Sheet 1 – 4 Sheets.

S. D. Locke.

Grain Binder.

No. 106945. Patented Aug. 30. 1870

Fig 1.

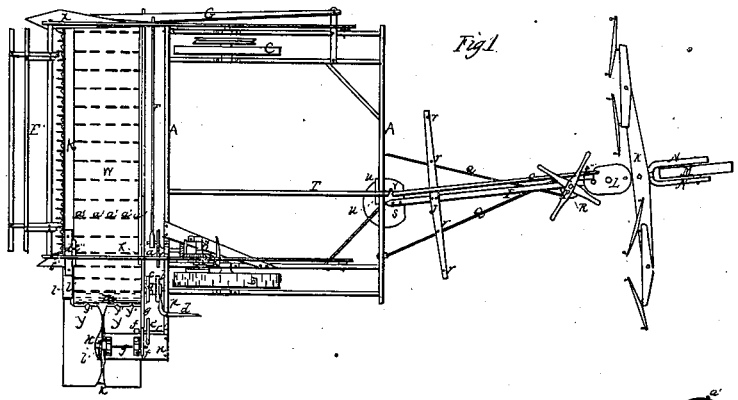


Fig. 2.

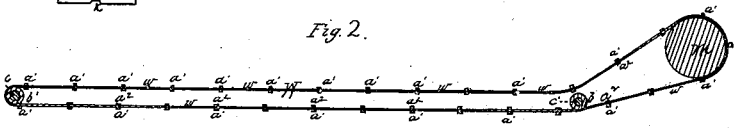


Fig. 3

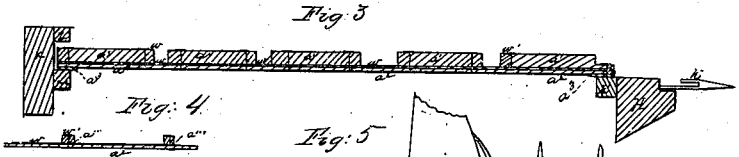


Fig. 4

Fig. 5

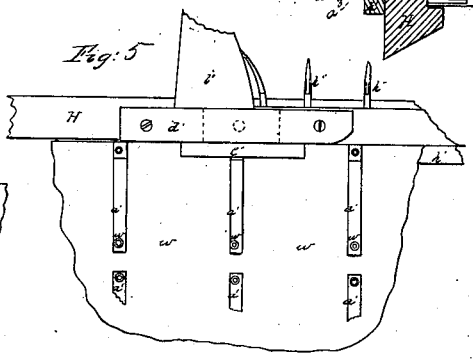
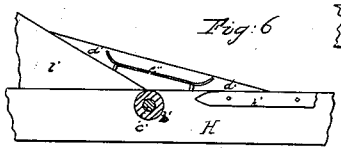


Fig. 6



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Sheet 2 - 4 Sheets.

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Grain Binder.

No. 106945 Patented Aug 30. 1870.

Fig 7

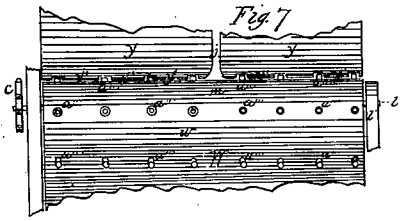


Fig 8.

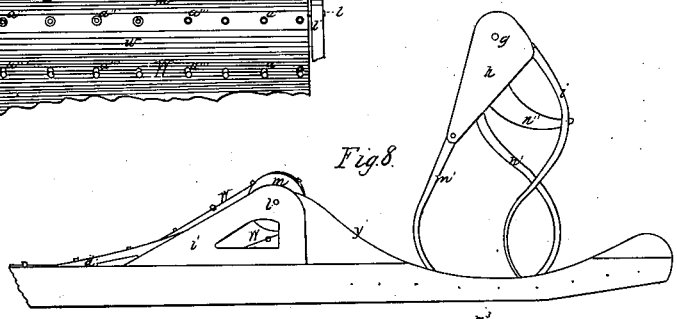


Fig 9.

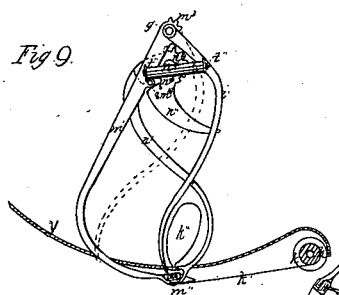


Fig 10

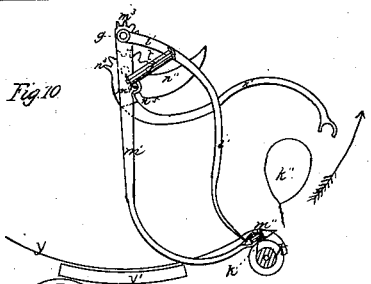


Fig 11

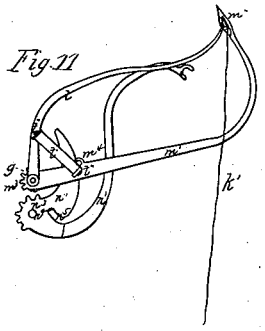
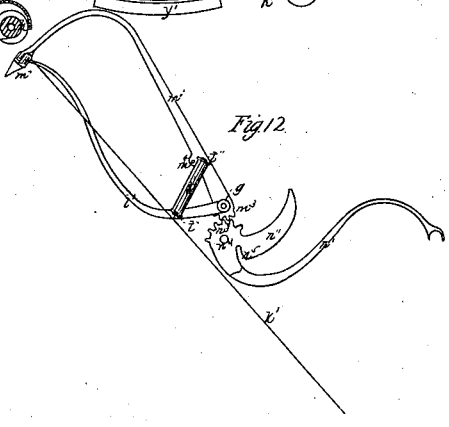


Fig 12.



Witnesses:

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Sheet 3—4 Sheets.

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Grain Binder.

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Fig. 13.

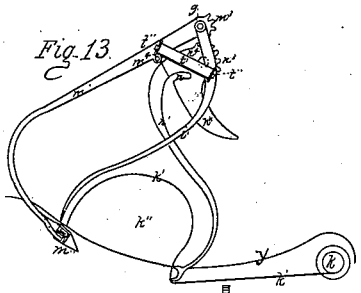


Fig. 14

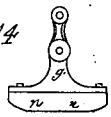


Fig. 16

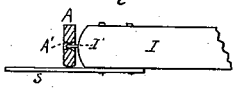


Fig. 15

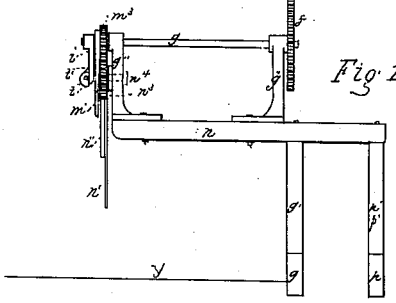


Fig. 17

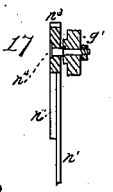


Fig. 18.

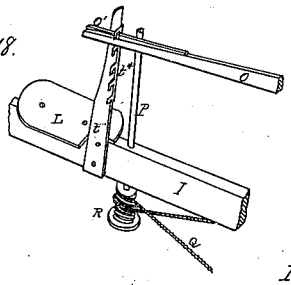


Fig. 19

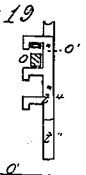


Fig. 20

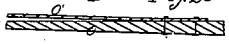
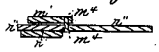


Fig. 21



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Sheet 4_4 Sheets.

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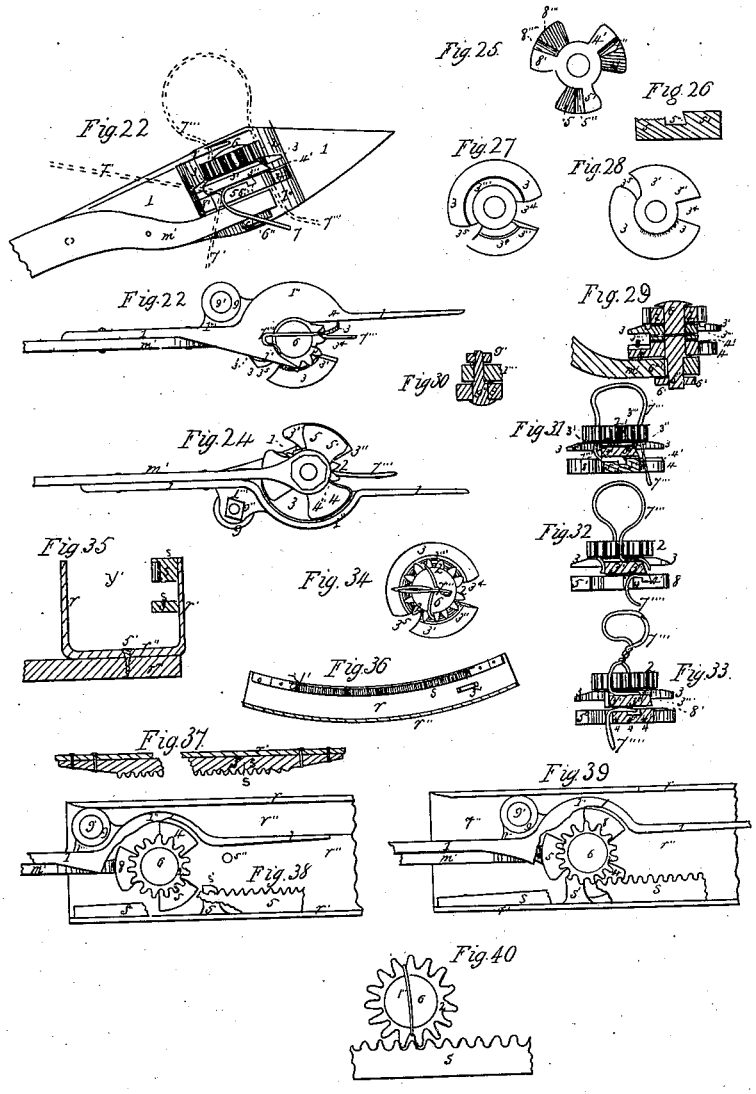
Grain Binder.

No. 106945. Patented Aug. 30. 1870



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John E Wilcox

Inventor:

Sylvanus D Locke

UNITED STATES PATENT OFFICE.

SYLVANUS D. LOCKE, OF JANESVILLE, WISCONSIN.

IMPROVEMENT IN MACHINES FOR CUTTING AND BINDING GRAIN.

Specification forming part of Letters Patent No. **106,945**, dated August 30, 1870.

To all whom it may concern:

Be it known that I, SYLVANUS D. LOCKE, of Janesville, Rock county, Wisconsin, have invented certain new and useful Improvements in Harvesting-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a top view or plan of my machine. Fig. 2 is a longitudinal vertical section of the apron W. Fig. 3 is a transverse vertical section of the apron through the cross-slats a' and a''. Fig. 4 is a transverse vertical section of the apron, showing a different construction of the same. Fig. 5 is a top view of a portion of the apron, showing the angle-block d' and spring e''. Fig. 6 is a side view from the direction of the apron of the angle-block d' and spring e'', with a portion of the cutter-bar and section of the roll b'. Fig. 7 is a top view of the adjacent portions of the apron W and binding-platform Y when the former is constructed as shown in Fig. 4. Fig. 8 is a front view of the binding mechanism, and the end of the apron and cutter-bar adjacent thereto. Figs. 9, 10, 11, 12, and 13 are front views of the binding mechanism, showing the different positions of the binding-arms during the operation of binding. Fig. 14 is a front view of the support on which the binding-arms take bearing. Fig. 15 is a side view of the binding-arms and their support. Fig. 16 is a transverse vertical section of the rear girt of the frame A A, showing how the pole I is joined thereto. Fig. 17 is a longitudinal section through the stud n^4, showing how the arm n' is supported. Fig. 18 is a perspective showing how the guiding-cable Q is attached to the lower portion, R, of the capstan P, and how the lifting-lever O is held. Fig. 19 is a transverse section of the lifting-lever O, just forward of its holding mechanism. Fig. 20 is a longitudinal vertical section of the handle of the lifting-lever O. Fig. 21 is a horizontal section through the pin n^4 of the arms m' and n', as shown in Fig. 10. Fig. 22 is a front view of the binding-head m''. Fig. 23 is a top view of the same. Fig. 24 is an under side view of the same. Fig. 25 is a top view of the rotating part of the wire-holder and wire-cutter. Fig. 26 is a transverse section of an arm of the same. Fig. 27 is a top view of the fixed part of the wire-holder and wire-cutter. Fig. 28 is an under side view of the same. Fig. 29 is a longitudinal vertical section of the binding-head m'' with its shield removed, as shown in Fig. 22. Fig. 30 is a section longitudinally through the stud-bolt $9'$ of the friction-roll 9, shown in Figs. 23 and 24. Figs. 31, 32, and 33 are vertical sections of the wire holder and cutter, showing the position of the binding-wire during the process of binding. Fig. 34 is a top view of parts, as shown in Fig. 33. Fig. 35 is a transverse vertical section of the rack-box Y', shown in Fig. 10. Fig. 36 is a longitudinal vertical section of the same. Fig. 37 is a longitudinal section of the rack. Figs. 38 and 39 are top views of the rack-box Y', with the binding-head m'' in the act of passing through it, and showing how the twisting-pinion and wire holder and cutter are operated; and Fig. 40 is a top view of the twisting-pinion and a portion of the rack.

The nature of my invention relates particularly to that class of harvesting-machines constructed after the manner of the machine known as the "header;" and it consists, first, in an improved mode of joining the pole to the main frame, whereby a horizontal and vertical adjustment of the parts is attained, substantially as hereinafter described; second, in the construction and arrangement of the delivering-apron in connection with the binding mechanism, substantially as hereinafter described; third, in the construction and combination of devices for automatically binding grain, as hereinafter described.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

I make my machine of the general form of the common "header," providing it with the ordinary parts thereof, as a frame, A A, drive-wheel B, grain-wheel C, reel E, driving-gear D, pitman F, pitman-lever G, cutter-bar H, pole I, whiffletrees K, driver's stand L, lifting-lever O, and rear wheel, M. The rear wheel, M, however, is allowed to turn only with the pole I, to which it is rigidly attached, as shown in Fig. 1. The lifting-lever as used on the header is perfectly rigid with reference to the main frame both horizontally and vertically, while the pole is also rigid horizon-

tally, and is only allowed a vertical movement for the purpose of raising and lowering the cutter-bar.

To enable my machine to be more easily and quickly turned around, I joint the pole I and lifting-lever O to the frame A A, as shown in Figs. 1 and 16, so as to allow the driver, standing on the foot-board L, to change at pleasure the inclination laterally of the pole to the frame. One mode of jointing laterally the lifting-lever is shown at *v*, Fig. 1, and consists of the simple interposition of a metallic hinge, as therein shown. A mode of jointing the pole is shown in Fig. 16, and consists in a simple pin, I′, that plays in a conical slot, A′, in the rear girt, A, of the frame, as therein shown. Around the lower portion, R, Figs. 1 and 18, of the capstan P, that takes bearing in the pole I, is the cable Q, that has its ends firmly attached to staples or hooks driven in the rear girt, A, on either side of the pole. Secured to the pole is an upright piece or standard, *t‴*, Figs. 1 and 18, that has attached thereto a cast-iron holder, *t⁴*, for receiving and holding the end of the lifting-lever O. The end or handle is provided with a spring, *o*, Figs. 1, 18, 19, and 20, that is used to retain the lever O in the holder *t⁴*, as therein shown.

J is a cross-bar on the pole, to which the horses' heads are hitched.

S is a circular plate, of iron, attached to the pole, as shown in Figs. 1 and 18, and used after the manner of the ordinary "circle-iron" on wagons, to prevent the pole and the parts rigidly joined thereto from tipping over sidewise.

In order to adapt the moving apron W to the binding-platform Y, so that the grain may be surely conducted from the former to the latter, I construct the apron, as in the ordinary manner, of strong cloth *w*, Figs. 2, 3, and 5, but attach the slats or straps a^2, for keeping it extended on the under side thereof, in order that at least a portion of its upper surface may be more closely approached by the binding of platform Y than the slat, as heretofore used, running quite across the top of the apron, would permit. Otherwise the grain would lodge between the apron and the platform. To aid in carrying the grain squarely across the platform, or to prevent it from turning while being carried, I attach to the upper side of the apron, by rivets that also pass through the straps a^2, the short slat or lugs a', Figs. 1, 2, and 3; or, instead of the slats a', the rivets may secure simply a large washer, a''', as shown in Figs. 4 and 7.

Where the slats or lugs a^2, (shown in Figs. 1, 2, 3, and 5) are used, the binding-platform Y is provided with fingers Y′, that, running between the rows of slats and close to the body of the apron, aid in picking up the grain and conducting it upon the binding-platform. Where simply the washers a''' are used, nearly the full edge of the binding-platform is brought close to the body *w* of the apron, only openings being left therein, through which the washers pass, as shown in Fig. 7. The apron W runs horizontally across the table over the rolls *b′*, and then is carried up a short distance over the driving-roll or drum *m*, as more particularly shown in Fig. 2. As heretofore used, the horizontal portion of the apron is held down both at its front and rear sides in the manner the rear portion of the apron herein described is held—that is, by the slat or piece *z*, Figs. 1 and 3, that terminates at the angle of the apron—(that is, at the point where the elevating portion of the apron commences) with a spring, *z′*, over the outer end of which the apron is drawn as the drum *m* revolves. However well this device has worked on the front side of the apron of the header, it will not answer to hold down the front side of the horizontal portion of an apron carrying grain across the reaping-platform and afterward elevating it into a binding attachment, inasmuch as the butts of the grain resting thereon throughout the entire length of the cutter-bar are so far retarded as to deliver the grain-heads first upon the binding-platform. To remove this cause of the grain turning, and also to enable the apron to run above the cutter-bar, so as to prevent the grain from riding on the sickle-guards, I employ for the purpose of keeping the apron down simply the angle-piece *e″*, that has its ends turned up, as shown in Fig. 6, to prevent the apron, as it passes under it, from catching. This angle-piece *e″* may be of any rigid material; but I prefer to make it of spring-steel, and it should be secured to the cutter-bar with the spring part above the apron at that point where it is desired the elevating portion of the apron should commence, Figs. 1, 5, 6, and 8. To prevent the grain from running under the spring *e″*, I cover it with the wooden block *d*, that, rising above the spring, carries the grain over it.

The binding-platform Y is supported on the end of the cuttter-bar H and the end of the cross-bar *x* continued, Figs. 1 and 8, and the top thereof should be of the curvilinear form shown in the latter figure. The binding attachment is supported, as shown in Figs. 1 and 15, on a short plank, *n*, resting on the blocks *p′* and *q′* on the end *p* of the front girt of the main frame A A and the end *q* of the cross-bar *x*, and consists of a shaft, *g*, that is supported on the bearings *g′* and *g″*, and to which is rigidly attached the arm *m′*, that bears the binding-head *m″*, and that is provided with a segmental pinion, m^3. On the shaft *g* is a second or compressing-arm, *i′*, that turns freely thereon, and that, playing in advance of the binding-arm *m′*, is secured thereto by a spring, *t′*, that has its ends held, by a bolt passing through it, firmly against the ears *t″* of the arms, as shown in Figs. 9, 10, 11, 12, 13, and 15. Passing through the bearing *g′*, and a short distance below the shaft *g*, is a stud-bolt, n^4. (More particularly shown in Figs. 15 and 17.) On this stud freely turns the arm *n′*, that is provided with a segmental gear, n^3, (in which plays the segmental pinion m^3,) and a cam-

head, n'', on the face of which the pin m^4 in the binding-arm m' works as the arm m' rotates.

On the binding-arm m' several different kinds of binding-heads, m'', whether binding with wire or cord, may be used; but I have herein shown only one, and that binding with wire. It consists simply of a stud-bolt, 6 6″, Figs. 22, 23, 24, and 29, which passes through the end of the arm m', and on which turns the twisting-pinion 2 and the rotating part 4 4′ 5 5′ 8 8′ of the wire holder and cutter, and to which is keyed or otherwise firmly secured, the fixed part 3 3′ of the wire holder and cutter. The form and position of the parts are as shown in the drawings, and they are shielded by the shield 1 1″, that is riveted to the arm m', Figs. 22, 23, and 24. On this shield and making a part thereof is the horn 1′ and the ear 1‴, to the latter of which is attached a friction-roll, 9, Figs. 22, 23, and 30.

h, Fig. 1, is a sheet-iron shield, fastened to the arm m' and shaft g in such a manner as to prevent the binding material from catching on the springs t' or other projecting parts.

Underneath the binding-table Y, and secured in any desired manner thereto, is a reel, k, Figs. 9 and 10, for carrying the wire, and a rack-box, Y′, through which the binding head m'' passes after having passed the wire around the bundle. This rack-box bears a rack, s, Figs. 35, 36, 37, 38, and 39, that operates the twisting-pinion, 2, and a lug, s', that operates the rotating part 4 4′ 5 5′ 8 8′ of the wire-holder and wire-cutter.

The twisting-pinion 2 may be any ordinary pinion, but should have the teeth cut a little deeper than those of the rack, so as to allow the wire to be inserted between its teeth without making it liable to come in contact with the rack-teeth, as shown in Fig. 40.

The apron W may be operated in any desired manner, as by a sprocket-wheel, a, on the crank-shaft bearing a chain running over the loose sprocket-wheel b, that clutches in the sprocket-wheel c, that is keyed or otherwise securely fixed to the shaft or axle l of the driving roll or drum m of the apron W, Figs. 1, 7, and 8. The loose wheel b is clutched in or out of the wheel c at pleasure by means of the lever d, Fig. 1. The binding attachment may also be operated in any desired manner, as by a chain on the sprocket wheel c, driving the sprocket-wheel e on the intermediate shaft, e', Fig. 1, that in turn, by means of the pinion f, operates the gear f', attached to the binding-shaft g, that by a complete revolution in one direction performs the entire operation of binding.

During the operation of my machine, if it be desired to turn it around in a right-hand direction, the same may be effected by turning the capstan P so as to incline the pole I to the frame A A, as shown in Fig. 1, when the forward movement of the horses will turn the machine. To keep the machine moving in a right line, it is only necessary to keep the pole I in a line perpendicular to the rear girt of the main frame A A. To raise and lower the cutter-bar the hand of the driver should be applied to the handle of the lifting-lever O, to press down the spring o', Figs. 1, 18, 19, and 20, when the handle may be withdrawn from one socket of the holder t^4 and again inserted in another above or below it at pleasure, where the spring o', upon being released, securely holds it, as shown.

The forward movement of the machine, through means of the gear-set D and sprocket-wheels a, b, and c rapidly revolves the apron W, carrying the cut grain first across the platform in front of the cutter-bar and then over the drum m, delivering it in a continuous stream upon the concave surface of the binding-platform Y, where the rotary movement of the arm m', attached to the revolving shaft g, causes it to be bound into bundles and cast upon the ground at the side of the machine in the manner following, to wit: The arms, being in the position shown by Fig. 10, secure the end of the binding-wire k' (carried on the reel k) in the binding-head m'' by inserting it between the fixed and rotating parts of the wire-holder, which is accomplished by placing it in the position shown by the right-hand portion of the dotted line, (marked 7‴, Fig. 22,) when by revolving the rotary part 4 4′ 5 5′ 8 8′ one-third of a revolution the end will be drawn between the rotary part and the fixed part of the wire-holder, as shown by 7 in Fig. 22, where it is represented as compressed between that portion marked 5 of the arm 5 5′ of the rotary part of the wire-holder and wire-cutter and the face of the adjacent portion 3′ of the fixed part 3 3′ of the wire-holder and wire-cutter. Then the arm m', revolving in the direction indicated by the arrow in that figure, (10,) and driving before it the compressing-arm i, increases still more the space between it (the arm m') and the arm n' by means of the pin m^4, acting in the cam-groove m^5, until the arm n' is swung up so far as to allow the pin to leave the groove, when the arm n' becomes stationary and remains so while the pin m^4 sweeps around the circular face of the cam-head n'', as shown in Fig. 11, at which time the position of the wire with reference to the binding-head is shown by dotted lines, (marked 7″, Fig. 22,) that is, it has commenced to enter the rear opening, 3^5, between the portions 3 and 3′ of the stationary part of the wire holder and cutter. The arm m', continuing to revolve and driving the compressing-arm i', as before, soon passes the arm n', when the teeth of the segmental pinion m^3 on the arm m', striking into the teeth of the segmental gear n^3 on the arm n', causes the latter arm to be driven down or back over its course again, as shown in Figs. 12 and 13, until the ends of the two arms meet near the front end of the rack-box Y′, at which time the segmental pinion m^3 has run out of the segmental gear n^3, and the pin m^4 has again reached the face of the cam-head n'' and enters again the cam-

groove n^5, that is of such shape as to allow the pin m^4 to hold the arm n' firmly against the arm m', as shown in Figs. 8 and 9, while the latter drives it back again through the rack-box until the pin m^4, having reached the bottom of the cam-groove n^5, acts again on the right-hand face thereof, so swinging up the arm n' until the pin leaves the groove, as before, and so the operation is repeated for each bundle. As the arms are driven together the unbound grain on the table or binding-platform Y is seized between the arm n' and the compressing-arm i', as shown in Fig. 9. If the quantity of grain is sufficient, the compressing-arm is driven back toward the arm m', as shown by dotted lines in same figure, the spring t' allowing the arms to adjust themselves to the amount of grain seized between them, and yet compressing whatever quantity may be seized with the full force of the spring. While the arms are approaching each other, and when slightly in advance of their position shown in Fig. 12, the wire k' having worked up the inclined face of the horn 1', swings over its point and enters the rear side of the twisting-pinion 2 and the rear opening, 3^5, in the fixed part of the wire holder and cutter, as shown by the left-hand portion of the wire, indicated by 7''' in Figs. 22, 23, 24, and 31. The arms continuing to approach each other, the arm n' seizes the wire and loops it around the grain, as shown in Fig. 13, until the arms having come together it drives it (the wire) into the front side of the twisting-pinion and between the arms 4 4' and 5 5' of the rotary part and into the mouth 3^4 of the stationary part of the wire holder and cutter, when its position is fully shown by 7''' in Figs. 22, 23, 24, and 31. As the arm m' meets the arm n' and commences to drive it back the binding-head m'' enters the end of the rack-box Y', when the twisting-pinion 2 meshes in the rack s, Fig. 38, causing the pinion to commence rapidly revolving, and so twisting the ends of the wire that is around the grain together, as shown in Fig. 33. The first movement of the twisting-pinion 2 draws the wire into the circular groove 3''' in the fixed part 3 3' of the wire-holder, as shown by 7''' in Fig. 32, while the lug s', striking the arm 5 5' of the rotary part of the wire holder and cutter, Fig. 38, revolves the part one-third of a revolution, so bringing down the arm 4 4' to the position occupied by the arm 5 5', as shown in Fig. 39, and so continuously the passage of the binding-head m'' through the rack-box Y' causes the lug s' to rotate the rotating part of the wire holder and cutter one-third of a revolution, or over the space occupied by an arm. As the rotating part is operated by the lug s', it first bends the wire 7''', Fig. 32, over the cutting-edge 3'', Fig. 32, and forcibly seizes it between the face of the part 3' and the holder 4, when the cutting-edge 4', following, severs the wire, as shown in Fig. 32, so separating from the main body of the wire that portion that runs around the bundle and has its ends held from being withdrawn from the pinion 2 by being looped under or back of the pinion in the groove 3''' of the fixed part aforesaid, and enabling the continued movement of the pinion, as the binding-head sweeps through the remaining portion of the rack-box Y', to twist those ends together, as shown in Fig. 33, thereby completing the process of binding. As the arms again open to the position first assumed, as shown in Fig. 10, the bundle is discharged from the arms and falls upon the ground. After the wire 7'''' is severed by the cutting-edges 4' and 3'', Fig. 32, and the end 7'''' of the wire running to the reel is held, as previously described, between the parts 3' and 4, Fig. 33, this end 7'''' becomes the new end that, as the arm m' again revolves, is looped around the new grain on the binding-platform Y' and inserted in the twisting-pinion, &c., as before, and so continuously.

It should be observed that the recesses 5'', 4'', and 8'', Figs. 22, 25, 26, 31, 32, and 33, aid very much in holding the end of the wire, as thereby the extreme end thereof remains uncompressed, and so, being larger than that held in the jaws, prevents the end from being withdrawn until released by the movement of the rotating part. It may also be observed that serrating the face of the parts 4, 5, and 8 after the manner of a sickle, as shown in Figs. 25 and 26, aids somewhat in holding the ends of the wire.

It will be seen that as the binding-head passes through the rack-box the roll 9, working against the flange or side v, keeps the pinion in the rack; that the shield 1 is to protect the parts of the binding-head as it passes through the grain, and that the first teeth in the rack, Figs. 37 and 38, are shortened to prevent the teeth of the pinion catching thereon.

What I claim is—

1. The jointed pole I, capstan P, cable Q, jointed lifting-lever O, and frame A A, the parts being constructed and arranged substantially as described, so as to permit a horizontal and vertical adjustment thereof, as set forth.

2. The plate S, attached to the jointed-pole I, and arranged as described with reference to the rear girt, A, of the main frame, so as to prevent the twisting of the pole, while permitting a horizontal and vertical adjustment of the parts, substantially as set forth.

3. The arrangement of the apron W, having the extending slats a^2 on the under side, and the short slats or washers on the upper side thereof, with the fingers y' of the binding-platform Y, substantially as and for the purpose described.

4. The combination of an elevating-apron, binding-platform, and rotating binding-arm when arranged in relation to each other, substantially as described, so that the continuous stream of grain flowing from the apron upon

the binding-platform is separated and gathered into bundles by the binding-arm, substantially as set forth.

5. The combination of the rotating binding-arm m' with the compressing-arm n', substantially as described.

6. The combination of the pin m^4 on the arm m' with the cam-head n'' on the arm n', whereby the binding-arms are held together while the band is secured, and afterward opened to allow the bundle to be discharged, substantially as described.

7. The combination of the rotating binding-arm m', having thereon the segmental pinion m^3 and pinion m^4, with the reciprocating arm n', having thereon the segmental gear n^3 and cam-head n'', for the purpose of carrying the binding material around the bundle, substantially as described.

8. The combination of a rotary compressing-arm, i', with a reciprocating arm, n', whereby the loose grain is gathered and compressed ready for the binding material, substantially as described.

9. The twisting-pinion 2, having a central bearing, 6, when the teeth by which the pinion is revolved are made to twist the binding-wire, which is inserted between them on opposite sides of the pinion, substantially as described.

10. The rotary part of the wire holder and cutter, constructed and operating substantially as described.

11. The fixed part of the wire holder and cutter when provided with cutting-edge $3''$, holding-face $3'$, openings 3^4 and 3^5, for receiving the ends of the band around the bundle, and the groove $3'''$, substantially as and for the purpose described.

12. The combination of the twisting-pinion 2 with the circular groove $3'''$ in the fixed part of the wire holder and cutter, whereby the ends of the binding-wire are held in the twisting-pinion until the same are twisted together, substantially as described.

13. The combination of the rotating part of the wire holder and cutter, constructed as described, with the lug s', whereby the requisite movement of the former is obtained, substantially as described.

14. The horn I′ on the rotating arm m', arranged with reference to pinion 2 as set forth, whereby the binding-wire is inserted and held in the rear teeth of the pinion, substantially as described.

15. The shield h on the rotating binding-arm for guiding the wire over the projecting portions of the binding-arms, substantially as described.

16. The rack-box Y′, when provided with the lug s', rack s, and opposite flange, r, for holding the binding-head in the rack and against the lug, substantially as described.

17. The arrangement of the friction-roll g and flange r of the rack-box Y′, whereby the twisting, holding, and cutting mechanism are held in proper position as they pass through the rack-box, substantially as described.

18. The shield 1, attached to the arm m', when used to shield the various parts of the binding-head as it passes through the stream of flowing grain coming from the apron, substantially as described.

SYLVANUS D. LOCKE.

Witnesses:
LYN P. WOOD,
JOHN E. WILCOX.