig. 9 the cup-piece is represented arranged in position on the disk, the ratchet-wheel and dog being indicated by the dotted lines. The knife 33, for cutting the cord, is secured to the cup-piece 30 by a screw, 34, so that it can be conveniently removed for sharpening. On the lower edge of the cup-piece is a segment of bevel-gear, 35, adapted to engage a similar segment, *z*, on the plate 36, opposite its hook end 37. The plate 36 is secured to the shaft 38, which has a bearing in the plate 39 underneath, and another in the lug 40 on the main frame. The upper end of the shaft 38 is cranked, and provided with an anti-friction roller, 41, adapted to the grooved guide-track 42 in the wheel 43. This wheel is secured to the shaft 12, and turns simultaneously with the wheel 14, secured to the forward end of said shaft. The groove 42 runs parallel with the face of the wheel 43 for a short distance, and has no effect on the shaft 38 until the needle has been placed around the sheaf, as already described, placing the cord 17 over the knotter 44 and into one of the marginal notches of the disk 28, as shown in Fig. 2. At this point the groove 42 inclines toward the face of the wheel 43, and while this portion of the cam-groove is passing over the roller on the shaft 38 it has the effect to turn the plate 36 sufficiently to cause its hook end 37 to draw the cord 17 directly underneath the knotter in proper position for tying. At the same time the cog end *z* of the bracket, which engages the segment on the cup-piece 30, has the effect to turn said piece and the disk 28 (which is connected thereto by the dog and ratchet, as before explained) sufficiently to force the cord between the two plates 45 and 46 the distance from one notch in the disk 28 to another. The outside plate, 46, is a flexible spring adapted to accommodate itself to any unevenness of the cord and adjustable in tension by the screw 47, which secures it to the other plate. The operation last described fastens the cord securely preparatory to tying the knot. At this point the groove 42 again runs parallel with the face of the wheel, so that the shaft 38 is held in one position while the knot is being tied.

The construction and operation of the knotter are as follows: It consists simply of a rod, 44, provided at its lower end with a rigid rounded bill form toothed jaw, 48, forming an angle with the axis of the rod 44, as shown, and a pivoted toothed upper jaw, which is free to move up and down in a guide-slot. An upper projection, *p*, serves to take the strain of the overlying cord off the upper jaw, 49, until it is required to close down upon the cord between the jaws. Cord being stretched across the knotter, as indicated in Figs. 2 4, and 7, and fastened as already described, one revolution of the knotter brings it in the position shown in Fig. 11, the short end of the cord having passed in between the jaws 48 and 49 without their being opened to receive it by any auxiliary machinery, their ends being flared apart for that purpose, as shown in Fig. 12. Now, if the cord be cut at 51 and drawn downward off the knotter by its other end the strain of the cord itself on the upper jaw as said cord is drawn off the end of the knotter will be sufficient to hold the short end 51 of the cord until the loop 52 passes over it, forming a complete knot. The upper jaw, 49, is made longer than the lower one, this construction serving to hold the end of the cord after the loop has passed off the end of the lower jaw, drawing said end through as far as required to make a secure knot. After the knot has been drawn entirely off the upper jaw, relieving it of pressure, it readily lets go the end 51 of the cord. The knotter 44 is journaled in the box 53 on the main frame of the binder, and is provided at its upper end with a bevel-pinion, 54, which is turned to tie the knot at the proper time by the bevel cog-segment 55 on the face of the wheel 43 opposite the cam-groove 42. During this period in the revolution of the shaft 12 the compressing-arms 24 are also operating to compress the sheaf, as before explained. At this point the groove 42 inclines back to meet the starting-point, and by this portion of said groove the plate 36 and the cup-piece carrying the knife are moved back to the first position; but the disk 28 remains stationary, being prevented from going back with the cup-piece by the spring 56, which drops into each notch of the disk in succession as it is revolved, and the dog 31, by means of the spring 32, passes freely over the ratchet 29 and drops into another notch of said disk ready to repeat the operation. The knife 33 also, which, as previously explained, followed the disk down out of the way of the cord during the first movement, is by this movement drawn back across the cord, cutting it off. At the same time the short hook 57 on the plate 36 operates to assist the movement of the cord off the knotter, and the shaft 13 is caused to make a half-revolution, discharging the sheaf, as heretofore explained. The disk 28 and the cup-piece 30 are both journaled on the same shaft 58. A little guide, 59, serves to keep the cord on the knotter.

C, represented more particularly in Figs. 5 and 6, indicates the double automatic trip-

ping device, through which motion is communicated from the harvester to the binder mechanism and grain-carriers A and E alternately. In this device the sprocket-wheels 60 and 61 are constructed to turn loosely on the shaft 12 between the collar 62 and the clutch-half 63, which are connected to said shaft by the pins 64. The wheel 60 is provided with ratchet-teeth 65, and the clutch-half 63 with ratchet-teeth 66. Both wheels have long hubs 67 and 68, on which is a sleeve, 69, constructed in two parts and fastened together by the screws 70, crossing the wheel 61 between the spokes, and provided with ratchet-teeth on each end, as shown at 71 and 72. The sleeve 69 is constructed to slide freely on the hubs 67 and 68, guided by the spokes of the wheel 61 and the feather or pin 73.

In the Figs. 1, 5, and 6 the sleeve is represented clutched with the wheel 60, which drives the carriers, leaving the binder-shaft 12 at rest. On the clutch-half 63 is attached a lever-arm, 74, pivoted to said collar at 75, and provided with a roller, 76. On the frame 77 is a lever, 78, pivoted at 79, and held down on the stop 80 by the tension-spring 81. When, in revolving, the binder-shaft, with the clutch 63 and roller-arm 74 attached, approaches the position represented in Figs. 5 and 6, the end of the arm 74 comes in contact with the end of the lever 78 at 82, which forces the roller 76 against the rim 83 on the sleeve 69, pressing said sleeve out of connection with the clutch-half 63 on the binder-shaft 12 and into connection with the chain-wheel 60, as represented in Figs. 5 and 6. The wheel 61 runs continually in the direction indicated by the arrow, receiving its motion through the chains 84 and 85, and intermediate wheel, 86, from the wheel 87, which is connected with the driving-wheel 88 by ordinary bevel-gear.

E represents a device for packing the grain into the binder. It consists of two or more wheels, 89, secured to the shaft 90 and revolved by the chain 10, operating on the sprocket-wheel 91. The packer-wheels 89 are provided with fingers 92, pivoted to them at 93, and so guided by the track 94 and shield 95 as to project beyond the rim of the wheel, to which they are pivoted, only while passing around the under side, falling back within the rim after having pressed the grain into the binder. This is accomplished by the track 94, which turns the fingers out when their wings 96 come in contact with the end of the track at 97, and holds them out until they pass off at the other end. The pins 11 prevent the fingers from falling back too far. The arms D, which have the tracks 94 and shields 95 formed entire, are secured to the frame B of the binder, and sit out a sufficient distance from the wheel 89 to permit the passage of the fingers 92 during the rotation of the said wheels. When sufficient grain has been delivered into the binder by the carriers and packers against the cord 17 and the compresser-arms 24 to force the trip-arm N, attached to the end of the compresser-shaft 13, against the lower end of the lever 78, lifting it against the tension-spring 81, off the end of the arm 74, the sleeve 69 is forced out of connection with the wheel 60 and into connection with the clutch 63 on the binder-shaft by the spiral spring O′, which is seated in a recess in the sleeve, thus setting the binder mechanism in motion and stopping the delivery of grain into it by freeing the wheel 60 from its driver 61. The binder-shaft 12 now makes one revolution, and comes to rest again when the levers 74 and 78 come in contact, as already explained, during which time the sheaf is bound, and discharged in the open space *f′*, between the binder and the drive-wheel.

The cord 17 is carried in the pail *a* on the driver's platform. It is constructed with an open top and elevated guide, *b*, and is placed within convenient reach of the driver, to enable him to see and readily disentangle any kink in the cord. Through the guide *b* the cord passes, and then runs downward through the guides *c* and *d*, back to the guide *e* in the heel of the needle 16, through guides on the back of said needle, and through a perforation near the point of the needle up over the knotter to the disk 28, where it is always fast.

Y′ is a device for automatically adjusting the tension of the cord. It consists of the rod *f*, pivoted to the lever 18 of the machine, the lever *l*, and the guide *c*. The lever *l* is pivoted to a fixed bearing, *m*, on the frame of the machine, its upper or short arm being rounded, and adapted to press on the cord lying on the rounded surface of the guide *c*. Any required tension may be given to the cord by adjusting the weight *w* on the long arm of the lever *l* nearer to or farther from its fulcrum, and fastening it in set position. One end of the rod *f* is pivoted to the lever 18 at *h*. The other end of said rod passes freely through a bearing, *k*, of the lever *l*, and is threaded to receive a nut, *n*. When the binder is at rest in the position shown in Fig. 7 of the drawings, the lever *l* is held away from the cord by the nut *n* on the rod *f*, so that the cord is relieved of all tension. As soon as the binding mechanism commences to operate, and the lever 18 has moved far enough to draw the nut *n* away from the lever *l*, this lever is caused to drop by the weight *w*, and tension is put on the cord. The device may be set to let the tension on at any required time or point during the operation of the needle by manipulating the nut *n*. In the construction illustrated the rake-head extends forward through the swivel-bearing of the driving-chain next the sickle, and is provided with a rake-finger at its projecting end forward of said chain, in order to catch the butts of the grain near the sickle.

It should be pointed out that during the tying operation the compresser-arms 24, under the operation of the cam, compress the grain to relieve the tension on the cord and knotter while the knot is being tied.

Having described this invention, what I

claim, and desire to secure by Letters Patent, is—

1. The combination, with the cam-wheel 43 and the shaft 38, having an arm engaging a cam-groove in said cam-wheel, and provided with the plate 36, of the cup-piece 30, provided with the gear-segment 35, and knife 33, the disk 28, plates 45 and 46, and spring-dog 31, substantially as specified.

2. The binding-head for tucking, fastening, tying, and cutting the cord, consisting of the cam-wheel 43, the shaft 38, and the plate 36, cup-piece 30, dog 31, spring 32, knife 33, disk 28, plates 45 and 46, spring-dog 56, knotter 44, pinion 54, and guide 59, substantially as specified.

3. The combination, with the shaft 13, having compresser-arms 24, pinion 25, arm 26, and rollers 27, of the cam-wheel 14, having an eccentric cam-track and cog-segment to operate this shaft, to compress and discharge the sheaf, substantially as specified.

4. The combination of the wheel 14, lever 18, link 20, needle-shaft, needle 16, shaft 13, arms 24, pinion 25, arm 26, shaft 12, cam-wheel 43, the knotter, the pinion 54, shaft 38, plate 36, disk 28, cup 30, dog 31, knife 33, plates 45 and 46, and spring-dog 56, substantially as specfied.

5. The automatic clutch mechanism consisting of the wheels 60 and 61, sleeves 69 and 70, spring O′, clutch-half 63, levers 74 and 78, and the adjustable tension-spring 81, substantially as specified.

6. A cam-wheel attached to the main shaft of the binder, and having on one side a cam-track for operating the cord-carrier, and on the other side a cam-track and segment of cog-gear for operating the devices for compressing and discharging the sheaf, substantially as specified.

7. A shaft having the tripping, compressing, and discharging arms, the cam-operated arms 26, and the pinion 25, substantially as specified.

8. The combination, with a cord-guide having a rounded surface, of the tension-lever carrying an adjustable weight, and a threaded rod engaging said tension-lever, carrying an adjusting-nut, and connected to a vibratory arm of the binder, substantially as specified.

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

JOHN J. DEWEY.

Witnesses:
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JOHN I. MORROW.