

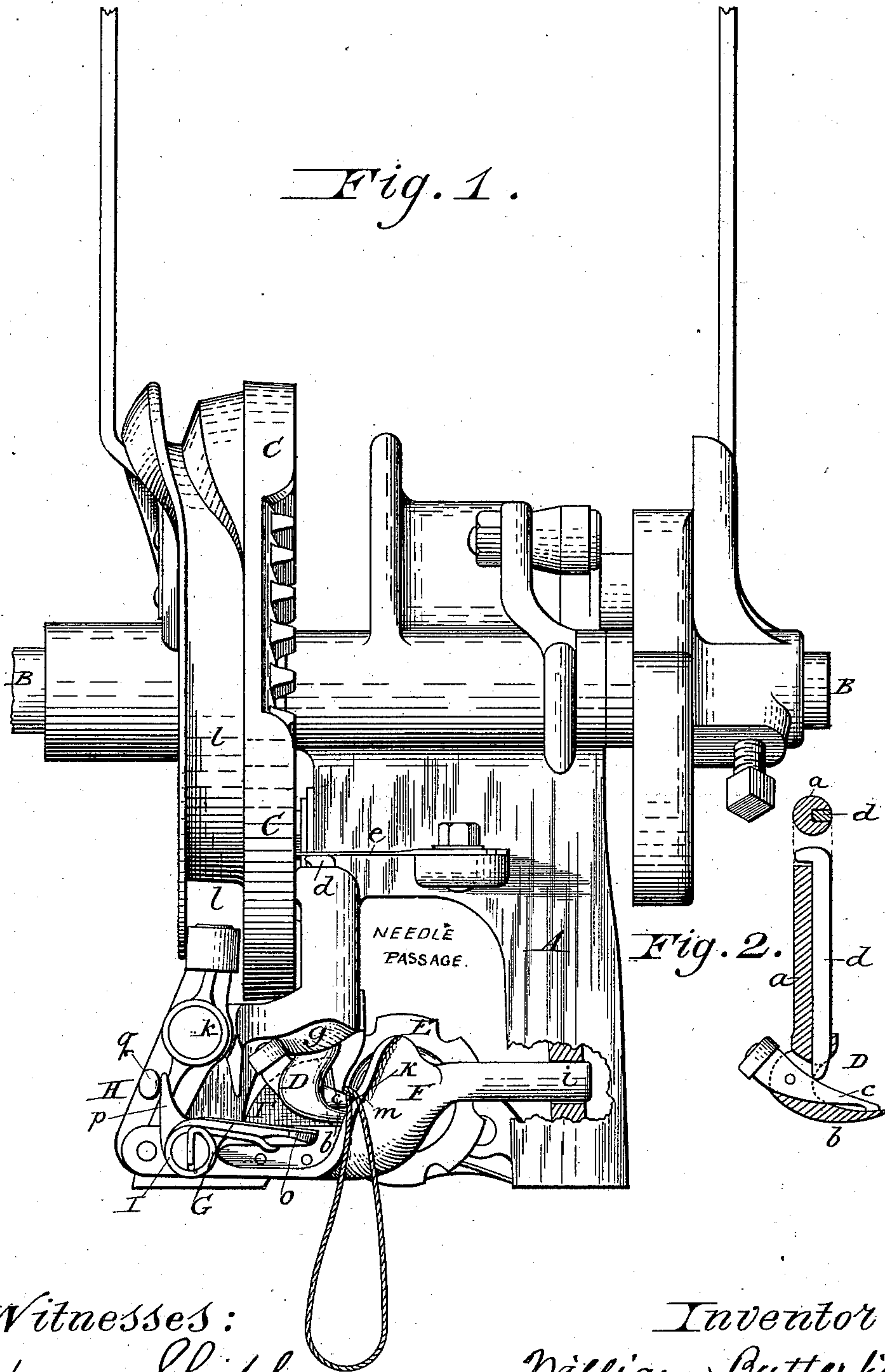
(No Model.)

2 Sheets—Sheet 1.

W. BUTTERFIELD.
GRAIN BINDING MACHINE.

No. 312,428.

Patented Feb. 17, 1885.



Witnesses:
Harry Shipley
Newton Wyckoff.

Inventor:
William Butterfield
By his Attorney,
Philip T. Dodge.

(No Model.)

2 Sheets—Sheet 2.

W. BUTTERFIELD.
GRAIN BINDING MACHINE.

No. 312,428.

Patented Feb. 17, 1885.

Fig. 3.

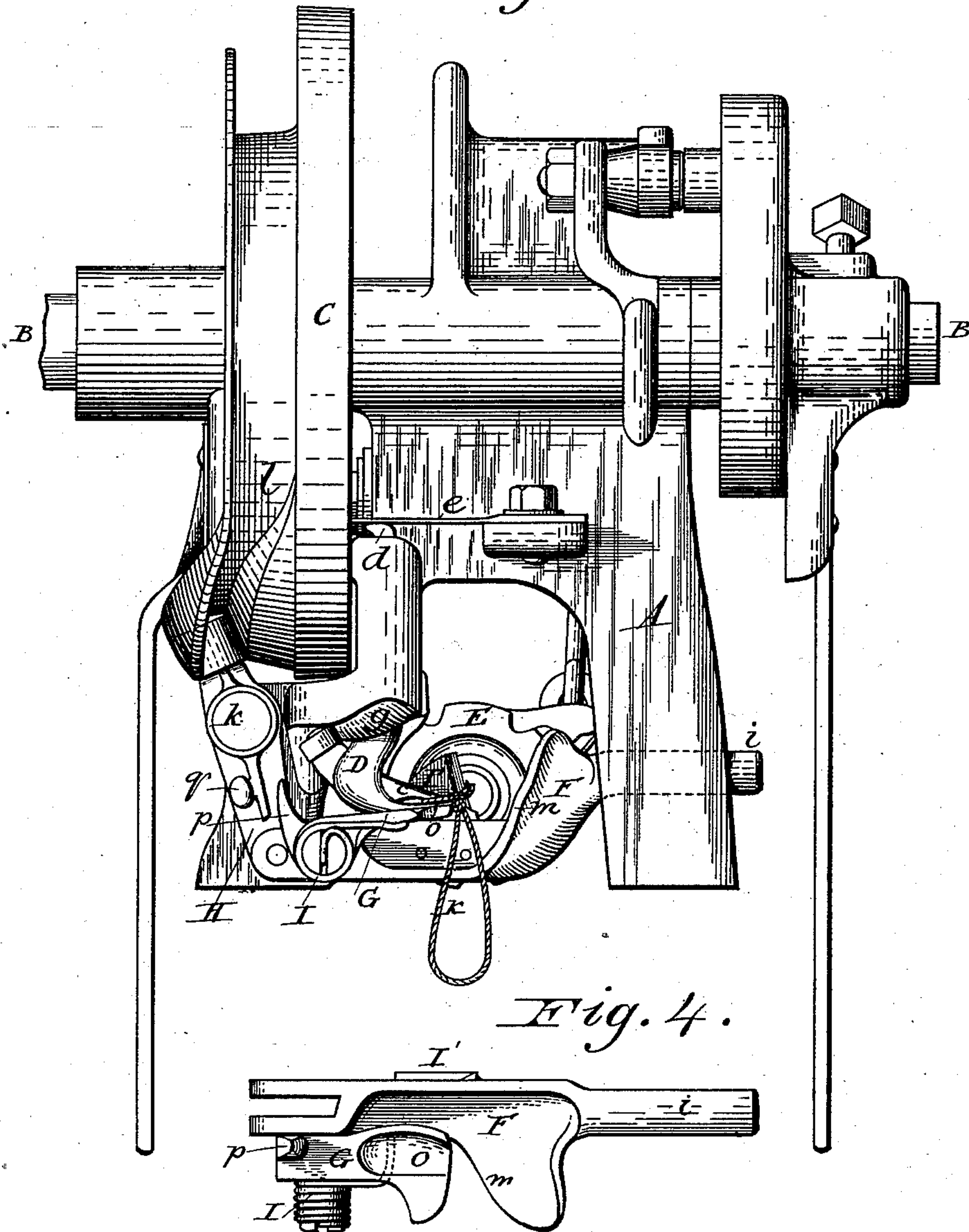


Fig. 4.

Witnesses:

Harry Shipley
Newton Wyckoff.

Inventor:

William Butterfield
By his attorney,
Philip T. Dodge

UNITED STATES PATENT OFFICE.

WILLIAM BUTTERFIELD, OF AUBURN, N. Y., ASSIGNOR TO D. M. OSBORNE
AND COMPANY, OF NEW YORK.

GRAIN-BINDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 312,428, dated February 17, 1885.

Application filed July 13, 1883. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM BUTTERFIELD, of Auburn, in the county of Cayuga and State of New York, have invented certain Improvements in Grain-Binding Machines, of which the following is a specification.

My invention has reference to that class of machines wherein the ends of the applied band are tied together by means of a revolving tying-bill or knotter having two fingers extending laterally from the spindle, and has reference more particularly to that class of tyers represented, for example, in the patent to Appleby, No. 212,420, and to machines in which the cord is clamped and held by a revolving disk located adjacent to the tyer.

The objects of the present invention are to effect the placing of the cord with certainty in the proper position to be engaged and retained by the rotary tyer, to effect the stripping of the knot from the tying-bill positively and in such manner as to prevent the cord from being slackened toward the bundle, to simplify the construction of the tyer as regards the arrangement of its closing-spring, and to secure a drawing or shearing action of the knife.

To this end the invention consists in a reciprocating cord-guide constructed and arranged to operate in a peculiar manner hereinafter explained; also, in a stripper mounted on the cord-guide and arranged to move past the outer face of the tyer, and to be thrown into and out of contact therewith; also, in a peculiar construction of the tyer-bill and its actuating devices, and in a knife mounted on a sliding and swinging guide-arm.

In the accompanying drawings I have represented my improvements as applied to a machine having in other respects substantially the same organization of parts as in the Appleby binders now commonly sold in the market; but it is to be understood that they may be embodied with equal facility in machines of other forms.

Referring to the drawings, Figure 1 represents a plan view of a clamping and tying mechanism and adjacent parts in the position in which they appear immediately prior to the commencement of the tying action. Fig. 2

is a longitudinal central and a horizontal cross section through the tying-bill or knotter. Fig. 3 is a plan view of the parts represented in Fig. 1 in the position in which they appear at the completion of the knotting operation at the instant when the knot is being discharged from the tying-bill. Fig. 4 is a plan view of the cord-guide with the stripper and knife attached thereto.

Referring to the drawings, A represents a rigid standard forming a portion of the main frame, as usual; B, the main shaft extending through the standard and carrying the wheel C, from which motion is imparted to the cord guiding, clamping, and cutting devices; D, the revolving tying-bill; E, the cord-clamping disk or wheel; F, the cord-guide, and G the stripper, mounted upon and carried by one end of the guide.

The tying-bill is of the same general character as those now in common use, consisting of a revolving spindle, *a*, provided at one end with a fixed transverse finger, *b*, and with a co-operating pivoted finger, *c*. Hitherto the closing of this finger has been effected by means of a spring or spring-cam, against which it was carried in the course of its rotation. To the employment of this spring-cam there were various objections, unnecessary to enumerate herein. In my improved device this cam is omitted, and as a substitute therefor I mount lengthwise within the spindle of the tyer a longitudinal rod or bar, *d*, the inner end of which bears against the finger *c*, while its opposite end is acted upon by one end of a flat spring, *e*, bolted at its opposite end firmly to a stud upon the standard or other fixed support, as shown in the several figures. The rod or bar *d*, being urged endwise by the action of the spring, serves to maintain the finger *c* in a closed position whenever it is relieved from the action of the opening-cam.

I prefer to construct the rod *d* in a flat form, and seat the same in a groove in one side of the tyer-spindle, with which it revolves; but the rod may be inserted centrally through the tyer-spindle, in which case, if made of round form, it may be rotated with the spindle or not, as preferred. The tyer-spindle is mounted, as usual, in a fixed support on the frame,

and is provided with the usual driving-pinion, which receives an intermitting motion from teeth and delay-surfaces on the wheel in the ordinary manner, these features constituting no part of the present invention.

The opening of the movable tyer-finger is effected by means of a stationary cam-surface, *g*, formed upon the frame in such position that the heel of the finger, having a roller thereon, is caused to travel over said surface by the rotation of the tyer. This cam, overcoming the resistance of the spring *e*, forces the rod *d* endwise, and opens the finger to prevent the entrance of the cord thereunder, in the well-known manner.

It will be perceived that the sliding rod merely bears against the movable jaw, without encircling the same or being pivoted thereto, so that both jaws are left of full strength.

Referring next to the cord-guide *F*, it will be observed that it has at one end a supporting arm or spindle, *i*, sustained in and arranged to slide through a corresponding opening formed in the frame, while at its opposite end it is pivoted to and carried by the lower end of a lever, *H*, this lever being pivoted centrally at *k* to the frame, and being seated at its opposite end in a cam-groove, *l*, formed in the periphery of the tyer-driving wheel *C*. The groove *l* is of such form as to impart a vibratory motion to the lever *H* at suitable intervals, the lever being thus caused in turn to slide the cord-guide *F* in a longitudinal direction to and from the tyer *D*.

As shown in Figs. 1, 3, and 4, the cord-guide is expanded centrally somewhat in the form of a spoon to extend around and below the tyer, with its forward edge or lip, *m*, extending in advance of the tyer, and curved downward in an oblique direction with respect thereto and to the usual path of the needle-arm, its form and location being such that when it stands near the tyer, as represented in Fig. 1, it will act upon the binding-cord *K*, and cause said cord to ride toward the tyer in such position as to be brought and retained with certainty across the fingers of the tyer. Its action in this regard is clearly represented in Fig. 1, in which it will be perceived that the two ends of the cord are retained by the edge *m* in such position with respect to the tyer that upon the revolution of the latter its fingers will act upon the cord with certainty. The cord being under strain, the lip *m* effectually prevents it from riding outward and escaping over the ends of the tying-finger during the rotation of the latter. In other words, it maintains the cord within the grasp of the tyer during the looping operation. The cam-groove is of such form as to effect the advance of the guide toward the tyer at the proper time to present the cord properly thereto, and to effect its movement backward away from the tyer to the position represented in Fig. 3 immediately upon the completion of the knot, and at the same time it is required to remove

the same from the tyer. For the purpose of effecting this removal I employ the stripper *G*, before mentioned. This stripper, which may be modified in form, consists, essentially, in a plate or arm adapted to act against the outer or rear surface of the tyer, for the purpose of forcing the knot positively forward over the ends of the tying-fingers.

As represented in the drawings, the stripper is made in the form of an elbow-lever. One end, *o*, is made concave in its upper surface in order to fit snugly against and around the outer surface of the tyer-wheel. The opposite end has its upright arm *p* adapted to encounter a lug or stop, *q*, formed upon the actuating-lever *H*, for the purpose of throwing and holding the stripper out of contact with the tyer during the knotting action.

For the purpose of throwing the stripper upward against the tyer, a coiled spring, *I*, is employed, one end being seated in a slot in the pivot which carries the stripper, while the opposite end acts beneath the stripper, as plainly represented.

The operation is as follows: The stripper being first moved to the left, as represented in Fig. 1, the heel end of the stripper encounters the stud *q*, whereby the stripper has its opposite end thrown downward away from the tyer and held out of contact therewith, as represented in Fig. 1. The cord, secured at one end by the clamping-disk, as usual, is passed around the gavel by the needle-arm and presented across the tying-bill to the clamp, during which operation the inclined edge of the guide *F* causes the cord to ride downward within reach of the tyer. The tyer then rotates and forms the knot in the ordinary manner. At the completion of this action, the guide *F* is moved to the right away from the tyer, carrying the stripper with it. During this movement, the stripper, relieved from the action of the stud *q*, is thrown upward by the spring *I*, so as to bear at its end against the outer surface of the tyer behind the loop or knot thereon. The continued movement of the stripper advances the tyer and causes its end to act against the loop and force the same positively forward over the end of the tying-fingers in the manner represented in Fig. 3, the effect of this action being not only to secure the positive completion and delivery of the knot, but to prevent the cord during the tightening action from being slackened toward the bundle, as commonly occurs in other tying devices. The knife by which the binding-cord is severed is secured rigidly to the under side of the guide-arm *F*, as shown at *I'*, its edge lying between the knoter and clamp. The movement of the guide to the right causes the knife to sever the cord at the same time that the stripper is advanced. The attachment of the knife to the guide, which is carried by a swinging support at one end, causes the edge of the knife to be moved with a drawing or shearing action across the cord. The advan-

tages of this action, which are great, being understood by every skilled mechanic, need not be detailed herein.

The present invention is restricted to those matters and things which are hereinafter specifically claimed, all other matters which may be incidentally shown or described being foreign to the present invention.

Having thus described my invention, what I claim is—

1. In combination with the stationary cam, the rotary tyer-bill having the pivoted jaw extended at the heel end to encounter said cam, the sliding rod extending lengthwise within the tyer-spindle and bearing at one end against the inside of the pivoted jaw, and the stationary spring acting against the opposite end of said rod.

2. In combination with a rotary tyer, a reciprocating cord-guide having a stripper movably attached thereto and arranged to act against the tyer, substantially as described.

3. In combination with the rotary tyer, the reciprocating cord-guide having the concave expanded central portion with the inclined edge *m*, whereby it is adapted to extend around and below the tyer and insure the delivery of the cord thereto, substantially as set forth.

4. The cord-guide, substantially as described, having one end mounted and arranged to slide in a fixed support, in combination with the swinging support at the opposite end, and means, substantially as described, for imparting a vibratory motion thereto.

5. In a grain-binder, the combination, with the cord-severing knife, of the reciprocating carrier, sustained at one end by a sliding connection and at the opposite end by a swinging connection, substantially as described, whereby the knife is caused to act with a drawing or shearing cut upon the cord.

6. In combination with the rotary tyer, the reciprocating device *F*, provided at one end with a cord-guide, *m*, and at the opposite end with a knife, and with a stripper in rear of the edge of said knife.

7. In combination with the tyer and the reciprocating carrier or support, the stripper pivoted to said carrier, a spring acting to throw the stripper into contact with the tyer during its forward movement, and positively-acting means, substantially as described, to throw the stripper out of contact with the tyer as it recedes therefrom, whereby the rotation of the tyer is permitted without interference from the stripper.

8. In combination with the tyer, the pivoted stripper, its carrier, the spring acting to throw the stripper toward the tyer, and the operating-lever provided with a stud or projection adapted to engage the stripper and throw the same out of contact with the tyer, as set forth.

WILLIAM BUTTERFIELD.

Witnesses:

CHAS. W. TOWERS,
C. W. UPHAM.