

(No Model.)

3 Sheets—Sheet 1.

J. S. DAVIS.

BAND SECURING MECHANISM FOR GRAIN BINDERS.

No. 301,808.

Patented July 8, 1884.



WITNESSES

Wm A. Link
Geo. W. Young

INVENTOR

John S. Davis.

By *his* Attorneys:

Galbraith, Hopkins & Hyatt.

(No Model.)

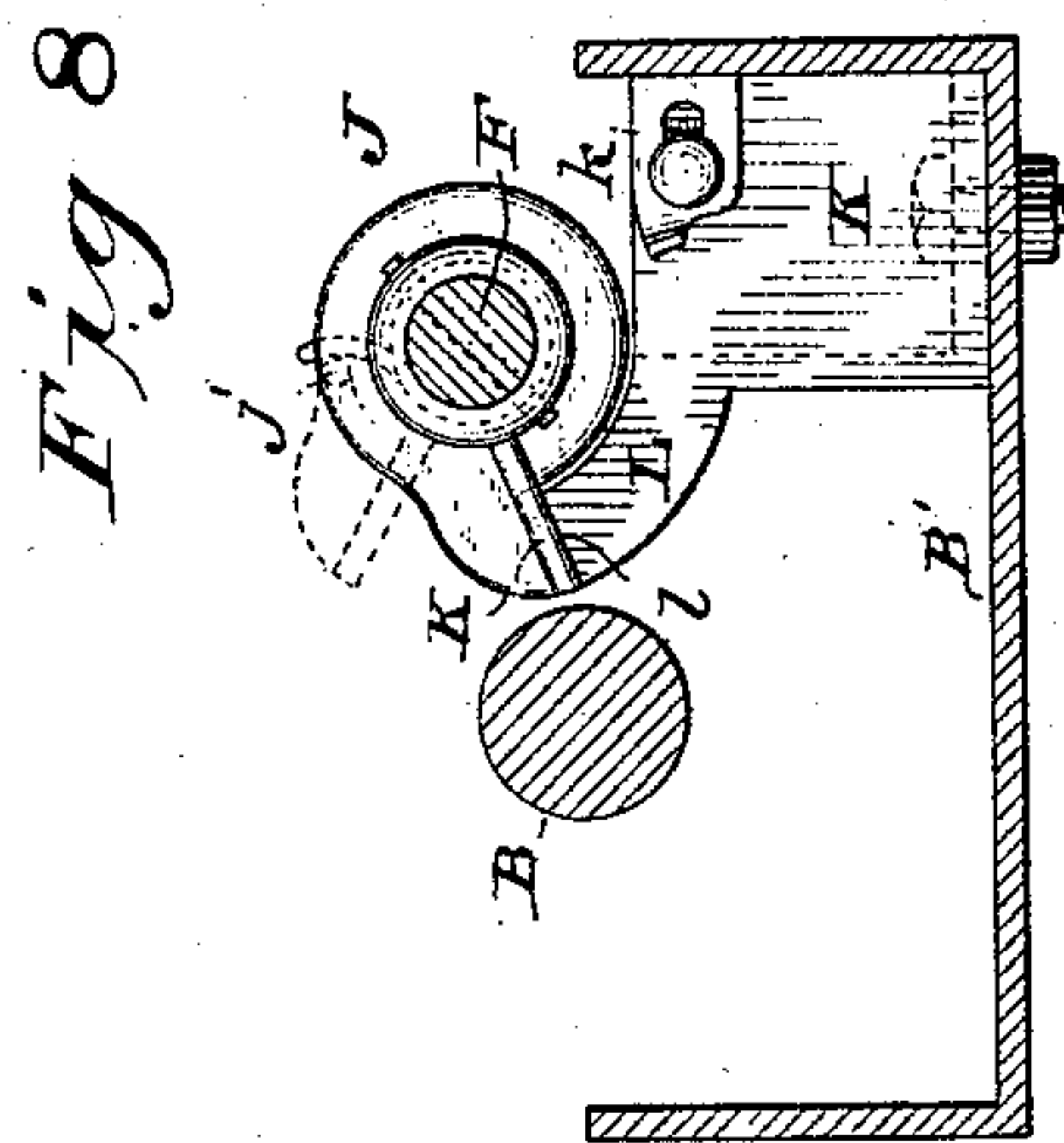
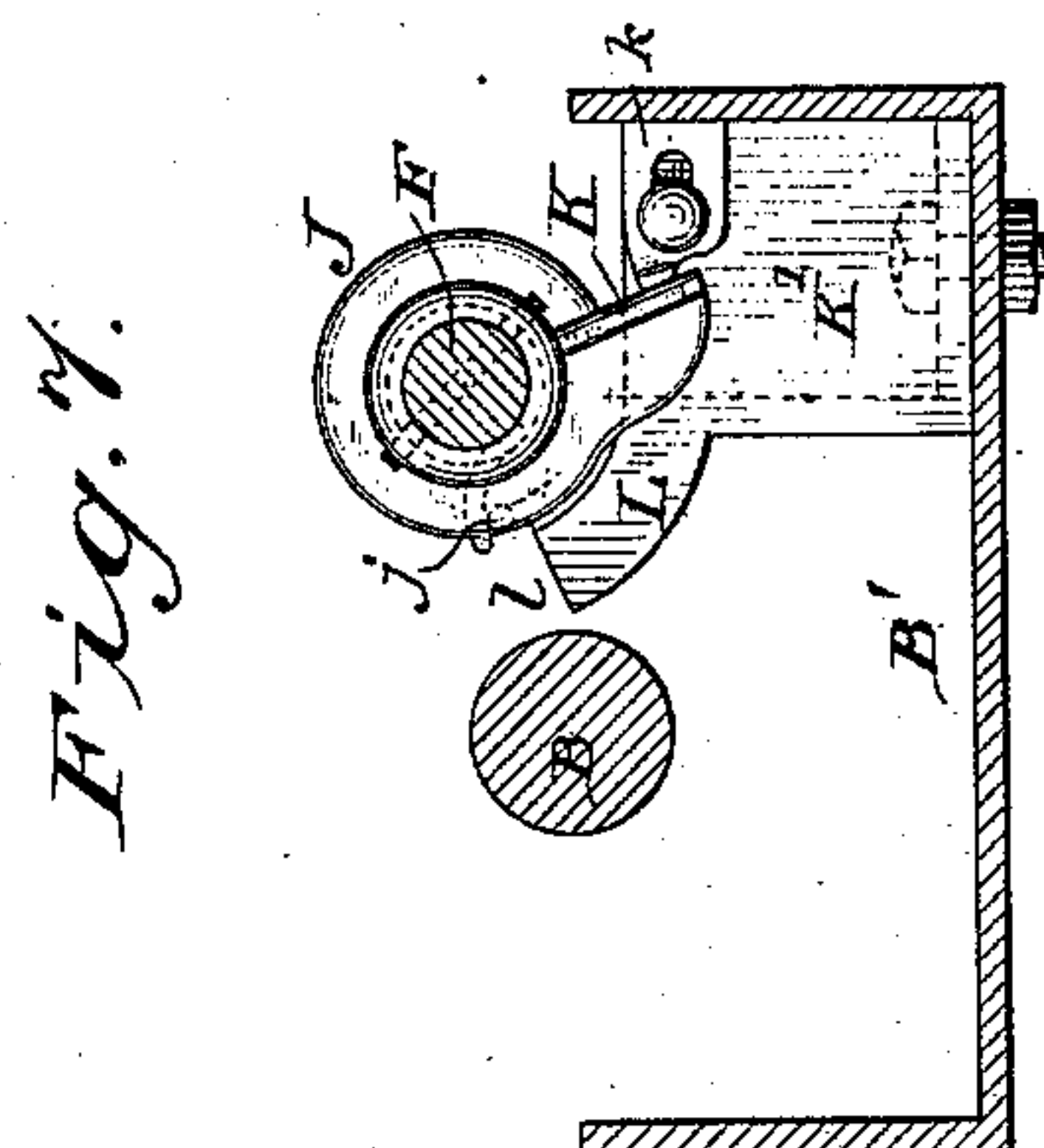
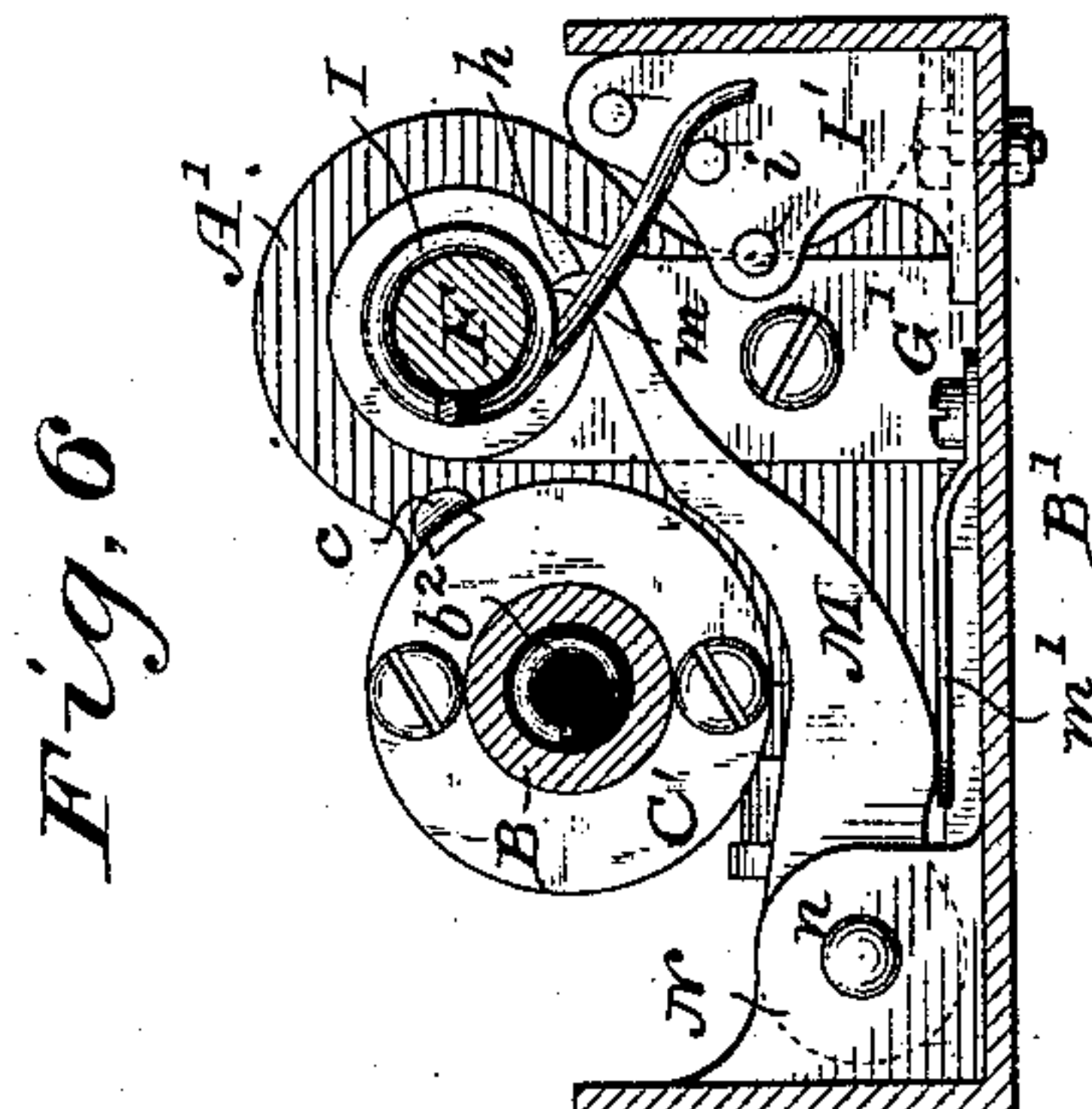
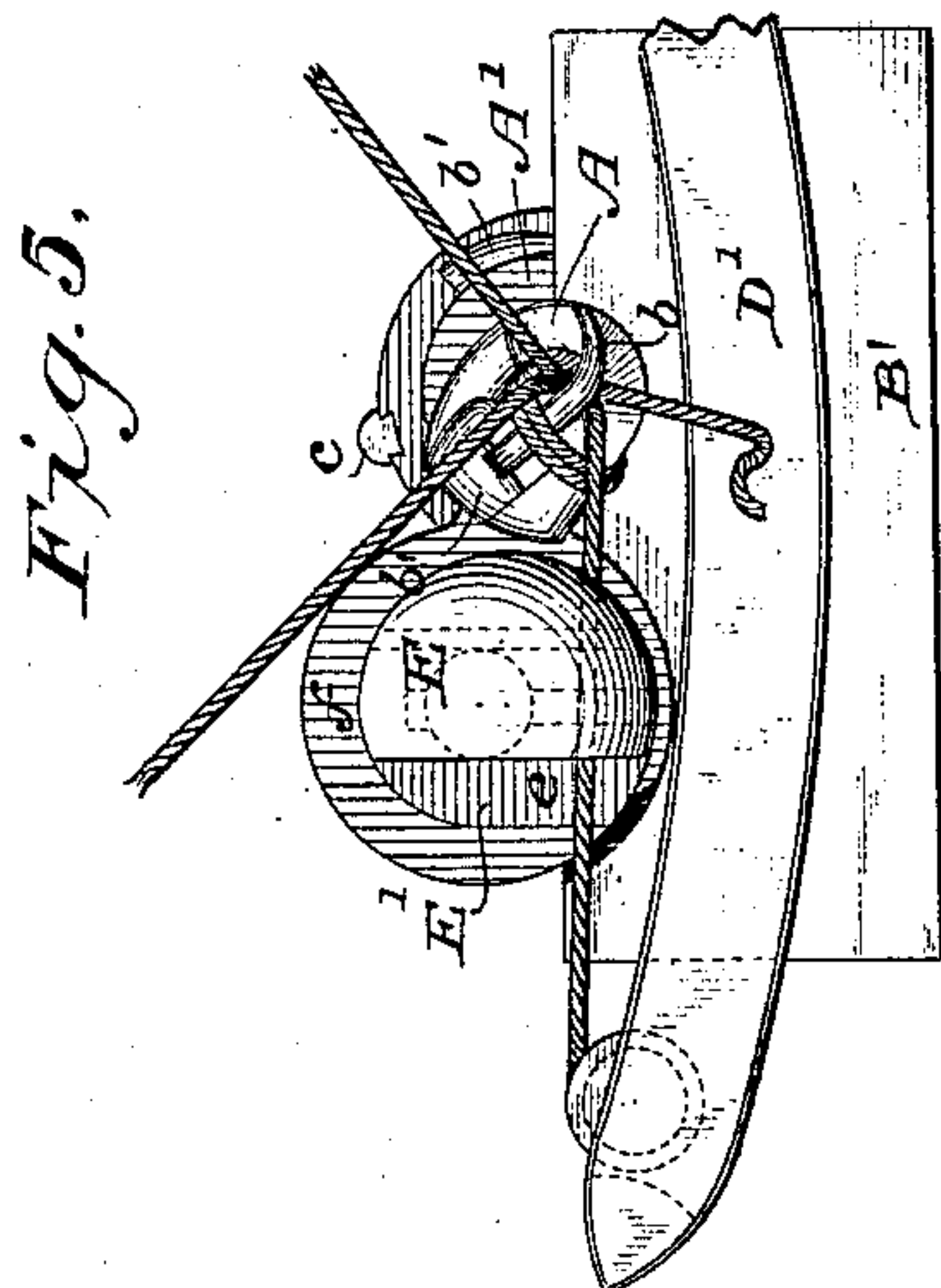
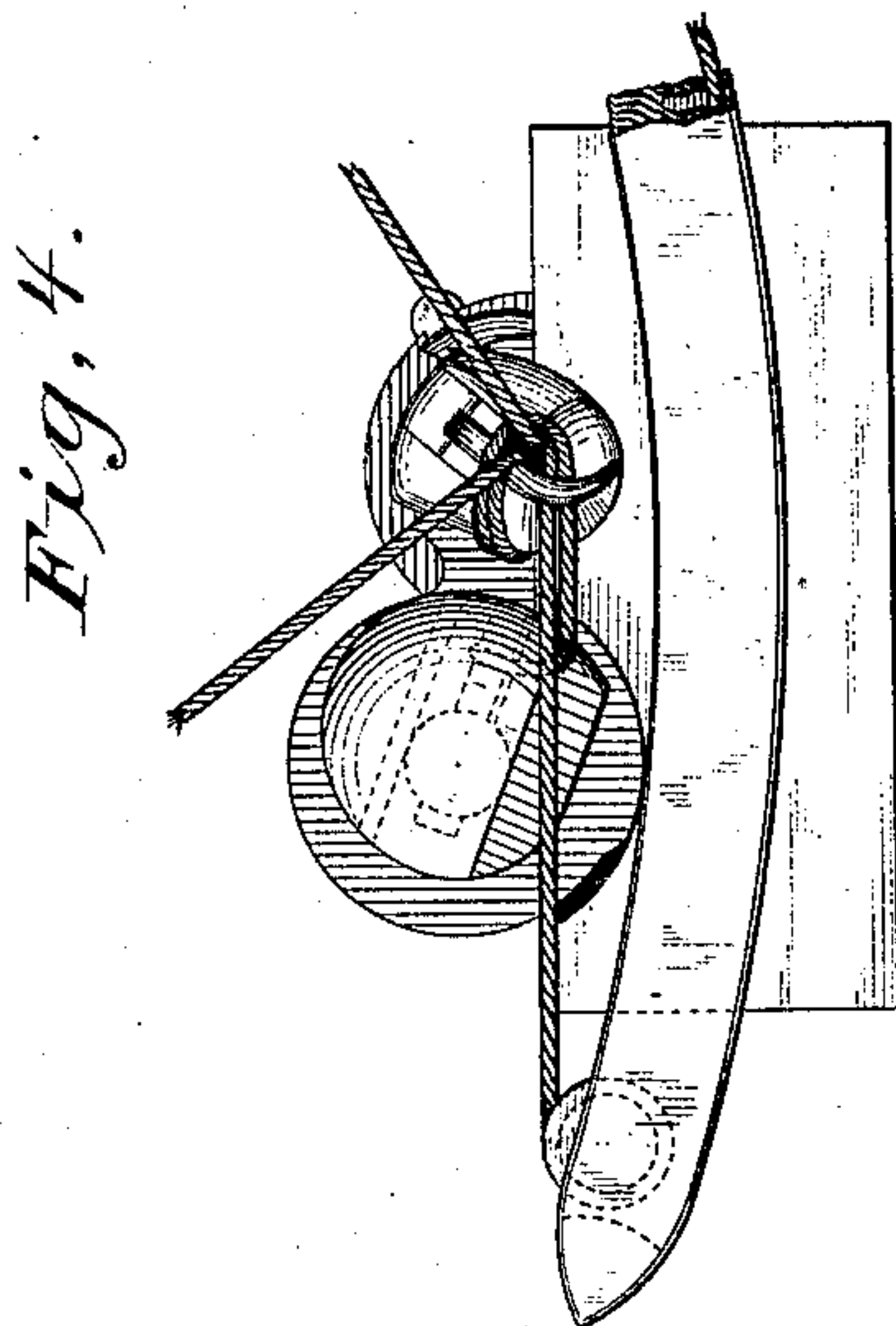
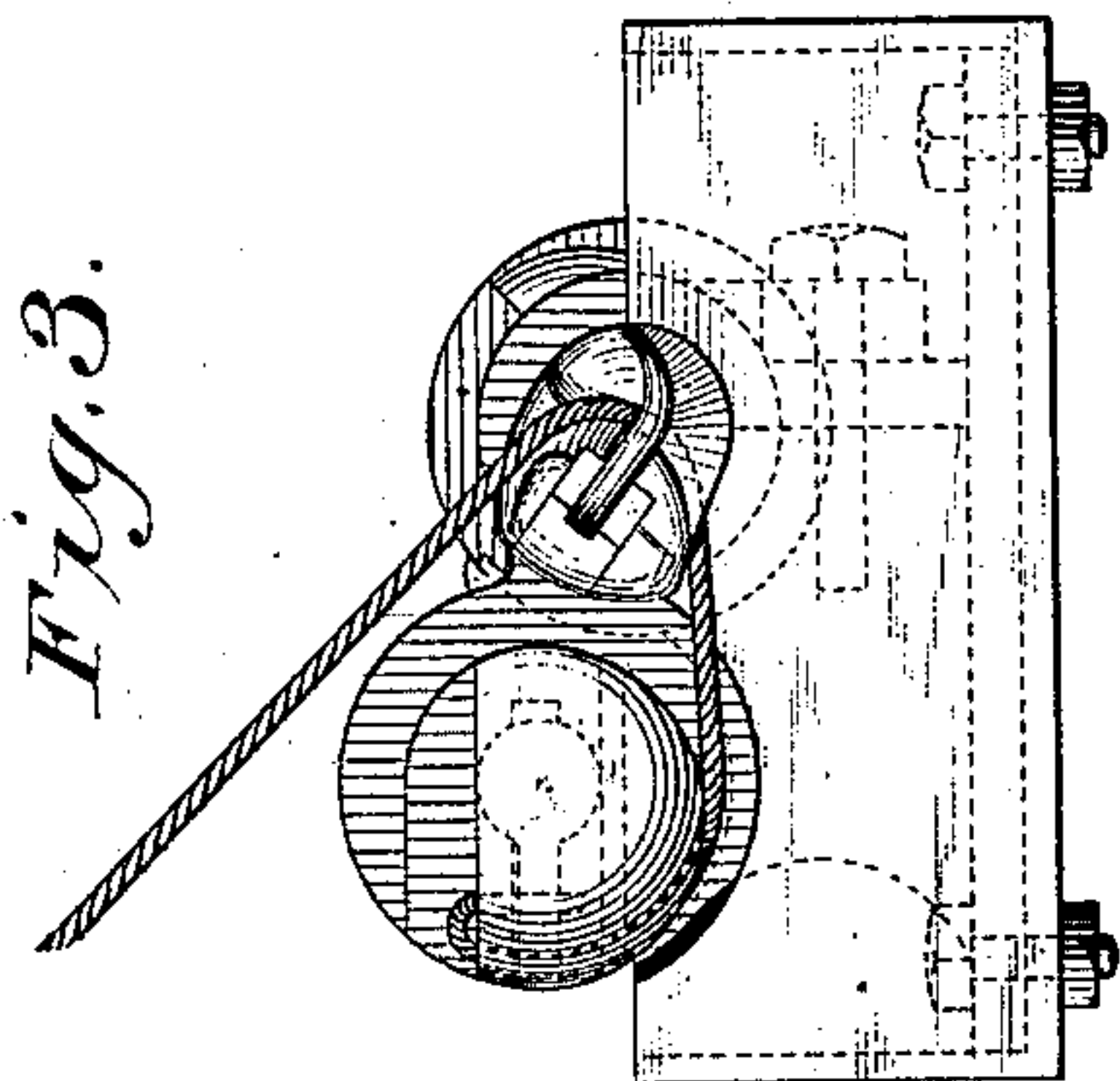
3 Sheets—Sheet 2.

J. S. DAVIS.

BAND SECURING MECHANISM FOR GRAIN BINDERS.

No. 301,808.

Patented July 8, 1884.



WITNESSES

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3 Sheets—Sheet 3.

J. S. DAVIS.

BAND SECURING MECHANISM FOR GRAIN BINDERS.

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Fig. 9.

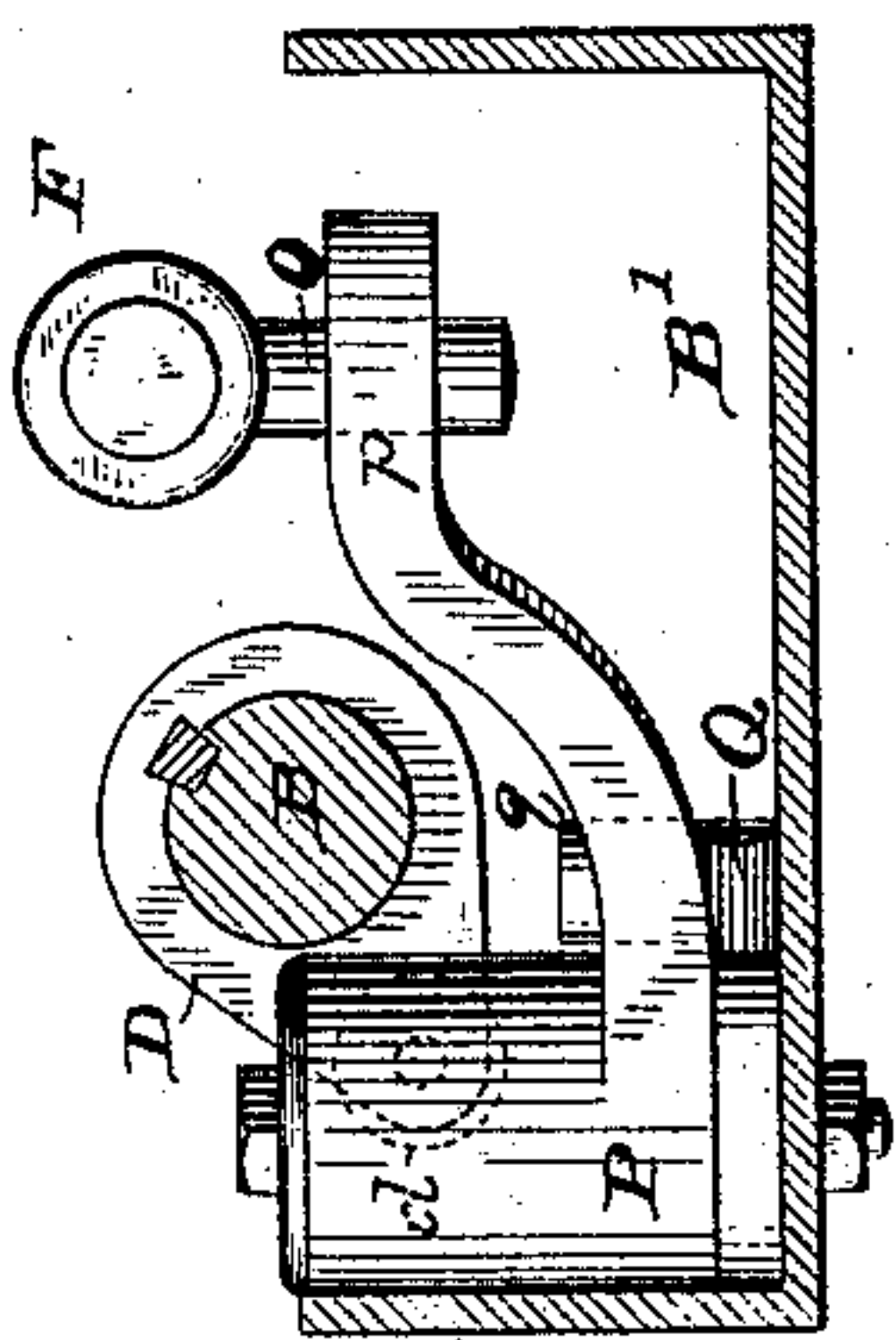


Fig. 12.

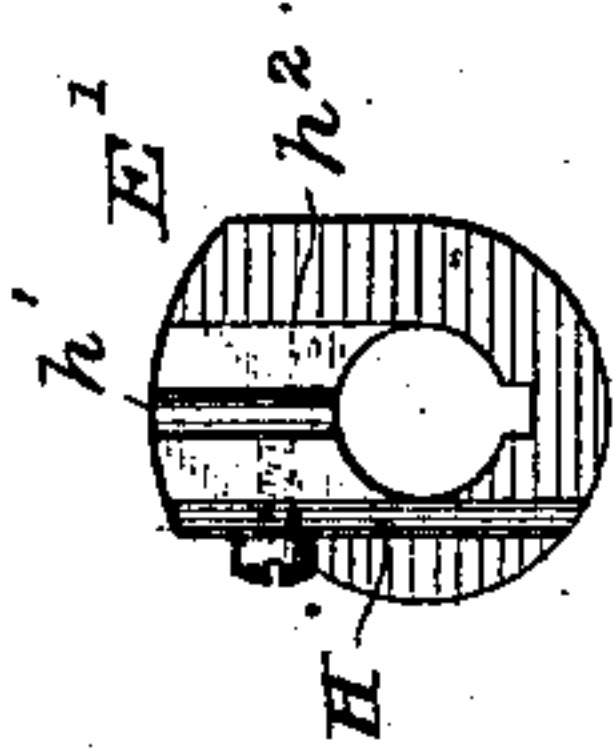


Fig. 15.

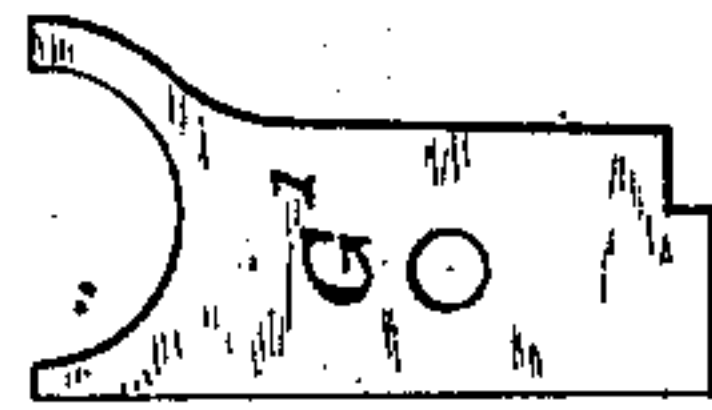


Fig. 11.

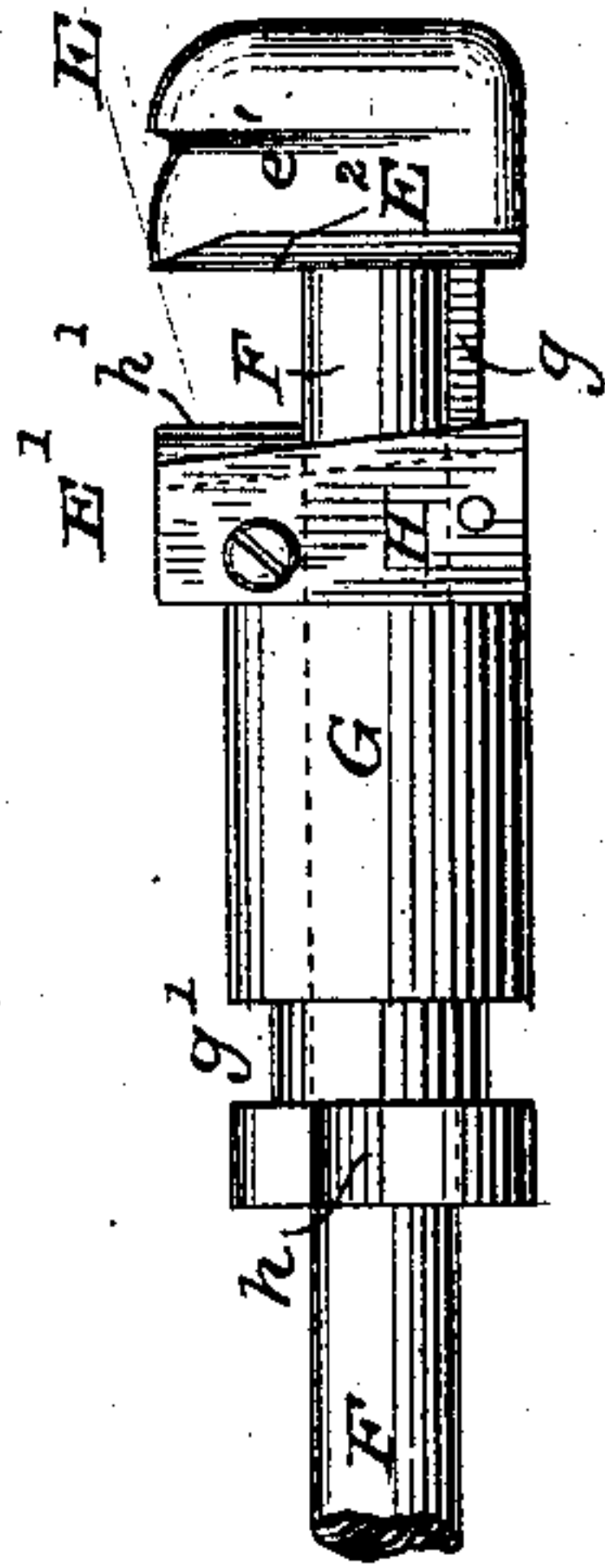


Fig. 14.

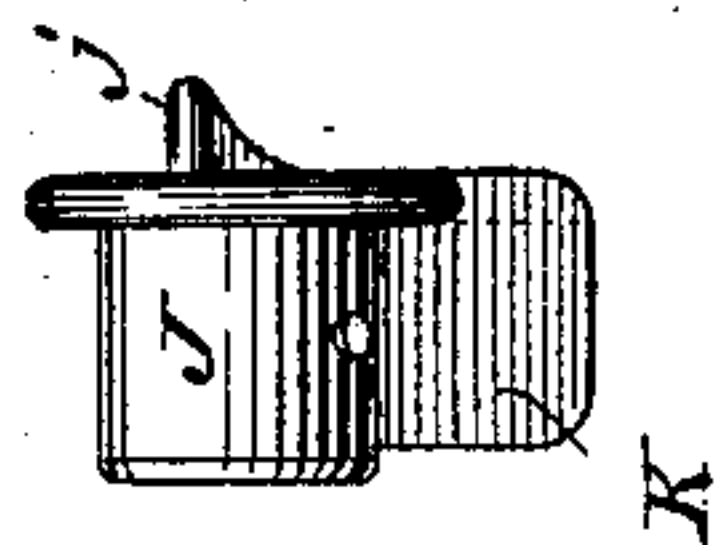


Fig. 13.

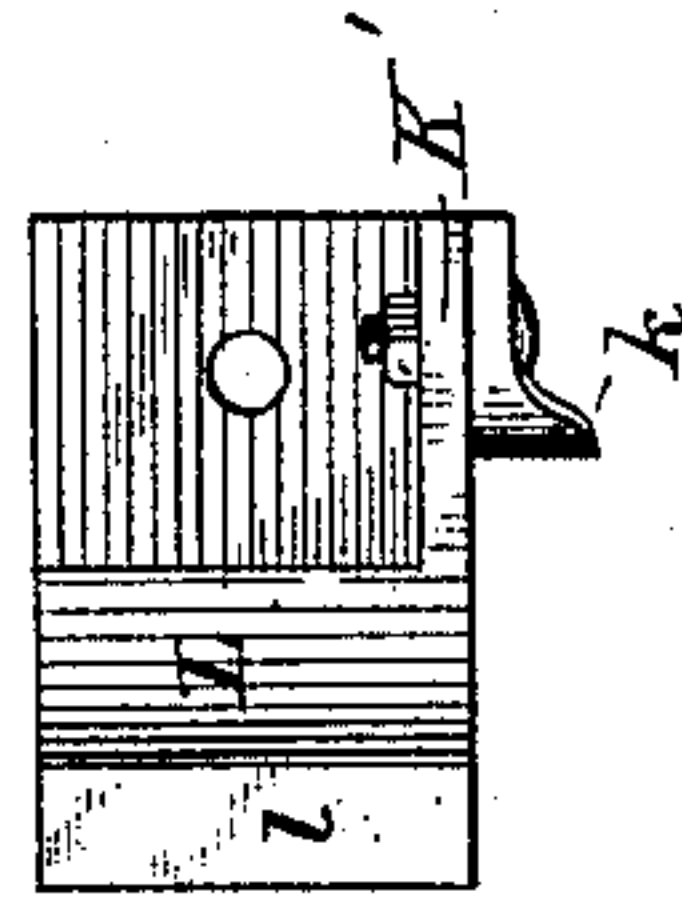


Fig. 16.

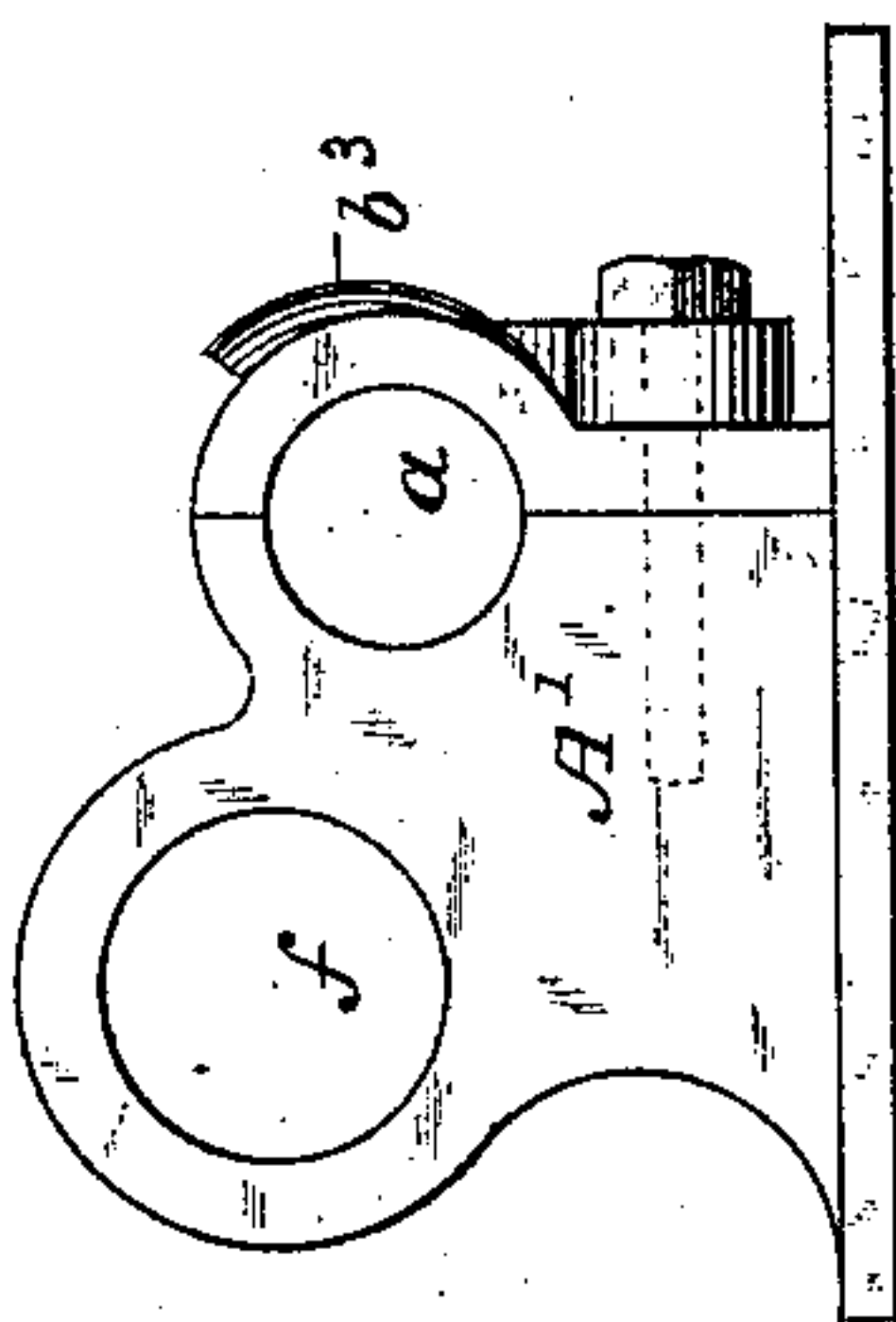
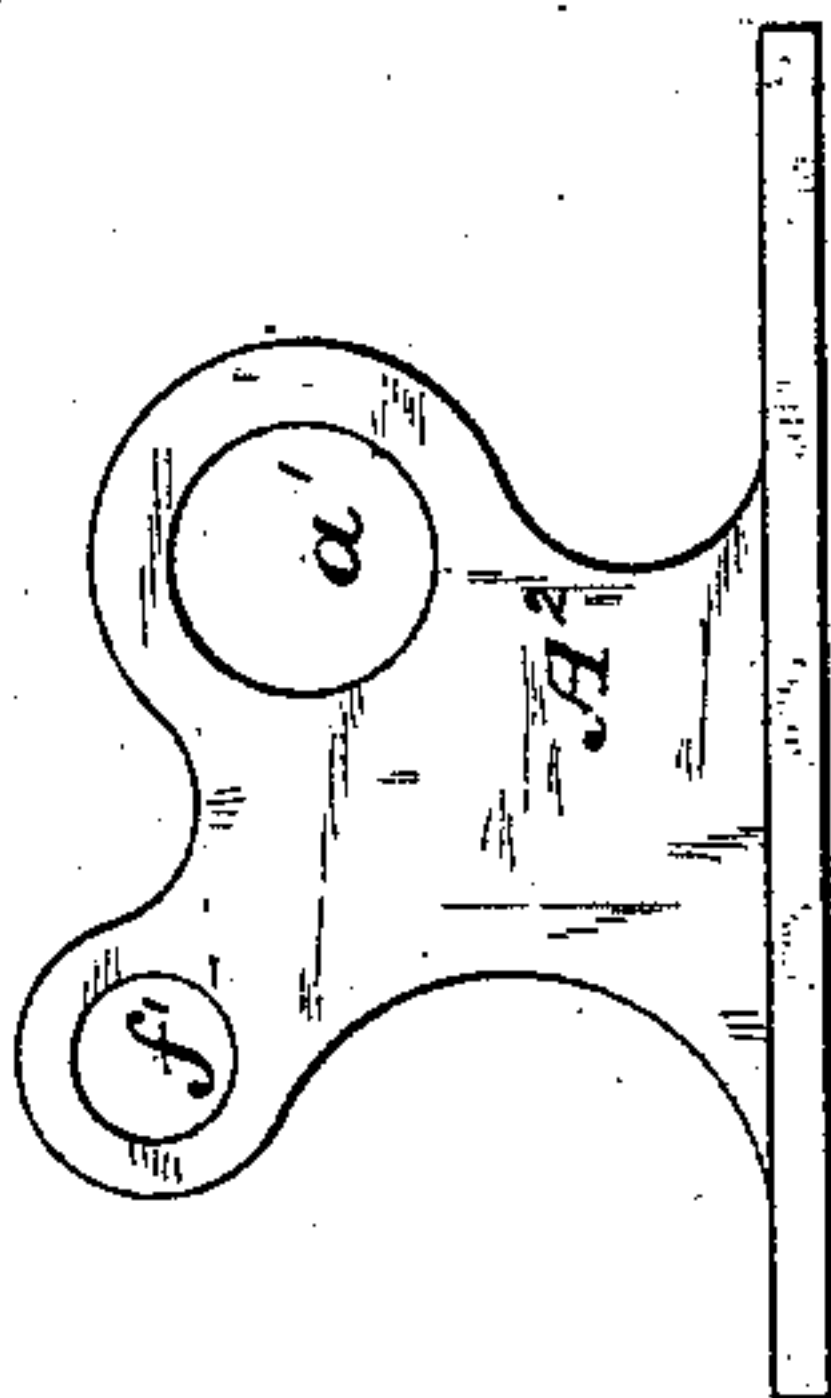


Fig. 17.



WITNESSES

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UNITED STATES PATENT OFFICE.

JOHN S. DAVIS, OF TOLEDO, OHIO, ASSIGNOR TO THE TOLEDO MOWER AND REAPER COMPANY, OF SAME PLACE.

BAND-SECURING MECHANISM FOR GRAIN-BINDERS.

SPECIFICATION forming part of Letters Patent No. 301,808, dated July 8, 1884.

Application filed June 14, 1883. (No model.)

To all whom it may concern:

Be it known that I, JOHN S. DAVIS, of Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Band-Securing Mechanism for Grain-Binders, of which the following is a specification.

My invention relates to improvements in mechanism for clamping, knotting, and cutting the binding material, especially to improved means for supplying the binding material to a knotter, during the formation of the loop of the knot, from the band ends instead of from the banding portion, or mainly from such portion of the binding material. By "banding portion" is meant the length of binding material which encircles a bundle or is included in the loop formed by crossing or bringing together at or near the knotter that portion of the binding material next the end held by the clamp, and that portion next the end passing to the binder-arm.

My objects, chiefly, are to avoid injuriously straining the binding material in securing the bands about the bundles of grain, and to insure a proper and, practically considered, uniform tension of the knotted bands about their respective tightly-bound bundles.

These main objects of my present invention are the same as are sought to be accomplished by the employment of a vibrating knotter and co-operating mechanism in another invention of mine heretofore secured by United States Letters Patent No. 282,445, dated July 31, 1883, and also shown and described, but not claimed, in United States Letters Patent granted for my invention June 5, 1883, No. 279,082.

In accordance with my present improvements I render unnecessary the employment of a vibrating knotter, while simplifying the construction and lessening the cost of the mechanism used as compared with that heretofore employed.

The accompanying drawings sufficiently represent a suitable application of my improvements. Only those parts of appropriate mechanism illustration of which is thought to be required in order to convey a proper understanding of my improvements are shown. Some of these improvements may, however,

be used without the others, and be employed in connection with mechanism differing in some respects from that shown and hereinafter particularly referred to.

Figure 1 is a plan view of the entire band-securing mechanism, the top of the casing or box for this mechanism being removed, and the parts represented as in their normal or stationary positions. Fig. 2 is a view, partly in side elevation and partly in vertical section, on the line 2 2 of Fig. 1, with a portion of one end of the casing broken away and the knotter removed. Fig. 3 is an end elevation, with the knotter and cord-holder in their normal positions, enough of the binding material being shown to represent it as in the position it is caused to assume when pressed against by the grain as the binding-receptacle is about filled, or sufficient grain to form a bundle has accumulated. Fig. 4 is an end elevation, with a portion of the binder-arm shown, representing the knotter and holder in the positions occupied by them at that stage in their operation at which the loop for the knot is completed and the cord seized by the tying-bill, at which time the holder is about to release the cord. Fig. 5 is an end elevation showing the parts illustrated in the next preceding figure, but at a later stage in their operation, the cord-holder being represented as in the position it is caused to occupy at a time when temporarily arrested in its backward turn after its sliding jaw or reciprocating member has been projected far enough to release the band end, and the entire holder has commenced to move around to its normal position, the projecting jaw of the holder having crossed over the binder-arm end of the cord for the purpose of engaging it, so as to cut and clamp it upon the retraction of the said jaw, immediately after which retraction the holder resumes its turning movement toward its position of rest. Fig. 6 is a view, partly in elevation and partly in section, on the line 6 6 of Fig. 1, showing details of devices for dogging the cord-holder to lock it against being prematurely turned in the direction it is moved to supply cord for the knot, with parts adjacent to said devices. Fig. 7 is a view, partly in elevation and partly in section, on the line 7 7 of Fig. 1,

showing details of controlling devices for limiting the backward turning movement of the cord-holder for permitting endwise movement of its sliding member, and for temporarily arresting its backward turning movement during the movement of reciprocation of its sliding member. Fig. 8 is a view similar to Fig. 7, except that the moving parts are shown as occupying different positions, the dotted lines serving to sufficiently indicate the position to which the cord-holder shaft is moved when the holder is at the limit of its turn, (about as shown in Fig. 4,) for supplying cord to the knotter, and the full lines showing the parts as in the positions (corresponding with Fig. 5) occupied when the backward turning movement of the holder is temporarily arrested. Fig. 9 is a view, partly in elevation and partly in section, on the line 9 9 of Fig. 1, showing details of devices for projecting the sliding jaw of the cord-holder. Fig. 10 is a bottom view of the turning cord-holder and cutting devices as seen at a time when they occupy the position in which they are represented in Fig. 5—that is to say, at a time when the reciprocating member of the holder and its attached cutter is moved outward, and when the turning movement of the holder is temporarily arrested to enable the sliding jaw after having engaged the binder-arm end of a band to cut and clamp the cord upon the retraction of the jaw preparatory to the completion of the backward turning movement of the holder to take up cord to supply to the knotter during the formation of the next knot. Fig. 11 is a view similar to Fig. 10, but with the parts in a different position, which corresponds with that in which they are shown in Figs. 1, 2, and 3, except that the reciprocating head or cord-holder is represented in a "forced" position, it being shown as projected to more clearly illustrate the details of construction. Fig. 12 is a view in end elevation of the non-reciprocating tubular member of the holder and its cutter detached from the shaft of the cord-holder. Fig. 13 shows detached and in plan the bracket and stop-lug of the controlling devices for permitting endwise movement of the jaw of the cord-holder and limiting its turning movement, and Fig. 14 shows in elevation and detached from the shaft of the cord-holder the flanged and lugged collar of the controlling devices. Fig. 15 shows detached and in elevation a recessed keeper or forked stud by which endwise movement of the inner non-sliding section of the holder and cutter is prevented. Fig. 16 shows detached and in front elevation the bearing-block or supporting-bracket for the knotter and holder at or near the outer end of the casing, the knotter-bearing being divided and one section of it formed with a cam for actuating the tying-bill. Fig. 17 shows detached and in front elevation the bearing-bracket for the knotter and holder-shafts near their inner ends.

The knotter A, in this instance shown, is the

same or essentially the same, except that it does not vibrate and does not have a jointed shaft, as that shown and described in the before-mentioned patents of June 5, 1883, and July 31, 1883, Nos. 279,082 and 282,445, the knotter-shaft B being mounted to rotate (turning in opposite directions, so as to cause the knotter to first engage the cord and then loop and knot it) in bearings a a' in brackets or blocks A' A^2 , and in a bearing, a^2 , at the inner end of the casing B' , close to the pinion B^2 , by which the shaft is actuated, as fully explained in said patent, in which is also to be found explanation of the manner of operating the pivoted jaw b of the tying-bill or knotter-head by means of its shank b' , a spring, b^2 , Fig. 6, in the knotter-shaft, and a cam or incline b^3 . (See Figs. 1 and 16.) This cam is shown as applied to the detachable section of the knotter-bearing a . The abutting flanges or collars C C' of the outer or knotter head-section and the inner partially-tubular section of the knotter-shaft are united by screws, as heretofore, and in addition are provided with a projecting piece or lug, c , which is gained or dovetailed in place in the two flanges, thus aiding in securing these parts together and acting as a wiper to perform a function further on to be explained. The knotter-shaft, near its inner end, close to the bearing a' , and between this bearing and the bearing a^2 , is provided with an arm or crank, D , sleeved and keyed in place upon it, and carrying a roller, d , at its outer end for a purpose in turn to be explained. A binder-arm, D' , presents the binding material to the knotter in a well-known way—such, for instance, as fully described in various Letters Patent of the United States heretofore granted for my inventions, among which may be particularly designated those dated March 20, 1883, and April 3, 1883, Nos. 274,441 and 275,330.

In order to supply cord from the band ends to a knotter such as above described, or to any one of other suitable knotters, the use of which may be preferred to that in this instance shown and now deemed best suited for the purpose, I provide a cord-holder of the class having a motion of rotation alternately in opposite directions, or turning first one way and then the other, and so constructed and actuated that it is caused to alternately take up and give out cord in regulated quantity, the cord thus taken up and given out by the oscillation of the holder being utilized in the formation of the knot. The cord-holder and its actuating mechanism, as in this instance shown, are as now in detail to be described. The sliding jaw or outer reciprocating member, E , of the cord-holder and cutter turns about a fixed center or axis—that is to say, the cord-holder is supported by a shaft, F , which turns in fixed bearings. This shaft is parallel with the knotter-shaft. The sliding jaw E is fixedly connected with the outer end of its shaft, and the shaft has a reciprocating movement im-

parted to it, whereby it is caused to slide endwise through its bearing-openings f f' in the brackets A' A^2 . The inner non-sliding member, E' of the holder and cutter is provided with a bearing sleeve or barrel, G , by which it is connected with the shaft F in such a manner as to turn therewith. A groove in the bearing sleeve or barrel and an engaging rib or feather, g , fast on the shaft, serves to connect the parts, so that while they rotate together endwise movement of the shaft independently of the inner member of the holder is permitted. The bearing-barrel of the inner holder-section is fitted in the bracket-bearing f , and the shaft F reciprocates in the bearing-barrel instead of directly in the bearing-opening of the block A' . The bearing-barrel is provided near its inner end with an annular groove, g' , in which fits the forked or grooved end of a keeper, G' , which is secured by a screw or screws to the block A' . In this way endwise movement of the inner section, E' , of the holder is prevented. At its inner end the bearing-barrel is provided, for a purpose further on explained, with a V-notch, h , formed in the collar or annular flange produced by the formation of the groove g' . This notch in the collar is on that side of the bearing-barrel which is normally the lowermost, and a cutter-blade, H , is secured on the same side. This cutter is made with an inclined edge, so that in connection with a straight cutting-edge, E^2 , of the sliding member of the cord-holder the cord will be severed by a shear-cut at the proper time. The sliding holder-section E is flattened or cut away at e on one side—the side opposite that provided with the knife E^2 —that it may move outward across the cord without straining it, and is formed with a groove or seat, e' , in which the cord rests when engaged by and wound partially about the jaw. The grooved portion of the jaw is of rounded outline, and in order to give to the jaw a sufficient length of cord-engaging surface without necessitating more than a partial revolution, as well as provide desirable leverage for turning the holder-shaft by the pull of the cord on the holder when operating it as further on to be explained, and also to prevent waste of cord by insuring that the clamped end of a band shall be presented close up to the knotter as the loop of knot is being completed, and when, owing to the relative positions of the parts, liability of contact between the knotter and holder is prevented, I make the rounded portion of the jaw eccentric with its axis. As will be apparent from inspection of the drawings, the holder-jaw would interfere with the operation of the knotter if made to project as far from its axis all round as it does at that portion of its cord-engaging surface terminating at its flattened or cut-away side e . The sliding jaw or reciprocating member of the holder is provided with a lip, H' , at its flattened side, and between this lip and the knife E^2 it is formed with a recess, H^2 . The non-reciprocating or inner

section of the clamp is provided with a lug, h' , to enter the recess in the sliding member, and with a recess, h^2 , having a yielding packing for a well-known purpose. The lip H' enters the recess h^2 , and the cord is clamped, as clearly shown in Fig. 2.

With band-securing mechanism organized as in this instance for use in connection with a low-down or platform binder, necessitating the location of the cord-holder beneath the binding-receptacle, it is important that the holder be so constructed as to fit it for operating in a space of quite narrow area vertically, in order that there may be left unoccupied by the holder sufficient of the available vertical space beneath the binder-receptacle to enable the binder-arm to work to the best advantage below the holder, at a suitable distance above the level of the ground, to clear obstructions. In accordance with my invention, the desired compactness of arrangement is secured by locating the cord-engaging surface of the holder, throughout its extent, as close to the axis of the holder as may be without interfering with the most advantageous working of the parts, and extending said surface sufficiently far about the holder-axis to provide for taking up and supplying to the knotter an ample length of cord at the band end without causing the holder to project at any point to an objectionable degree from its axis. As shown, the cord-engaging surface of the reciprocating member of the holder curves about it to an extent somewhat in excess of one-fourth of a complete circuit of its axis, the holder is caused to make about one-half of a revolution, and the cord passes about the holder, when at rest, on opposite sides of (both above and below) a plane passing horizontally or substantially horizontally through the longitudinal center or axis of motion of the holder. The shaft F is acted upon by a spring, I , with a tendency to hold it in the position of rest in which it is shown in Figs. 1 and 2, or else to turn it so as to restore it to this position when it is moved out of it. This spring is double-acting, being made to perform the additional function of sliding the holder-shaft inward to the limit of its movement in this direction after it has been moved in the opposite direction against the force of the spring, in manner as soon to be explained. The spring I is coiled about the holder-shaft, and bears at its outer end against a post or upright plate, I' , removably fastened in place, and upon any desired one of a series of pins, i , fixed to this post or plate. By adjusting the end of the spring from one to another of these pins its tension may be properly regulated. At its inner end the spring bears against and engages with a flanged and lugged collar or sleeve, J , fast on the shaft F close to its bearing f' . The end of the spring rests upon a lug, j , of the collar. The shaft is held against being turned beyond its normal position by the action of the spring by means of a lug or rib, K , extending lengthwise of the

collar, and projecting downwardly therefrom, so as to come against an adjustably-secured stop, *k*, on a bracket, *K'*, fastened to the casing-bottom.

5 The bracket *K'* of the just above-described controlling devices is so constructed as to permit of the endwise or reciprocating movement being given to the holder-shaft after a partial rotation, against the force of the spring, has
10 been imparted to the holder to supply cord to the knotter, and the bracket is also made to act as a stop for limiting the amount of rotary movement which can be imparted to the holder-shaft by its spring while the holder is being
15 reciprocated. To adapt the bracket for performing these functions, in connection with the collar *J*, it is formed with a curved side projection, *L*, terminating in an inclined ledge, *l*, above the level of which the rib *K* is moved
20 when the holder is on the latter part of its turning movement to give cord to the knotter, and over or in sliding contact with which ledge the rib moves after the cord has been released by the holder and the sliding member
25 or jaw of the holder is being reciprocated.

The before-mentioned projection *c* of the knotter-shaft connecting-disks serves as a wiper to actuate a dogging-lever, *M*, Figs. 1 and 6, to depress its nose *m*, free it from the
30 notch *h* of the bearing barrel or sleeve, and thus release the holder-shaft, so that it may be turned by the strain on the holder as the cord is being pulled by and wound about the knotter. The holder is thus caused to supply
35 the knotter with cord by turning against the force of the spring *I*. The holder-shaft is normally locked by the dog being held in engagement with the notch of the bearing-barrel by means of a spring, *m'*, acting with a
40 tendency to force the dog upward about a pivot, *n*, by which the dog is jointed at its heel between lugs *N N* on the casing-bottom. The outward sliding movement is imparted to the reciprocating member of the
45 cord-holder *E* from the knotter-shaft in this instance by the following means: The inner end of the holder-shaft has a loose screw-connection with the sleeve of a downwardly-projecting lug, *O*, which enters a slot in one arm,
50 *p*, of an elbow-lever, mounted by a sleeve-bearing, *P*, to vibrate about a vertical pivot, *o*. The other arm, *Q*, of this elbow-lever is provided with a short upwardly-projecting lug, *q*, and vibrates close to the bottom of the casing. The roller *d* of the knotter-shaft
55 crank or tappet-arm *D* acts on the elbow-lever when the knotter-shaft is turning. This tappet-roller strikes the lug *q* at a time in the knotting operation about such as shown in
60 Fig. 4, at which time the rib *K* of the collar *J* has been brought, by the turning of the holder-shaft, into position such as to permit of its passing above the side ledge of the bracket *K'*.

65 From the above description the operation of the devices will be understood to be as fol-

lows, assuming that well-known binding mechanism and mechanism for starting the binding mechanism in action upon the accumulating of a gavel are provided, suitable
70 forms of which mechanism are shown in patents hereinbefore mentioned: When by the rotation of its shaft the knotter reaches a point in its operation when cord is to be supplied from the holder, the wiper *c* trips the dog *M*,
75 which locks the holder-shaft in its normal position, and thus leaves the holder free to be turned by the pull on it of the clamped band end as the cord is taken up about the knotter to form the loop of the knot. The turning
80 movement of the holder by the strain exerted on it by the knotter through or by way of the band end is permitted by the turning-connection or loose screw-joint between the holder-shaft and the elbow-lever. This turning move-
85 ment of the holder and its shaft does not separate or otherwise affect the relative positions of the sliding jaw or reciprocating member of the holder and the inner section of the holder. Any tendency to premature endwise move-
90 ment of the holder-shaft by the working of its threaded end in the threaded sleeve of the stud by which it is connected with the elbow-lever is counteracted by the thrust pressure of the spring *I*, which results in causing the el-
95 bow-lever to vibrate slightly, or to the extent of the movement imparted to the sleeved lug by the turning of the holder-shaft. The continuation of the turning movement of the holder to supply cord to the knotter rocks the
100 stop-rib *K* above the level of the side ledge, *l*, of the controlling mechanism of the holder-shaft. Next, at about the stage in the knotting operation represented by Fig. 4 the knotter-shaft actuates the holder-shaft by the op-
105 eration of the tappet *D* on the lug *q* of the elbow-lever, thus thrusting out the sliding member of the cord-holder by the endwise movement imparted to its shaft by the vibration of the elbow-lever, and releasing the clamped
110 end of the band to enable the knot to be subsequently completed while the band ends are held by the tying-bill, as heretofore. This outward movement of the sliding member of the holder causes it to cross the binder-arm
115 end of the band, and as soon as the clamped end of the band is released the holder is turned by the spring *I* about half-way back toward its normal position, being temporarily arrested in the position in which it is represented in
120 Fig. 5 by contact of the stop-rib *K* with the ledge *l*. During the remainder of the movement of reciprocation of the outer member of the holder this rib is supported by and slides along the ledge. When the knotter-shaft by
125 the continuation of its rotation and near its completion has turned the tappet *D* far enough to release the elbow-lever, the spring *I* at once acts to retract the holder-jaw to cut the binder-arm end of the band and clamp the end of the
130 cord in obvious way preparatory to the upward rock of the binder-arm. When upon the in-

ward movement of the outer member or jaw of the holder, the rib K slides clear of the ledge 7, the spring I immediately acts to complete the return rocking movement of the holder-shaft, thus taking up cord by the holder and leaving the parts in their normal positions, with the holder locked against accidental movement in either direction preparatory to a repetition of the above-described operation.

10 It will be seen that in accordance with my improvements mechanism of simple construction serves to supply cord at the ends of the bands for forming the knots without waste; that as the knotter and the shaft of the cord-
15 holder extend parallel with each other, and are mounted in fixed bearings, or rotate about fixed axes, the holder may be actuated and controlled with certainty, and by inexpensive means from the knotter-shaft; that the oscillating movements of the cutting and clamping mechanism and the reciprocating movements of the sliding jaw or outer member of the cord-
20 holder are such as to insure certainty of action, and that by locating the cord-engaging surface of the holder for its entire extent close to and extending it sufficiently about the axis of the holder the binder-arm may be brought very near the holder-axis and the knotter, thus securing the compactness of parts needed for
25 the adaptation of my invention to a platform-binder.

Although I have shown an oscillating holder having a turning movement of about half of a revolution, it is obvious that the holder may
35 be turned more or less, according to the peculiarities of the knotter employed, the size and shape of the holder, the amount of cord taken up by it, the extent of its surface about which the cord passes or is wound, &c.;
40 and I do not wish to be understood as confining my improvements strictly to the particularly-described formation of the holder, nor to the amount of turn which it has imparted to it; neither do I wish to be understood as
45 limiting my invention to the manner in detail described of actuating the holder from the knotter-shaft and by the pull of the band end. On the other hand, I do not wish to be understood as unqualifiedly claiming a turning or
50 swinging cord-holder, by which cord is taken up from the binder-arm and given out to the knotter, as I am aware that, broadly considered, such cord-holders are older than my invention.

55 I claim as of my own invention—

1. The oscillating cord-holder having the sliding member, about which, when at rest, the cord passes for about one-fourth or more of a complete circuit of its axis, and on opposite
60 sides of a plane passing horizontally or substantially horizontally through said axis, substantially as and for the purpose hereinbefore set forth.

2. The combination, substantially as hereinbefore set forth, of a knotter, its rotary shaft, a cord-holder by which cord is taken up and

supplied to the knotter, and means actuated from the knotter-shaft for operating the cord-holder to supply cord to the knotter and release the clamped end of the band.

3. The combination, substantially as hereinbefore set forth, of the knotter, its rotary shaft, the oscillating non-reciprocating member of the cord-holder, the oscillating and sliding member of the cord-holder, about which the
75 cord passes, the spring-actuated sliding and oscillating cord-holder shaft, and means actuated from the knotter-shaft for moving the cord-holder shaft endwise to project the sliding member of the cord-holder, for the purpose described.

4. The combination, substantially as hereinbefore set forth, of a knotter, its turning-shaft, a cord-holder having a sliding member and turning in opposite directions to take up cord
85 and supply it to the knotter, means actuated from the knotter-shaft for projecting the sliding member of the cord-holder, and controlling devices by which the holder is locked against accidental movement, and serving to
90 temporarily arrest its backward turn.

5. The combination, substantially as hereinbefore set forth, of the rotary knotter, the oscillating non-reciprocating member of the cord-holder, the oscillating and sliding member of the cord-holder about which the cord
95 passes, the sliding and oscillating cord-holder shaft to which the cord-engaging member of the holder is fastened, means by which the cord-holder shaft is positively projected, and
100 the spring by which the cord-holder shaft is retracted as well as turned in the direction opposite to that in which it is turned by the pull on the cord in the formation of the knot.

6. The combination, substantially as hereinbefore set forth, of the knotter-shaft, the oscillating and sliding cord-holder shaft, its double-acting spring, the sliding member of the cord-holder fast to its shaft, and the mechanism actuated from the knotter-shaft for operating the cord-holder and its shaft, for the purpose described.

7. The combination, substantially as hereinbefore set forth, of the reciprocating member of the oscillating cord-holder, provided with
115 clamping and cutting devices, the shaft to which it is fixed, the non-reciprocating member of the cord-holder, and cutter turning with the holder-shaft, and means for temporarily arresting the turning movement of the
120 holder while the cord is being engaged, cut, and clamped.

8. The combination of the spring-actuated reciprocating and turning holder-shaft, the turning non-reciprocating member of the
125 holder, the sliding member of the holder fast to its shaft, means for positively moving the holder-shaft endwise in one direction against the force of its spring, and means by which the accidental endwise movement of the holder-shaft is prevented, substantially as hereinbefore set forth.

9. The combination, substantially as hereinbefore set forth, of the oscillating cord-holder, its oscillating shaft, the sliding member of the holder fast to said shaft, means by which it is positively turned in one direction, a spring by which it is turned in the opposite direction, and means by which it is locked against turning accidentally in either direction.

10. The combination of the turning knotter-shaft, the oscillating and sliding member of the cord-holder, the shaft to which it is fixed, the non-reciprocating member of the cord holder and cutter turning with the holder-shaft, the dog for locking the holder-shaft in its normal position, and the wiper of the knotter-shaft for tripping the dog, substantially as and for the purpose hereinbefore set forth.

11. The combination of the oscillating and sliding holder-shaft, its double-acting spring, means for moving the shaft endwise against the force of its spring, and controlling devices for limiting the backward turning movement of the shaft, and at the same time permitting its endwise movement, and for temporarily arresting its backward turn, substantially as and for the purpose hereinbefore set forth.

12. The oscillating and sliding member of the cord-holder, provided with the rounded grooved surface about which the cord passes both above and below the plane of the longitudinal center or axis of motion of the cord-holder, substantially as and for the purpose hereinbefore set forth.

13. The oscillating and sliding member of the cord-holder, provided with the curved eccentric cord-engaging surface extending, when the holder is at rest, above and below a plane

passing horizontally or substantially horizontally through the longitudinal center or axis of motion of the holder, substantially as and for the purpose hereinbefore set forth.

14. The oscillating and sliding member of the cord-holder, having the flattened side and the rounded cord-engaging surface, whereby it is adapted to cross over and engage the cord, and to take up cord to supply it to the knotter, substantially as hereinbefore set forth.

15. The combination of the rotary knotter-shaft mounted in fixed bearings, its tappet, the elbow-lever operated by the tappet, the holder-shaft mounted in fixed bearings, the loosely-jointed lug by which it is actuated by the elbow-lever, the flanged and lugged collar of the holder-shaft, the controlling-bracket with the side ledge and stop, and the double-acting spring, substantially as and for the purpose hereinbefore set forth.

16. The combination of the binder-arm, the cord-holder shaft turning in opposite directions, the oscillating cord-holder about which the cord passes, the spring acting on the cord-holder shaft, and by which the holder is turned one way to take up cord from the binder-arm, and the knotter by the pull of which on the band the cord-holder is turned the other way to supply cord for the knot, substantially as and for the purpose hereinbefore set forth.

In testimony whereof I have hereunto subscribed my name this 11th day of June, A. D. 1883.

JOHN S. DAVIS.

Witnesses:

ELISHA B. SOUTHARD,
J. H. SOUTHARD.