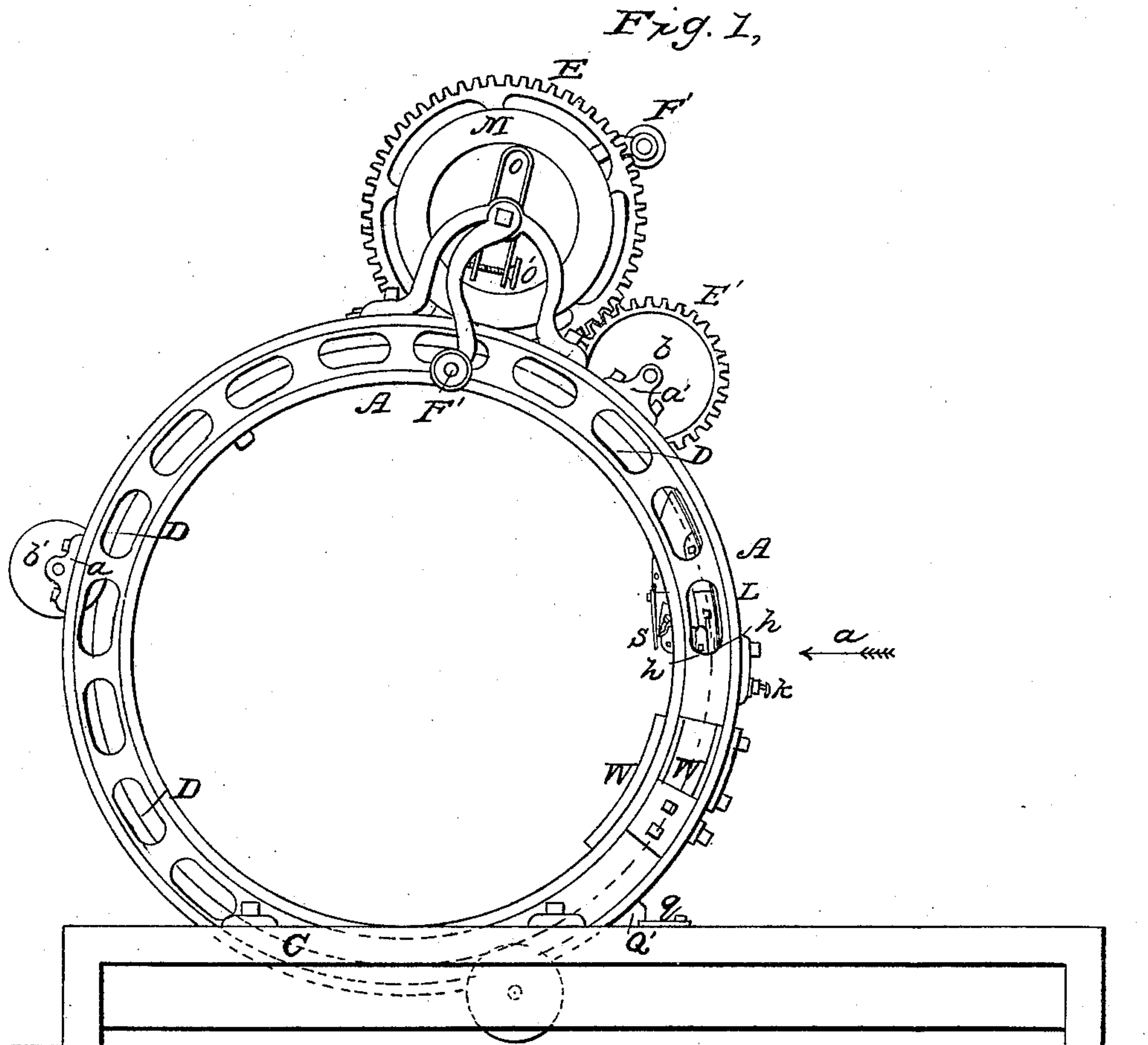


S. T. HOLLY.

Grain Binder.

No. 57,904.

Patented Sept. 11, 1866.



WITNESSES
W. L. Bennett
L. H. Munster

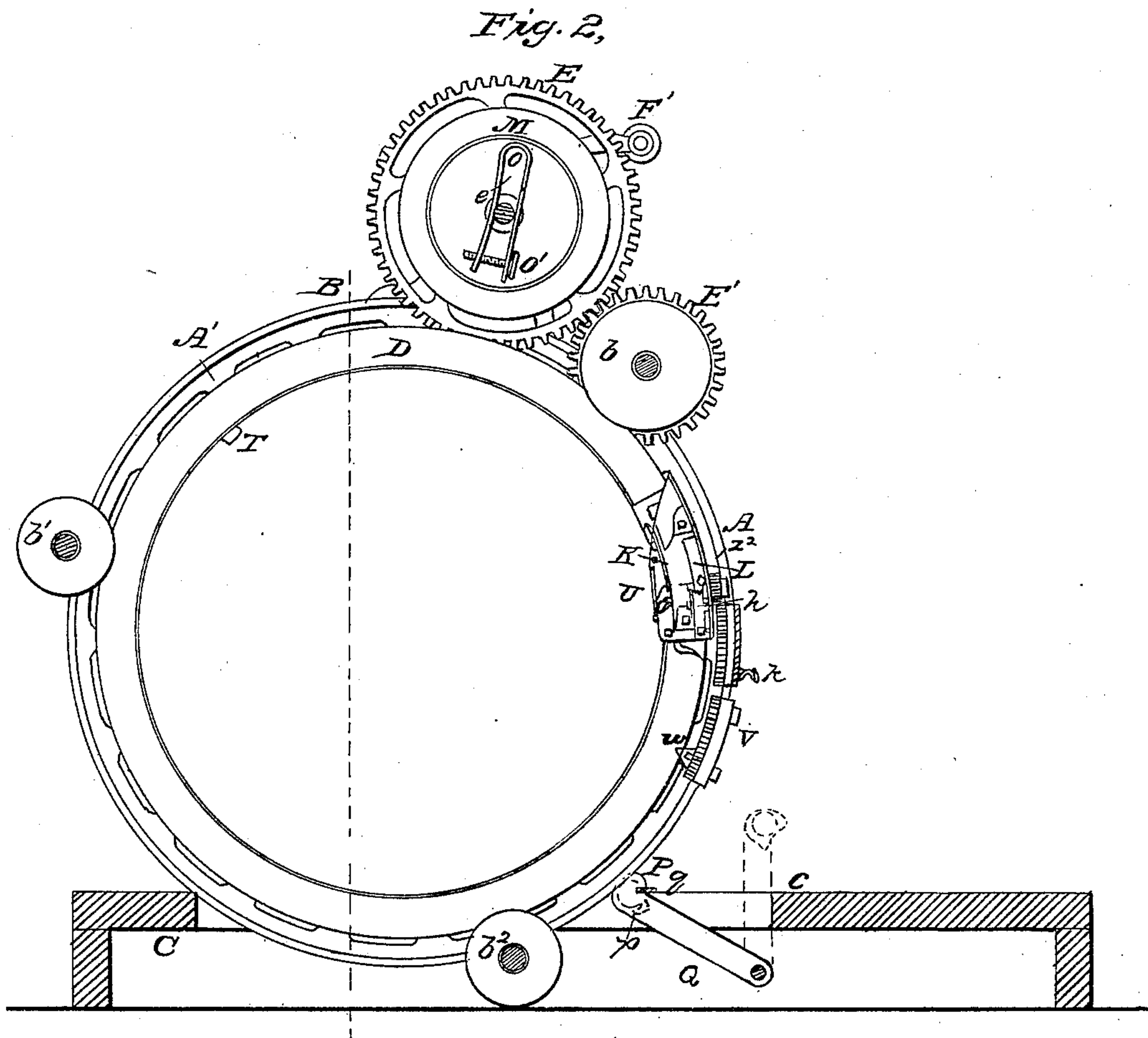
INVENTOR:
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WITNESSES:

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INVENTOR:

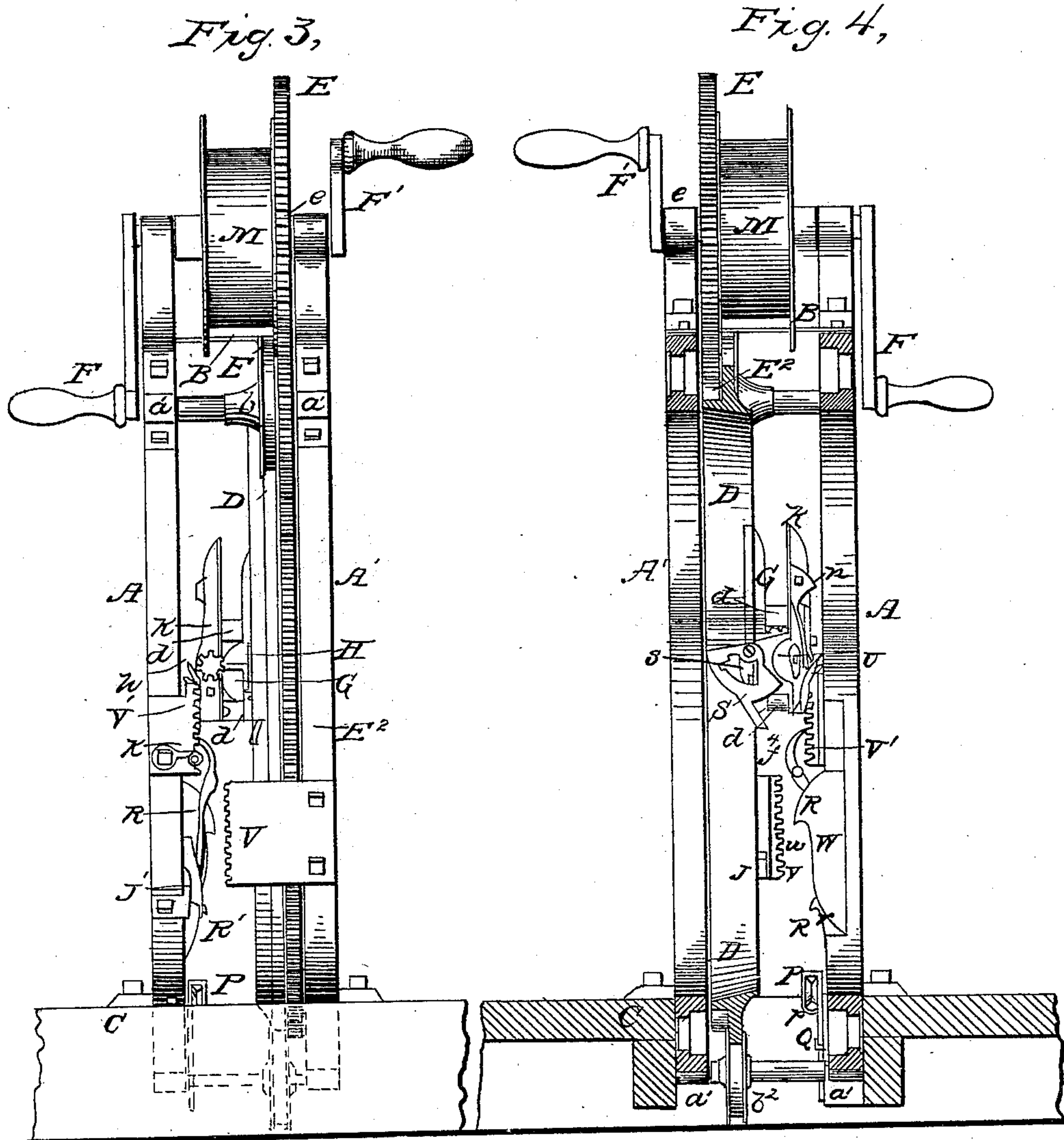
S. T. Holly
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4 Sheets—Sheet 3.

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WITNESSES:
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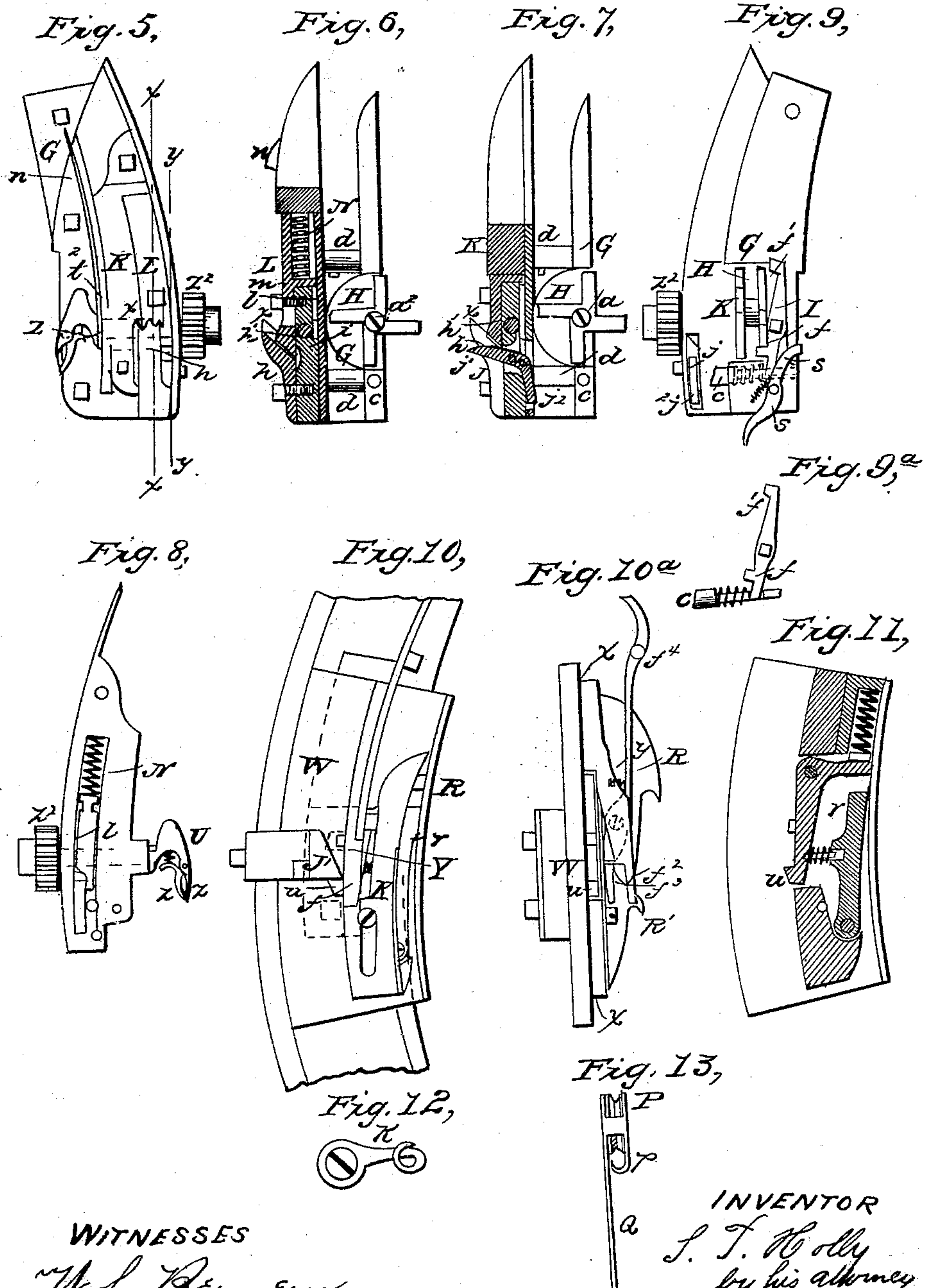
INVENTOR:
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UNITED STATES PATENT OFFICE.

SOLOMON T. HOLLY, OF ROCKFORD, ILLINOIS.

IMPROVEMENT IN GRAIN-BINDERS.

Specification forming part of Letters Patent No. 57,904, dated September 11, 1866.

To all whom it may concern :

Be it known that I, SOLOMON T. HOLLY, of Rockford, in the county of Winnebago and State of Illinois, have invented certain new and useful Improvements in Mechanism for Binding Grain, and other articles to which it is applicable, and that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 represents a rear elevation of a binding apparatus constructed in accordance with my invention, and suitable to be used in connection with a harvester. Fig. 2 represents a similar view, with one of the frames of the apparatus removed and with the spool in section. Fig. 3 represents an elevation of the side of the apparatus looking toward it in the direction indicated by the arrow *a* in Fig. 1. Fig. 4 represents an elevation of the same parts of the apparatus as seen from within the ring-carrier. Fig. 5 represents an enlarged view of the finger-stock. Figs. 6 and 7 represent sections of the same at the lines *x x* and *y y* of Fig. 5, and Fig. 8 represents a transverse section of the same. Fig. 9 represents an enlarged view of the inner side of the finger-stock. Fig. 10 represents an enlarged view of the shield-stock facing the finger-stock. Fig. 10^a represents an edge view of the same and Fig. 11 represents a section of the same at the line *x x* of Fig. 10^a. Fig. 12 represents an enlarged top view of the eye-guide of the binding material, and Fig. 13 represents a similar view of the guide-pulley of the binding material.

The object of the invention which constitutes the subject-matter of this patent is mainly to operate the instrument for securing the band by means of the revolving carrier that carries the binding material around the gavel, so that the operator is required to apply force to the revolving carrier alone, and the momentum acquired by the latter in revolving assists the securing of the band. In order to exemplify my invention, I have embodied it in a binding apparatus constructed to use cord as the binding material, and the general operation of this apparatus is as follows: The gavel of grain or other material to be bound is introduced into a ring which is arranged to revolve around the gavel and is provided

with instruments to carry a compressing-strap and the binding material with it, so that the gavel is simultaneously compressed and encircled with the binding material. The revolving ring or carrier also carries the instrument for securing the band, and this instrument is carried past mechanism which, acting upon it as it is moved onward by the revolution of the carrier, compels it to act upon and secure the band. The instrument which holds the compressing-strap and the other instruments which participate in the compression and binding of the gavel are also caused to move by the action of mechanism which acts upon them as they are carried along by the revolving ring-carrier, so that a single revolution of the ring-carrier completes the compression and binding of the gavel, the severing of the band from the spool of binding material, and the release of the secured band, and also leaves the members of the apparatus in the proper positions to bind a new gavel.

The invention is made up of a number of parts constituting improvements in binding mechanism, some of which may be used separately from the others. The first of these relates to the frame-work of the binding apparatus, and consists of the combination of a ring-carrier with a frame-work composed of two metallic ring-frames situated at the opposite sides of the ring-carrier, and forming a base to which the fixed members of the apparatus may be secured, so that the ring-carrier and its appurtenances are efficiently protected from injury, and the stationary members of the apparatus may be retained firmly in their proper relative positions.

The special object of the second part of the invention is to release the compressing-strap and permit its withdrawal from the bound sheaf by the movement of the revolving carrier for carrying the strap-holder around the gavel to be bound, and consists of the combination of a detachable strap-holder with a revolving carrier, and with an instrument supported by the frame of the apparatus in such manner that the strap-holder is operated to release the strap by the action of the said instrument upon the detent of the strap-holder while it is carried along by the revolving carrier.

The third part of the invention has refer-

ence to the construction of the traveling forceps or fingers for seizing the binding material and carrying it around the gavel, and consists of the combination of the movable jaw of the forceps with a slide, so that the use of a hinge to connect it with the fixed jaw is dispensed with, and a space is left between the two jaws for the working out of lint or fragments of the binding material.

The fourth part of the invention has reference to the spool upon which the binding material is wound, and consists of the combination of the spool with the driving-shaft of the revolving carrier, or some other shaft of the apparatus that revolves with the requisite speed, by means of a spring-connection, which yields to permit the spool to give off binding material under the tension due to the resistance of the spring-connection, but causes the driving or other shaft to turn the spool when slack binding material is formed, and take up such slack.

The fifth part of the invention consists of the combination of the spool of the binding material with an eye-guide having the form of a coil, so that the binding material taken from the spool may be readily introduced into it.

The sixth part of the invention consists of the combination of a pulley-guide for the binding material with a movable arm, and a fastening therefor, which permits the pulley-guide to be readily moved into a convenient position for the application of the binding material to it, and then replaced in the proper position for guiding the material to the traveling forceps.

The seventh part of the invention consists of the combination of the pulley-guide for the binding material with a curved tongue-casing, which permits the binding material to be readily applied to the pulley, but prevents its escape therefrom.

The eighth part of the invention has reference to the movable driver which supports the binding material at the inner side of the revolving carrier in the proper position for the band-securing instrument to act upon it, and consists of the combination of said driver with a latch, or other detachable fastening, to hold it in position, so that the necessity of extending a cam around the larger portion of the revolving carrier for that purpose is dispensed with.

The ninth part of the invention consists of the combination of the revolving carrier with a band-securing instrument mounted upon it, so that the band-securing instrument is caused to travel around the gavel by the revolving carrier, and may be operated while so traveling by mechanism supported by the frame of the apparatus, thus enabling the band to be secured by the movement of the revolving carrier.

The tenth part of my invention consists of the combination of a traveling band-securing instrument with a movable shield-plate, or its

equivalent, for holding the binding material between the band-securing instrument and the gavel while the said instrument is traveling and securing the band.

The eleventh part of the invention consists of the combination of a traveling band-securing instrument with a yielding and movable guard or holder, operating with a yielding pressure upon the extremities of the band, between the band-securing instrument and the traveling forceps, while the said instrument is traveling and securing the band.

The twelfth part of the invention consists of the combination of the stock of the movable shield-plate and guard, or of either of them, with the traveling band-securing instrument, by means of locking mechanism which compels the stock and its appurtenance or appurtenances to move with the traveling band-securing instrument during the securing of the band.

The special object of the thirteenth part of the invention is to hold the extremities of the band for the traveling band-securing instrument after the band has been severed from the mass of binding material wound upon the spool, and consists of the combination of the traveling band-securing instrument with movable nippers, to hold the extremities of the band while moving along with the said instrument.

The special object of the fourteenth part of the invention is to facilitate the opening of a tying-bill for the release of the knot, and consists of the construction of that instrument with lips flaring at its hinder or convex side, so that they may readily receive cord between them when pressed against it.

The special object of the fifteenth part of the invention is to insure the detachment of the secured band from the tying-bill, and consists of the combination of the said instrument with two sets of mechanism, the first to turn it forward and cause it to wind the binding material upon it in a coil, and the second to turn it backward, so that the lips of the bill may be opened by contact with the band.

The apparatus represented in the accompanying drawing embodies all parts of my invention, and is of a suitable construction to be applied to a harvester. The frame-work of this apparatus is composed of two metallic frames, A and A', which are connected by a cross-bar, B, and by the platform C of the apparatus to which the frames are bolted. This frame-work embraces the ring-carrier D, supports the guide-wheels b b^1 b^2 , by which it is held in place, and protects all the working members from injury. In practice it is used in connection with a funnel-shaped cradle, formed of wood lined with sheet metal, and occupying the same relative position to the ring-carrier as the cradle does to the ring-carrier in the apparatus described in my patent dated the 26th day of January, 1864, No. 41,378. This cradle has been removed from

the apparatus represented in the drawings, so that the parts can be more fully seen.

The ring-carrier D, which is the kind of revolving carrier that I prefer to use, is supported by three guide-wheels, b b^1 b^2 , whose rims are grooved to receive and hold the rim of the ring-carrier, and these guide-wheels are secured to shafts whose journals are supported in boxes a^1 secured to the two ring-frames A A'. The ring-carrier is caused to revolve by means of a driving-wheel, E, mounted upon a shaft, e , to which two crank-handles, F F', are secured for the hands of the operator. The power is transmitted from the driver to the ring-carrier by an intermediate wheel, E¹, whose teeth gear into those of the driver on one side, and into the ring of teeth E², secured to the ring-carrier on the other side.

The ring-carrier carries a detachable strap-holder, H, for the compressing-strap by which the gavel is compressed. This detachable strap-holder is a four-armed instrument constructed with slotted arms, and arranged to turn on a pivot, a^2 , and to operate upon the compressing-strap, as described in my previous patent aforesaid. The strap-holder is secured by its pivot to a block or stock, G, projecting from the ring-carrier. Its slotted arms hold the thickened end of the compressing-strap while the grain is being compressed, and permit it to escape, and recatch it after the binding is completed. The detachable strap-holder is held and permitted to turn by a detent, consisting of a lever, I, with two arms, f f^1 , one of which is pressed within the range of motion of the slotted arms of the strap-holder at one side of its pivot by a spring, g , while the other arm of the lever-detent is just out of the range of motion of the slotted arms at the opposite side of the pivot; hence, when the first arm f of the lever-detent is moved back out of the range of the arms of the strap-holder, the latter is permitted to turn on its pivot and let go the end of the compressing-strap, while by the same movement of the lever its other arm, f^1 , is brought forward to check the revolution of the strap-holder, by standing within the range of motion of its arms until the first arm f of the lever can be permitted to move forward and stop the revolution completely, when the slotted arm next succeeding the one which let go the strap occupies the proper position to hold its end. In order that the escape of the compressing-strap may be effected by the movement of the ring-carrier, the end of the detent-lever is perforated to admit a sliding pin, c , which is placed in a socket in the stock G of the detachable strap-holder. At the inner end of this pin there is a shoulder which bears upon the detent-lever, and its outer end projects radially from the periphery of the stock G. A stationary inclined block, J, is secured to the frame of the apparatus within the range of motion of the projecting end of the pin c , so that the pin c is carried along the in-

clined face of the block J by the movement of the ring-carrier, and is thereby moved inward and caused to move the detent-lever I, which permits the turning of the detachable strap-holder H, and the consequent escape of the end of the compressing-strap from it. The compressing-strap should be drawn from a spring-drum on which it is wound, the drum being arranged to turn upon an arbor secured to one of the frames of the apparatus; but, as I have described the construction and operation of such a drum in my previous patents for binding apparatus, it is not deemed necessary to describe them again. The stock of the compressing-strap is preceded and succeeded by friction-rollers d d , to facilitate the movement of the compressing-strap when it is withdrawn from the sheaf.

The ring-carrier also carries the traveling forceps or fingers in which the end of the binding material is seized, and by which it is held while being carried around the gavel by the revolution of the ring-carrier. These forceps consist of a fixed jaw, h , and a movable jaw, h' , whose opposite faces are fluted longitudinally so as to grasp the band more securely. Both jaws are carried by a finger-stock, K, which is an extension of the stock G of the compressing-strap holder. The movable jaw is formed upon the end of a slide, L, which is pressed toward the fixed jaw by a spring, N, that is situated in a socket in the finger-stock, with one of its ends bearing against the finger-stock and the other against a stump, m , projecting from the jaw-slide. This construction of the forceps with a sliding jaw dispenses with a hinge-connection between them; and, as the jaws maintain their parallelism in opening and closing, a space is left at the side farthest from that at which the binding material enters the jaws for the escape of fragments of the binding-material, which might otherwise clog the forceps. In order that such fragments may work out of the forceps, an opening, i , is formed for the purpose in the finger-stock. The movable jaw is opened, when the end of the band is to be let go, by means of an elbow-lever, j , which is pivoted to the finger-stock, with one of its arms, j^1 , projecting laterally from the finger-stock, and its other arm, j^2 , projecting backward from it. This elbow-lever is connected with the slide of the movable jaw by means of a rod, l , one of whose ends is hook-formed, to engage in a hole in the elbow-lever, while its other end is formed into a T-head, which engages with the stump m of the slide L. In order that the forceps may be opened by the revolution of the ring-carrier, an inclined block, J', is secured to the frame of the apparatus within the range of motion of the lateral arm j^1 of the forceps elbow-lever, and at the place where the forceps are to be opened, so that when this arm of the elbow is borne against the inclined block by the forward movement of the ring-carrier the elbow-lever is compelled to turn on its pivot

and move the sliding jaw of the forceps from the fixed jaw. When the arm of the elbow-lever passes by the inclined block the movable jaw is moved back toward the fixed jaw, so as to gripe the binding material between the two by the force of its spring N.

The binding material is drawn from a spool M, which is mounted upon the shaft *e* of the driving-wheel E, and is held to it by a spring-connection composed of a U-formed spring, O, whose arms embrace the driver-shaft and whose ends are connected by a screw, O'. The opposite sides of the hollow shaft *e*¹ of the spool are cut away, as seen in section at Fig. 2, to permit the arms of the spring to bear upon the driving-shaft *e*, and the force with which the spring bears upon the driving-shaft can be regulated by turning the screw to close the spring-arms more or less. As the driving-wheel E is connected with the ring-carrier through the intervention of an intermediate wheel, E¹, the driving-wheel and ring-carrier both turn in the same direction. The binding material is wound upon the spool in such direction that the turning of the driving-wheel and ring-carrier forward tends to wind up the binding material. Hence the withdrawal of the material from the spool during the turning of the ring-carrier is resisted by the friction of the spring upon the shaft of the driver; and whenever, during the operation of compressing the gavel, slack cord is formed, it is immediately rewound upon the spool by the turning of the spool by the driving-shaft *e*, through the intervention of the spring connection.

The binding material taken from the spool is conducted through an eye-guide, *k*, and is then carried round a guide-pulley, P, held beneath that part of the frame at which the traveling forceps stop when the binding is completed and whence they start when the binding is to commence. The binding material is then applied to the traveling forceps so that the binding material extends in a direction pointing toward the forceps when the latter is at its starting-point. The eye-guide *k* has the form of a coil, so that the binding material may be readily introduced into it at the overlapping end of the coil. The guide-pulley P, when the machine is in operation, is below the level of the top of the platform C, upon which the operator stands. In order that the binding material may be applied to it readily, it is secured to the end of a hinged arm, Q, which may be turned up, as represented in Fig. 2, to hold the guide-pulley in a convenient position for the application of the binding material to it; or may be turned down to depress the guide-pulley to its place after the binding material has been applied to it. When it is down it is held there by a turning-button, *q*. The pulley is fitted with a casing to prevent the binding material from escaping from it, and this casing is formed by a curved spring-

tongue, *p*, which permits the cord to be readily introduced, but prevents its escape.

As the binding material leads upward to the traveling forceps when at its starting and stopping point, the revolution of the forceps by the ring-carrier causes it, as it approaches its stopping-point, to rise under the binding material, extending tangentially from the periphery of the gavel of grain to the pulley P, so that the binding material is received in the diverging mouth of the jaws of the forceps, which are opened to admit it by the action of the stationary incline J' upon the lever *j*, that operates the movable jaw. The binding material is directed to the mouth of the forceps by the inclined edge of the finger-stock K on one side, and it is prevented from escaping on the opposite side by the edge of a hooked shield-plate, R. The instrument for securing the band is situated between the inner periphery of the ring-carrier and the traveling forceps, and in order that the ends of the band may enter from the gavel properly for the band-securing instrument to operate upon them, a movable driver, S, is employed to support the member of the band extending from the lower side of the gavel, and also the member from the upper side, in case it should happen to be within the range of the driver. This driver is pivoted to the finger-stock and hangs downward when the forceps start from their place of rest. It retains this posture until the finger-stock has made about a third of a revolution, by which movement the binding material is caused to extend from the forceps in advance of the driver. Then the shank *o* of the driver strikes an inclined block, T, secured to the frame-work of the binder, and as the continued onward movement of the finger-stock bears the driver against the incline the driver is caused to turn upon its pivot and project transversely behind the binding material. It is held in this position by a spring-catch, *s*, which is pivoted to the finger-stock, with its head in the range of a notch, *s'*, in the driver-shank; and the latch so holds the driver until it is detached by the second inclined block, J, secured to the frame-work of the machine in the proper position to act upon the spring-catch and release the driver when the ends of the band are secured. The driver S is widened out toward its pivot, so as to form a shield, *t*, which prevents the grain of the compressed gavel from coming in contact with the band-securing instrument.

The apparatus represented in the accompanying drawing is constructed to bind with cord, and the band-securing instrument is a tying-bill, U, constructed and operating substantially as the tying-bill of Jacob Behel, described in the patent dated the 16th day of February, No. 41,661, with a fixed jaw, *z*, which is secured to a shaft, and a movable jaw, *z*¹, which is hinged to the fixed jaw and is pressed toward it by a spring, as described

in Behel's said patent. This tying-bill U is mounted upon the ring-carrier so that it is caused to travel around the gavel with it, and become thereby a traveling band-securing instrument. The shaft of the tying-bill extends radially to the ring-carrier through the finger-stock K, and is fitted at its outer end with a pinion, z^2 . In order that this traveling band-securing instrument may be operated by the revolution of the ring-carrier, a cog-segment, V, is secured to the frame-work of the apparatus, within the range of motion of the pinion z^2 , as it is carried around by the ring-carrier, so that the pinion-teeth engage with the segment-teeth when the traveling forceps is approaching the end of its revolution; hence the onward movement of the ring-carrier compels the pinion to turn upon the fixed segment, whereby the tying-bill is turned the requisite extent to secure the band. This operation requires about one and a quarter revolution of the tying-bill.

In order that the two extremities of the band extending from the driver toward the traveling forceps may be held within the range of the motion of the tying-bill, the shield-plate R is hook-formed, so that the member of the band extending from the upper side of the sheaf is prevented from rising above the other member, and a hook-formed guard, R', is secured to the stock W of the shield-plate R, to act upon the extremities of the band between the tying-bill and the traveling forceps. As the band-securing instrument and driver are carried along by the ring-carrier during the securing of the band, the shield-plate R and guard R' are both made movable by arranging their stock W to move in a slot, W', formed in the frame A, so that it may move along with the finger-stock, and that the guard R' and shield-plate R, moving with their stock, may maintain their proper positions relatively to the traveling band-securing instrument while the band is being secured. The shield and guard stock W is retained in its position until the traveling band-securing instrument is brought into the proper position relatively to the guard R' by means of a spring-catch, u , of a knee form, which is pivoted in a socket in the shield-stock, and whose head engages with a projection, v , secured to the frame A of the apparatus. This spring-catch is released when the band-securing instrument has reached the proper position, relatively to the guard, for operating upon the extremities of the band by means of the end of the driver S, which then bears against the shank of the spring-catch. A spring-latch, v , is also secured to the guard-stock in a proper position to permit the passage of the driver as far as the position it occupies when it detaches the spring-catch, and then to pass behind it, so that the shield-stock is locked fast by the catch u and latch v to the driver S, and through it to the traveling band-securing instrument, and is compelled to move

along with it until the band is secured, when the driver is released by the detachment of its spring-catch s , and permitted to turn backward on its pivot, thereby disconnecting the shield-stock from the band-securing device, and permitting the former to return by gravity to the place whence it started, and where it is retained by the engagement of its catch u with the fixed projection v of the frame until the next revolution of the ring-carrier. The catch u , latch v , and driver S thus constitute a locking mechanism, by which the stock W of the shield-plate R and guard R' is locked fast to the band-securing instrument, and compelled to move with it during the formation of the knot, and is then released from said instrument. The winding of the extremities of the band on the tying-bill in the process of tying takes up a considerable quantity of cord. In order that cord may be yielded up for this purpose, the hooked guard R' is not fixed rigidly to its stock W, but is constructed to slide upon it, and is provided with a spring, which permits it to yield to the drag of the cord as the tying-bill winds it, while at the same time it holds the cord under the tension of its spring with a yielding pressure, and thereby causes it to hug the tying-bill snugly and open its bill by pressure.

In order that the band around the gavel may be severed from the remainder, the inner edge of the movable jaw of the traveling forceps is formed into a shear-blade, and a corresponding shear-blade, x , is secured to the finger-stock at the inner side of the fixed jaw h of the traveling forceps, so that when the binding material has been received into the jaws of the forceps, as they rise under the material, it is also between the shear-blades; hence the closing of the movable jaw h' by the action of the spring N effects the simultaneous closing of the shear-blades upon the binding material. As, however, the force of the spring may not be sufficient to make the shear-blades cut the binding material, a pin, w , is secured to the frame of the apparatus in the proper position to act upon the arm j^2 of the forceps-lever j , so that this lever is compelled to turn backward as its arm is borne against the pin by the forward movement of the ring-carrier, and to pull the movable jaw by the rod l toward the fixed jaw, so that the band around the gavel is severed, while the new end upon the remainder of the binding material is caught in the forceps and is held therein, ready to be carried around the succeeding gavel of grain. The fixed shear-blade has at its lower side a heel which overlaps the movable blade and prevents the cord from passing directly through between the forceps-jaws when they are opened to admit it.

The opening of the forceps, as before described, to receive the binding material, releases the end of the band that has been carried around the gavel, and the subsequent cutting of the binding material releases the

other end of the band. In order that both ends of the band may be held for tying, a pair of nippers, Y, composed of a fixed jaw, f^2 , and a hinged or movable jaw, f^3 , is placed between the tracks pursued by the tying-bill and the shear-blades, with the movable jaw held open by a spring, y , in such position that the extremities of the band around the gavel are borne between these jaws by the onward movement of the finger-stock before the traveling forceps are opened. An inclined block, n , is also secured to the finger-stock in the proper position to act upon a pin projecting from the shank f^4 of the movable jaw of the nippers, and close the nippers upon the band before the forceps are opened, so that the extremities of the band, although released from the forceps, are held by the nippers. As the tying-bill continues to travel during the securing of the band, the nippers Y are made movable, so that they may retain their positions relatively to the tying-bill during its operation, by securing them to the stock W of the movable shield-plate, so that, as the shield-stock travels along with the finger-stock and the tying-bill during the securing of the band, the nippers secured to said stock are also compelled to move along with the tying-bill while it is operating, and the incline n continues to press upon the jaw-shank and hold the nipper-jaws closed until the tying of the knot is completed, when the movable jaw is permitted to open by the backward movement of the shield-stock, carrying the nipper-shank backward from the incline n . In order that the tying-bill may seize the extremities of the band with certainty, I have constructed it concave on the side (a^3 , Fig. 15) at which it first comes in contact with the cord, so that its point overlaps the cord before its side presses against it, which insures the seizing of the cord. In order to insure the detachment of the tied band from the tying-bill, the lips of the latter are constructed flaring at its convex side, and mechanism is provided to turn it backward, (after it has been turned forward sufficiently to form the knot,) so that the cord compressing the loop (formed and held by the hook in the bill) draws between the flaring lips, presses the movable jaw open, and releases itself. The mechanism for thus turning the tying-bill backward consists of a second cog-segment, V, secured to the frame A of the apparatus in the proper position to engage with the pinion after it disengages from the forward segment V, and at the opposite side of the pinion from the forward segment V, so that the continued forward movement of the ring-carrier after the knot is formed and the shield-stock W has been detached from the tying-bill, brings the pinion z^2 into gear with the second segment. The tying-bill is turned backward to detach the knot immediately after it has been turned forward.

The backward turning of the tying-bill restores it to the proper position for acting upon the band at the succeeding revolution of the

ring-carrier, and it is retained in this position until it is to operate on the succeeding band by the pressure of a spring, t^2 , upon the flattened side of the hub z^3 of the fixed jaw of the tying-bill. The inclined block J that operates the detent of the detachable strap-holder is placed in the position to operate the detent when the knot is formed, so that the compressing-strap is then withdrawn and the gavel is permitted to expand and drag the knot tight. The same incline operates immediately afterward upon the latch s of the movable driver S, and causes it to unlatch the driver, which, turning backward on its pivot, disconnects the tying-bill from the stock of the movable shield-plate R and hooked guard R^1 , thus permitting the tying-bill to pass onward, while the stock, with its appurtenances, returns by gravity to its lowest position.

Having thus described the best mode of carrying my invention into effect which I have devised, I deem it proper to state that my mechanism may be modified to meet the views of different users, or as found expedient by builders of binding apparatus, without destroying its principle. Thus, for example, a revolving crank-arm with a long wrist may be substituted in some cases in the place of a ring-carrier to carry the traveling forceps, band-securing instrument, or strap-holder round a gavel of material to be bound. So, also, some other band-securing instrument than the tying-bill may be mounted upon the revolving carrier, mechanism adapted to its peculiar construction being employed to operate such instrument, in place of the mechanism adapted to operate a tying-bill. The spool for the binding material may also be mounted upon some other revolving shaft in the machine than the driving-shaft, provided the former be connected with the latter by a spring-connection operating substantially like that hereinbefore described.

What I claim as my invention in binders, and desire to secure by Letters Patent, is—

1. The combination of the ring-carrier with a frame composed of two metallic ring-frames, constructed and operating substantially as set forth.

2. The combination of a detachable holder for the compressing-strap with a revolving carrier, and with an instrument for operating the strap-holder, so that the strap-holder is operated to release the strap while it is carried by the revolving carrier, substantially as set forth.

3. The combination of one of the jaws of the forceps (for holding the binding material) with a slide, operating substantially as set forth.

4. The combination of the spool for the binding material with the driving-shaft of the revolving carrier, by means of a spring-connection, operating substantially as set forth.

5. The combination of the spool of the binding material with an eye-guide having the form of a coil.

6. The combination of the pulley-guide of the binding material with a movable arm and with a fastening therefor, operating substantially as set forth.

7. The combination of the pulley-guide of the binding material with a curved tongue-casing, operating substantially as set forth.

8. The combination of the movable driver for the binding material with a detachable fastening to hold the driver in position for supporting the binding material, substantially as set forth.

9. The combination, in a binder, of the following instrumentalities, viz: the revolving carrier and a band-securing instrument secured to it, so that the latter is caused to travel around the gavel, substantially as set forth.

10. The combination, in a binder, of the following instrumentalities, viz: the traveling band-securing instrument and movable shield-plate, substantially as set forth.

11. The combination, in a binder, of the following instrumentalities, viz: the traveling band-securing instrument and a yielding press-

ure-holder operating upon the extremities of the band, substantially as set forth.

12. The combination of the stock of the movable shield-plate and guard, or of either of them, with the traveling band-securing instrument, by means of a locking mechanism, so that the stock and band-securing instrument are connected and moved together, substantially as set forth.

13. The combination of the traveling band-securing instrument with movable nippers, operating substantially as set forth, to hold the extremities of the band.

14. The construction of the tying-bill with lips flaring at its hinder side, substantially as set forth.

15. The combination of the tying-bill with two sets of actuating mechanism, the first to turn it forward, and the second to turn it backward, substantially as set forth.

SOLOMON T. HOLLY.

Witnesses:

SILAS G. TYLER,

B. D. WHITMON.