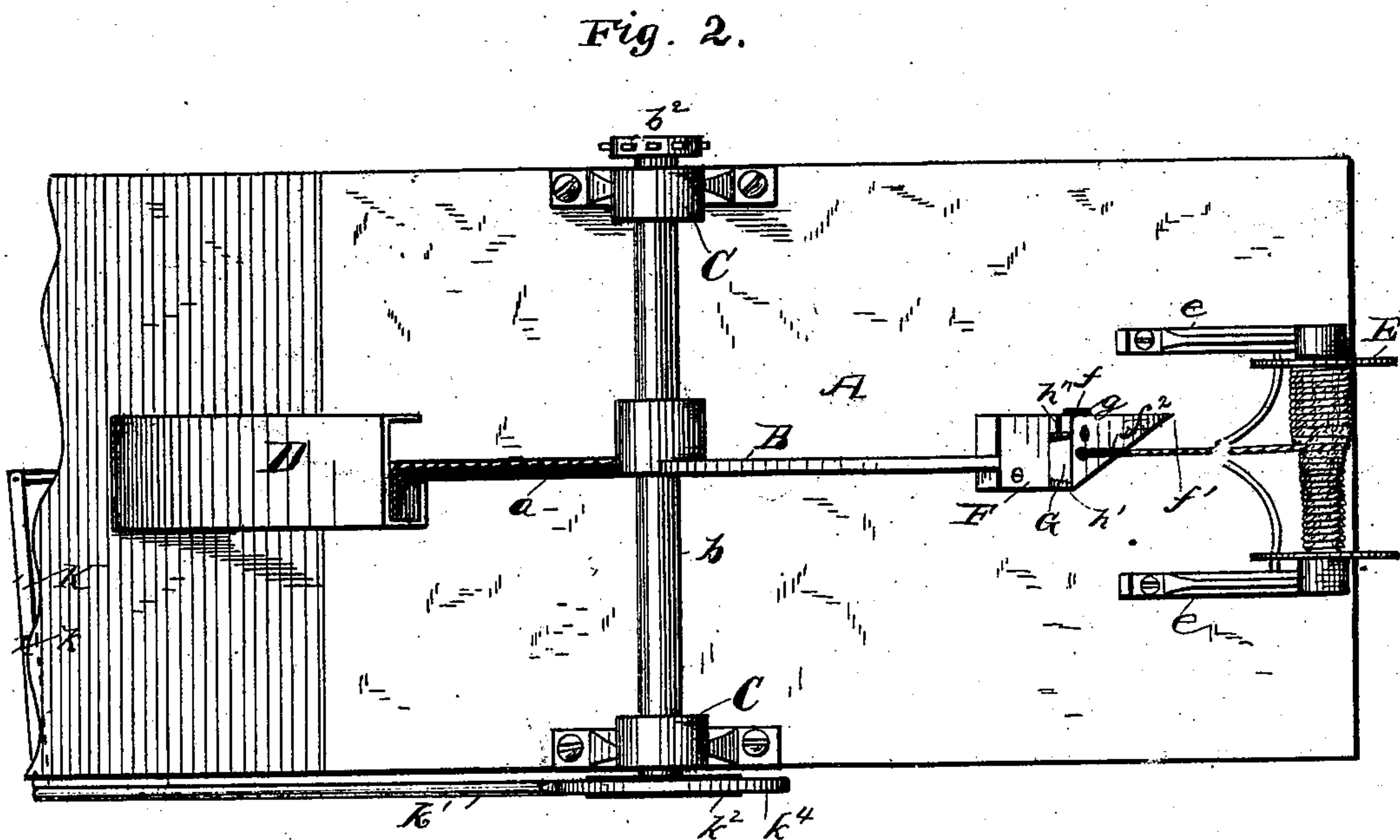
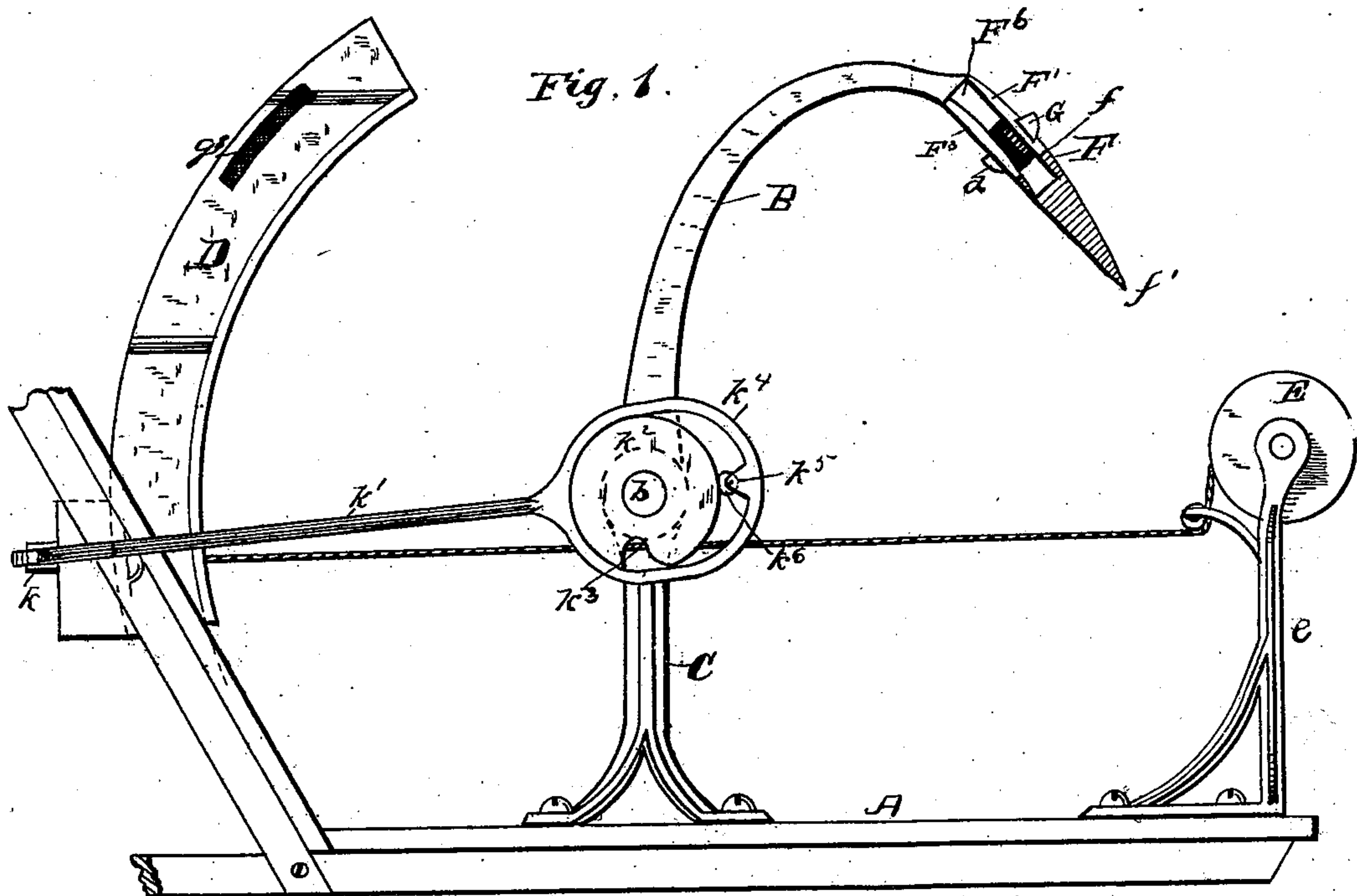


J. D. HEEBNER.

Binding Attachment for Reapers and Harvesters.
No. 227,774. Patented May 18, 1880.



Attest,

W. H. Knight,
G. W. Kirk

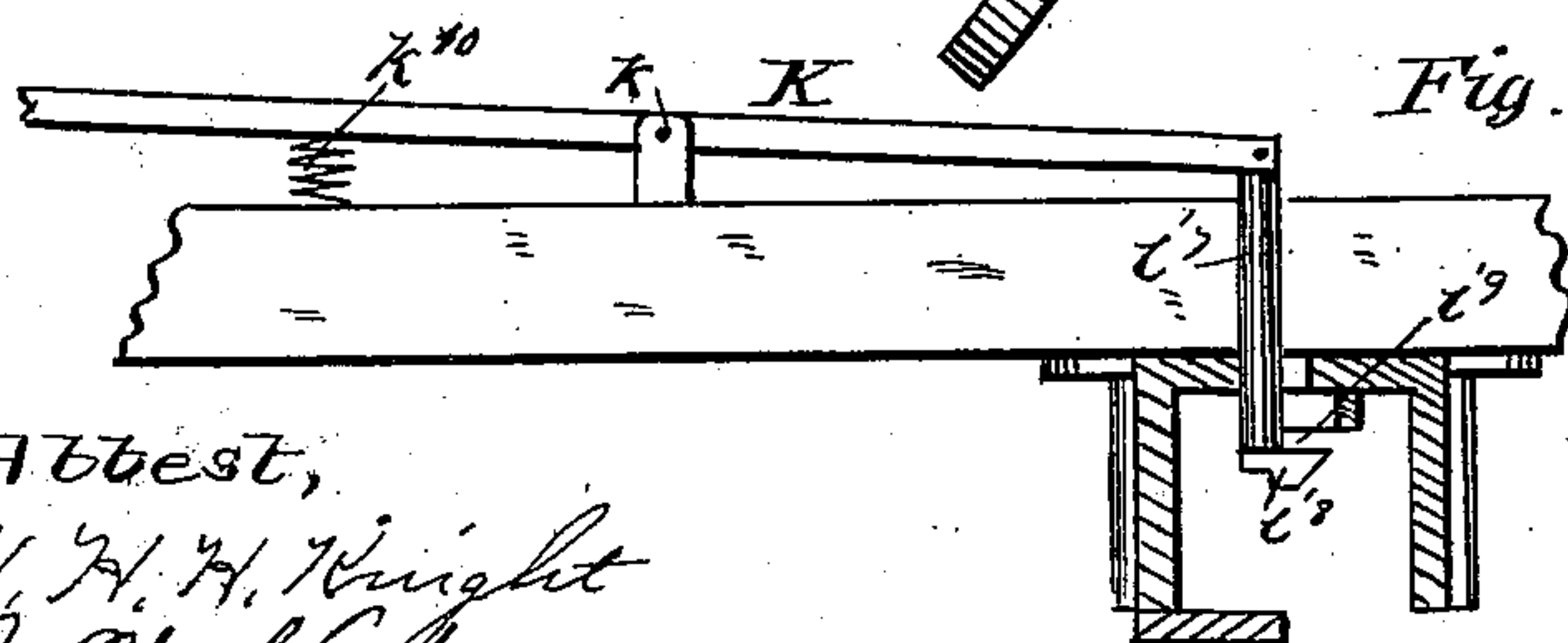
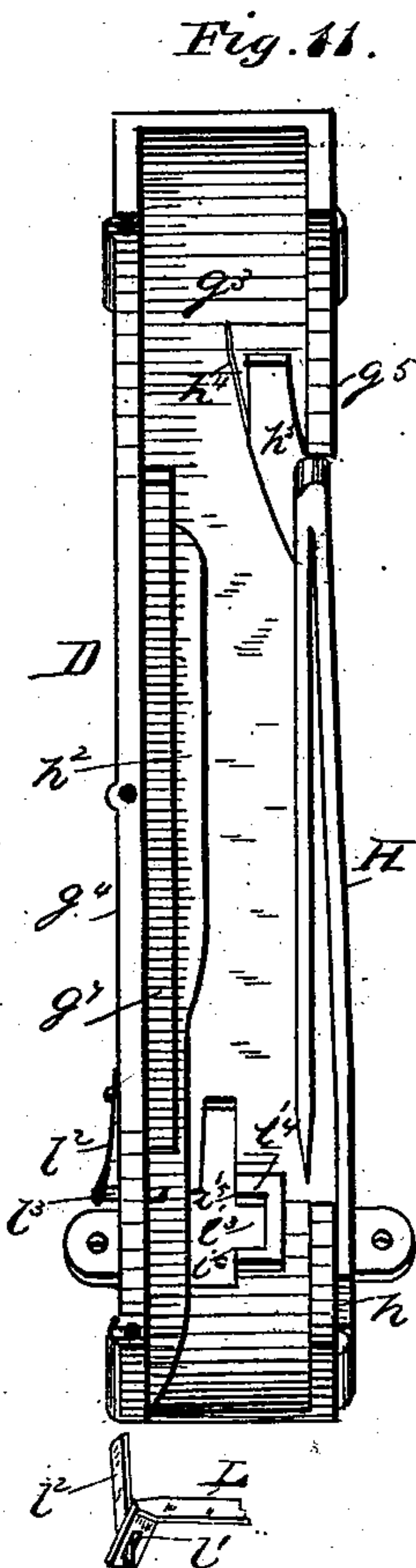
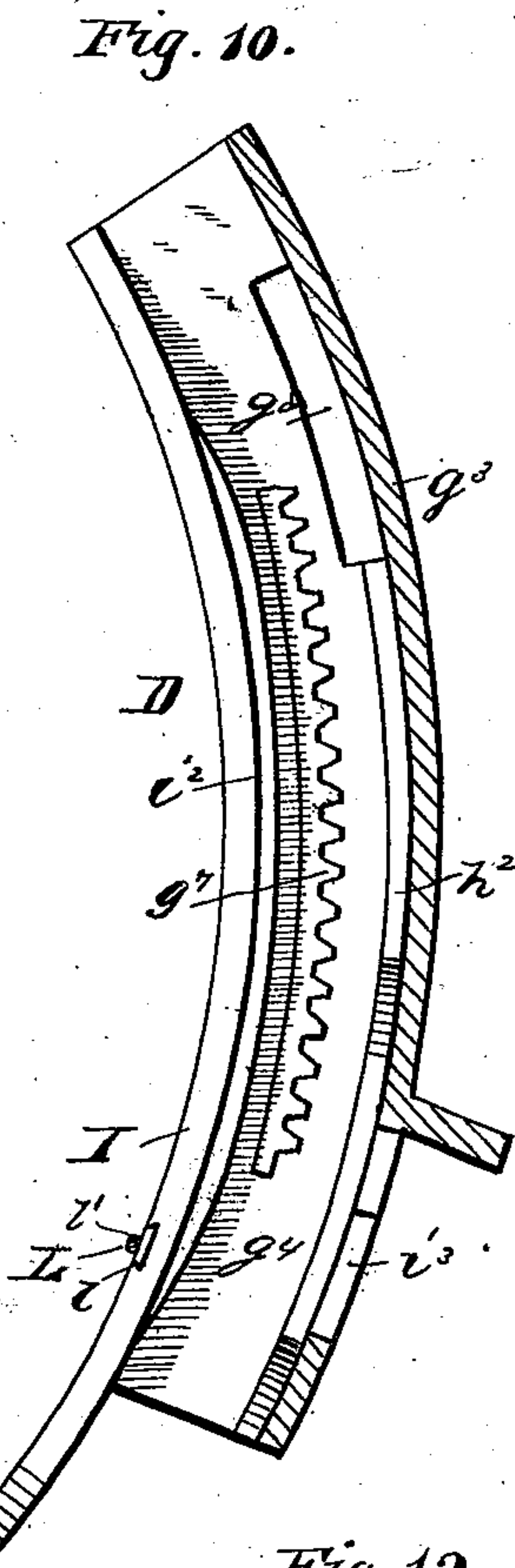
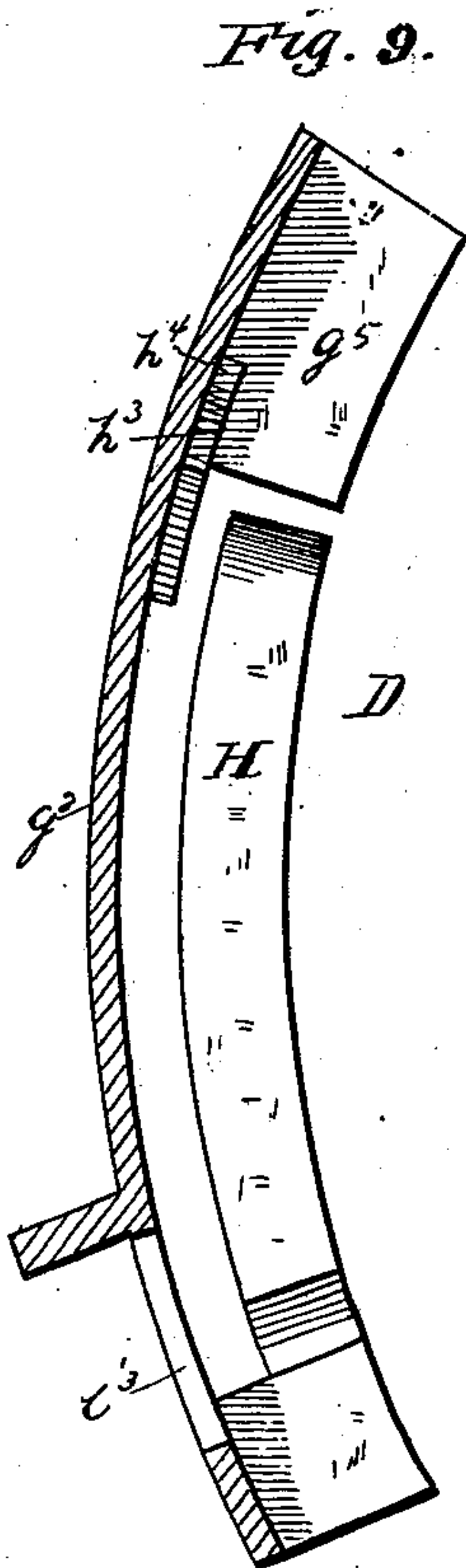
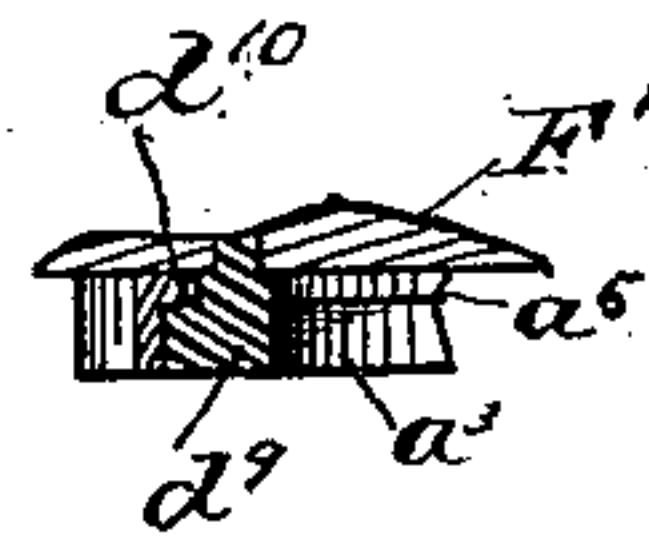
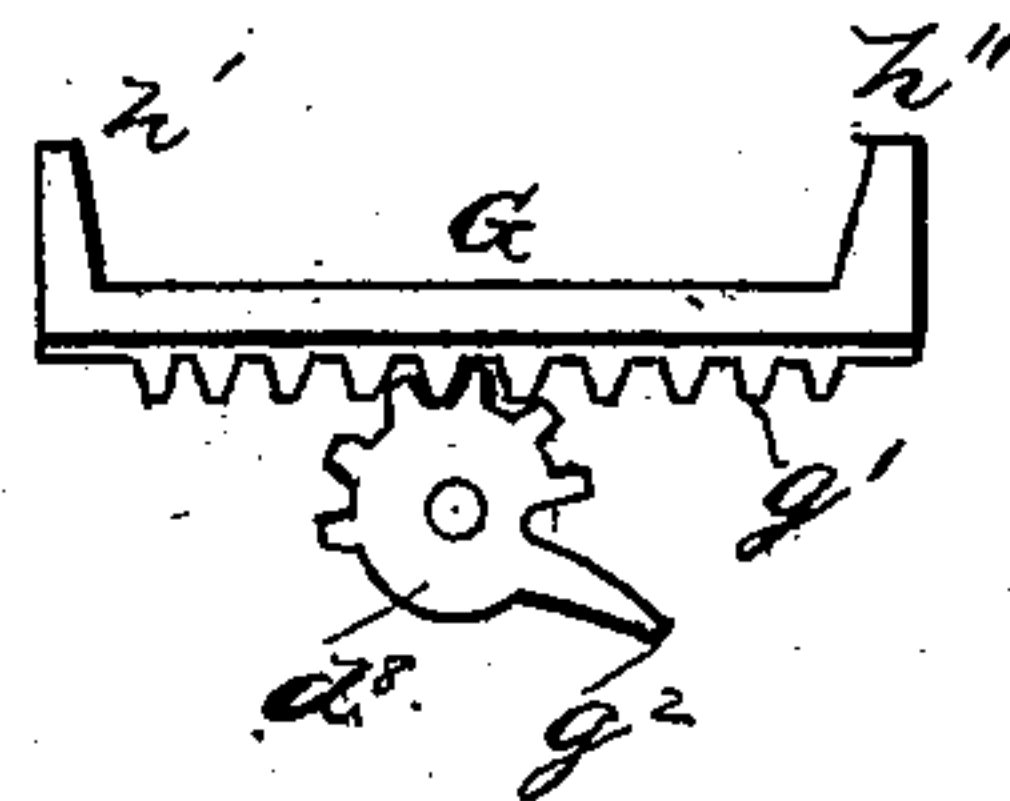
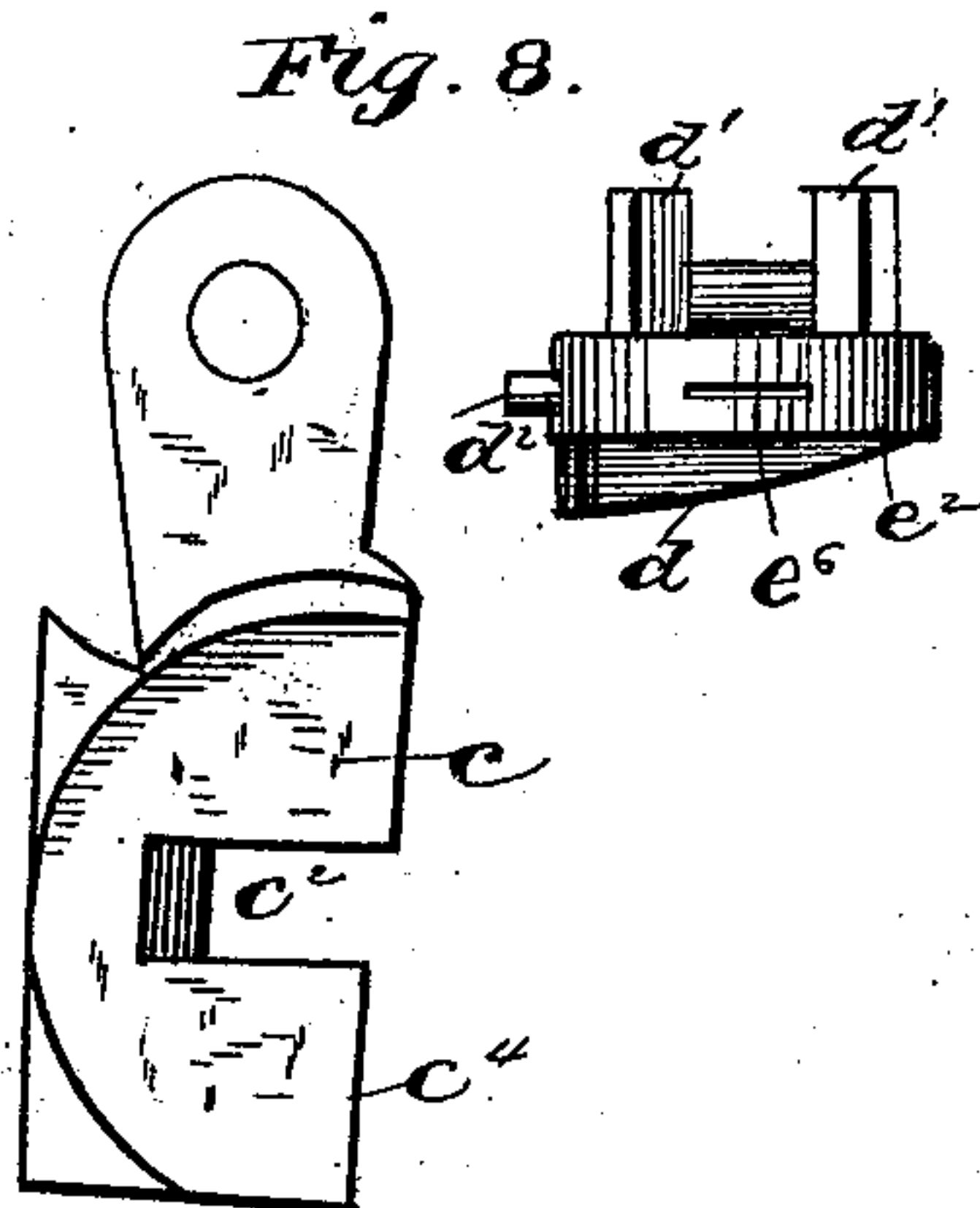
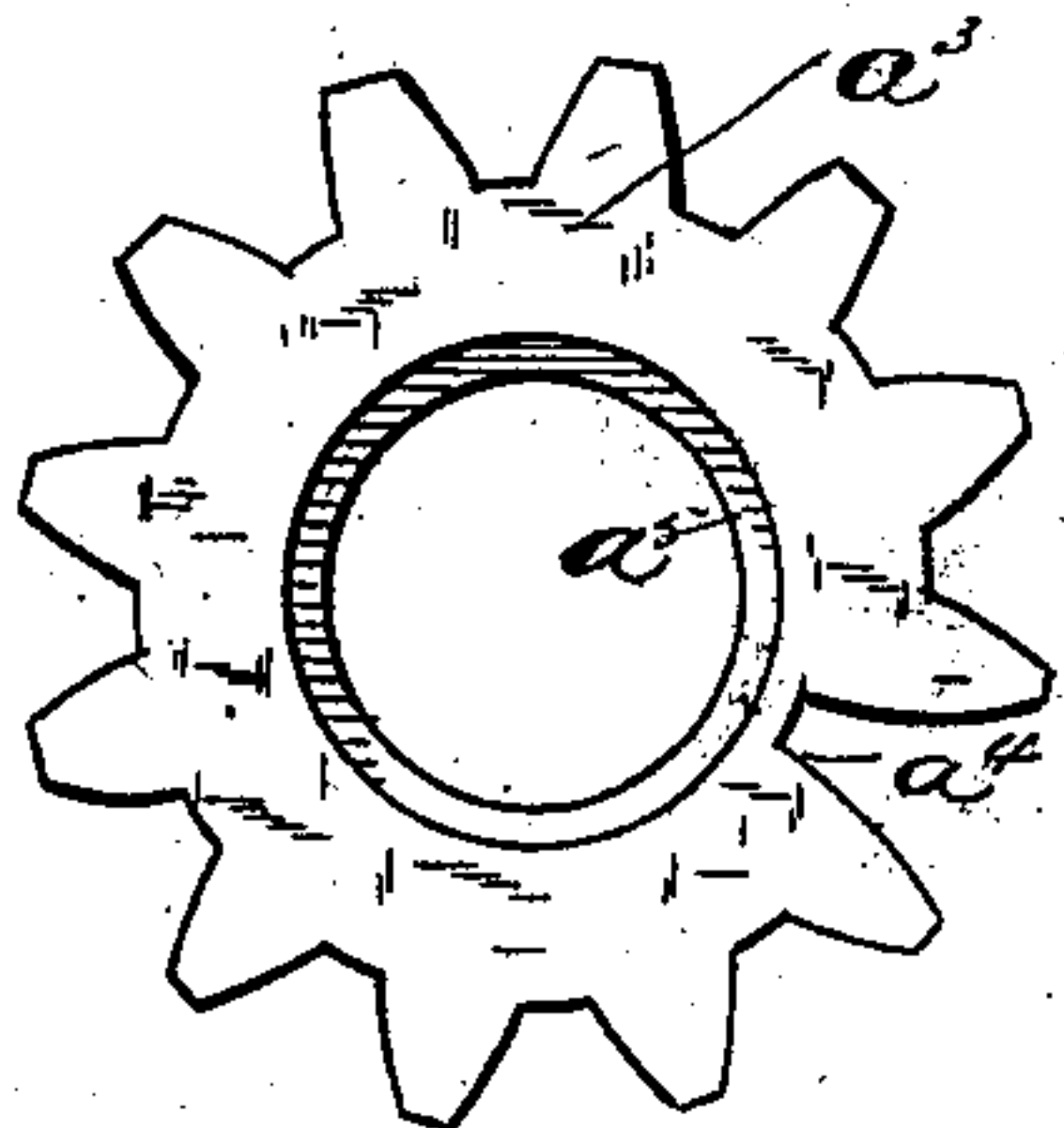
Inventor,

Josiah D. Heebner.

by S. S. Kirk
Atty.

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UNITED STATES PATENT OFFICE.

JOSIAH D. HEEBNER, OF NORTONVILLE, ASSIGNOR OF ONE-HALF OF HIS RIGHT TO DAVID S. HEEBNER, ISAAC D. HEEBNER, AND WILLIAM D. HEEBNER, OF LANSDALE, PENNSYLVANIA.

BINDING ATTACHMENT FOR REAPERS AND HARVESTERS.

SPECIFICATION forming part of Letters Patent No. 227,774, dated May 18, 1880.

Application filed October 10, 1879.

To all whom it may concern:

Be it known that I, JOSIAH D. HEEBNER, of Nortonville, in the county of Montgomery and State of Pennsylvania, have invented certain new and useful Improvements in Binding Attachments for Reapers and Harvesters; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

In the drawings, Figure 1 is a side elevation of my improved binding attachment. Fig. 2 is a top-plan view of same. Figs. 3, 4, 5, 6, 7, and 8 are detail views of the case and its contained mechanism. Figs. 9, 10, and 11 are detail views of the curved upright standard and its attached parts. Fig. 12 is a detail view of cutter, showing arm in cross-section.

Operators of grain-binders as heretofore and at present constructed have experienced considerable trouble by their machines becoming inoperative through the derangement or breakage of the various parts, and especially of the parts included in and composing the tying mechanism. This is owing in a great measure to the complication of parts in said tying mechanism, which complication of parts I have in the present invention sought to avoid, my object being to provide a binder attachment in which the parts, and especially those parts composing the tying mechanism, should be simple, durable, and compact; and to this end it consists in the arrangement of the parts comprising the tying mechanism, and in the means of operating the same, substantially as hereinafter set forth and described.

Referring to the drawings, A represents the platform or table of a harvester, reaper, or grain-binder.

B is the binding-arm, secured in any suitable manner—as, for instance, by a key or set-screw—to a shaft, *b*, which shaft has its bearing at *b'* *b'* in two upright standards, C, upon the platform or table A.

The shaft *b* is rotated by means of a sprocket-wheel, *b*², (on the shaft *b*) and a chain, said chain connecting it with a similar sprocket-

wheel on the main driving-shaft of the harvester or reaper.

The platform A is provided with a slot to allow the binding-arm to pass under the grain upon said platform when the machine is being operated.

Secured to the platform or table is an upright curved standard, D, the said standard being hollow and containing certain mechanism for operating the tying mechanism, as hereinafter described.

E is the spool for holding the cord, and is mounted in standards *e e*, attached to the upper side of the platform. (Shown in Figs. 1 and 2 of the drawings.)

The outer or free end of the binding-arm terminates in a slotted or grooved box or case, F, for holding the tying mechanism. The case or box F has one side inclined or cut away from a point, *f*, near the middle of one side to the opposite outer corner, thus terminating in a point, *f'*, as shown in the drawings, by reason of which inclined surface the cord is more surely directed to and into the slot *f*² in said case, and also the case itself will more easily penetrate the straw.

The case F is made in three parts, F¹ F² F³, the central part, F², forming a continuation of the binding-arm, being cast or forged therewith. The upper and lower parts, F¹ F³, are secured to the central part by screws or bolts, as shown.

The central part, F², is made somewhat narrower than either the upper or lower parts, F¹ F³, the shorter sides of each of the latter being rabbeted at *f*³ *f*⁴, as shown in detail, thus forming, when the parts are in position as a whole, a groove, F⁶, the object of which groove is hereinafter described.

Extending from the forward inclined part of the case, and in a parallel line with the side *a'* of said case, is a slot, *f*², which slot catches and directs the cord to the tying mechanism contained in F. The upper rear portion of F² is recessed at *a*² to receive an annular toothed disk or ring, *a*³, which disk or ring fits accurately within said recess, just enough space being allowed for the ring to rotate freely without binding.

The recess *a*² is provided with an opening to

the groove F^6 , through which the teeth of the disk extend into said groove in order that the disk may be rotated at the proper time, as hereinafter described.

5 One of the spaces between the teeth is extended inward nearly to the internal side or edge of the disk, forming a slot, a^4 , which slot, when the disk is at rest, is directly in line with the slot f^2 in F , and receives the cord entering
10 the latter. At the lower edge of the internal side or edge of the disk is a flange, a^5 , its object being to further strengthen the disk. Directly beneath the disk a^3 , and forming a portion of the bed upon which said disk rests, is a latch
15 or griper, c . The rear end of the latch is elongated and is pivoted to the rear screw or bolt, c' , in a recess provided in the under side of F^2 and about said screw or bolt for that purpose.
20 When the latch or griper is in place its under side is flush with the bottom of F^2 . A slot, c^2 , in the latch allows the tying-finger to be operated, as hereinafter described.

The gripping-jaw c^4 of the latch c , when the tying mechanism is being operated, impinges
25 against a counter gripping-jaw, c^5 , attached to the lower section, F^3 , of the case F . The latch or griper and the gripping-jaw in F^3 are made of steel tempered to resist wear.

The gripping-surfaces may be corrugated, or
30 the jaw c^5 may have a groove, into which the jaw c^4 may fit, each of which modes of construction being to increase the friction of the cord between the jaws, thereby preventing said cord from withdrawing ere released by
35 the grippers.

When the tying mechanism is at rest the jaws c^4 c^5 are held apart by a spring, c^6 , that throws outward the latch. In the upper surfaces of the gripping-latch c and section F^2 is a
40 second annular groove or recess, a^6 , its purpose being to allow passage-way for the cord during the tying operation. The lower part, F^3 , is provided with a circular opening, e' , directly beneath and corresponding in size with the
45 central opening in the disk a^3 , in which opening is fitted a plug or mandrel, e^2 , which plug will move freely in the opening e' , and is held in position therein by two leaf-springs, e^3 e^3 , resting and secured in grooves e^4 e^4 in the up-
50 per side of F^3 .

The springs e^3 may be attached to F^3 in any suitable manner. Upon the outer or free ends of the spring are spurs e^5 , which spurs project into small slots e^6 in the sides of the plug, thus
55 retaining it in place. Upon the outer end of the plug is an inclined or wedge-shaped projection, d , which projection serves at the proper time to press the plug inward. When it is so acted upon two small spurs, d' d' , upon the
60 upper inner end are pressed against the disk a^3 , thus preventing the cord from becoming entangled and holding it in position for tying the knot.

The inner end of the plug has a circular
65 groove cut therein to allow passage-room for the tying-finger, said groove being cut from side to side and passing upward between the

spurs d' d' . The plug is prevented from rotating by a spur, d^2 , which extends into a groove, d^3 , in F^3 . A slot, d^4 , in the forward part
70 of the plug, and in line with the slot f^2 in the case, allows the cord to enter the slot a^4 in the disk.

Directly above the disk a^3 and in the under side of the section F' is cut a circular groove, d^5 , to allow room for the passage of the cord
75 above the disk. A slot, d^6 , is cut through the part F' , in which slot is placed a small mutilated gear wheel or pinion, d^8 , pivoted to lugs d^7 d^7 upon the under side of F' . The lugs extend
80 through the opening in the disk a^3 and are flush with the bottom of the same. The teeth upon the pinion d^8 extend upward through the slot d^6 and engage with the teeth of a rack, g' , formed upon a sliding block, G , that slides
85 to and fro in a dovetail slot or groove, g , on the top of F' , for a purpose hereinafter described.

The outer side of the block G is provided with two wedge-shaped projections, h' h'' , by
90 which projections the block is slid to and fro.

One of the teeth g^2 upon the pinion is elongated and forms a finger, the edges of which are slightly rounded, so that the cord may not
95 be cut or injured by said finger when tying the knot. The space between the finger and the next following tooth is deeper than the baseline of the regular teeth, and has its sides and edges rounded for the same purpose as those
100 of the finger were.

At one side of the lugs d^7 is a projecting spur or anvil, d^9 , against the top of which the cord is pressed at one stage of the process of
105 forming the knot. The outer edge of the anvil is slightly rounded to allow the internal side or edge of the disk, against which edge it is pressed, to move freely. A groove, d^{10} , at the base of the anvil allows the flange a^5 of the disk passage-room.

The operation of the above combination is
110 hereinafter fully set forth and described.

The arm or standard D is curved in a segment of a circle the radius of which is the radius of the arc described by the binding-arm. The arm consists of a back, g^3 , and side g^4 ,
115 cast entire, the opposite side, g^5 , being cut away, as shown, in which opening is placed a spring, H , secured to D at h , for the purpose of holding the binding-head F against the side g^4 . Upon the side g^4 is secured a circular
120 rack, g^7 , the depth or thickness of which rack corresponds with the width of the groove F^6 in the binding-head. The teeth upon the rack, when the binding-arm is rotated, engage
125 with the teeth on the disk a^3 , thus rotating the latter, the disk turning twice in the length of the rack.

Beyond the rack, on side g^4 , and at the upper free end thereof, is a slot, g^8 , to allow the sliding block G passage-way at a certain stage of
130 the tying operation.

Attached to the inner side of the back g^3 of D is a strip, h^2 , the front edge of which forms a cam-track, against which one of the projec-

tions h' on G slides, for the purpose of placing the finger g^2 in the proper position for taking the cord. The front edge of the strip h^2 is parallel to the side of the arm D. The lower half of the strip is somewhat narrower than the upper, the point of junction being slightly inclined, to allow the projection h' to easily pass from the lower to the upper track. The lower end terminates in an inclined plane, so that the projection h' may readily pass to the cam-track.

Directly opposite the upper end of the rack g^7 , and secured to the back of D, is a second cam-strip, h^3 , the front edge of which is inclined forward from the side of the arm D, and terminates near the center of the arm. The projection h'' of G strikes against and is moved by h^3 , which movement rotates the pinion d^8 and completes the knot, as herein after described. A spring, h^4 , serves to prevent the cam-track on h^3 from becoming inoperative through wear.

The arm D is partially covered on its inner side by a face-plate, I, which is secured by screws to the side g^4 , a passage-way being left between the plate I and the side g^5 , through which the binding-arm travels.

Upon the inner side of I, and at the free edge thereof, is a cam-strip, i^2 , against which strip the projection d on the plug e^2 slides, and by which the plug is forced against the disk a^3 .

At the lower end of the arm D is a square opening, i^3 , cut through the back g^3 . Upon the inner face of the back, and partially surrounding said opening, is a projecting block, i^4 , the upper edge of which, i^5 , has a square sharp edge, the opposite edge, i^6 , being rounded.

Directly in line with the opening i^3 , and passing through a suitable guide in the frame supporting D, is a rod, i^7 . The rod i^7 is provided at its inner end with an oblong cutting and pinching head, i^8 . At one side the head projects about half its length beyond the side of the rod, as shown at i^9 . The upper side of the head has its lower edge sharpened to cut the cord, while the edges of the lower side are slightly rounded to hold the cord.

Directly opposite the cutting and pinching head i^8 , and upon the inner side of the face I, is a sliding finger, L, which finger moves backward and forward in a dovetail groove, l , in the face-plate. The finger extends from side to side of the arm D, its outer end having a slot, l' , in which the end of a leaf-spring, l^2 , fits. A spur, l^3 , is attached to the inside of the spring, and extends through the side of D to the inside of the arm, the object of the spur being to press the spring outward when the case F strikes said spur, and thus move the finger L from the track of the arm B. The purpose of the finger L is to hold the cord down and in position to be grasped by the pinching-head i^8 .

The outer side of the head is from its center beveled downward to its projecting edge,

as shown, which incline or bevel causes the cord catching upon the same to slide downward and under said projection when the head is pushed outward.

The rear end of the rod i^7 is pivoted to a lever, K, which lever is fulcrumed at k and operated by a pitman, k' , which receives motion from a cam, k^2 , upon one end of the shaft b of the binding-arm. The cam is circular in general form, having at one side a slight hollow or depression, k^3 . Upon the pitman, and inclosing the cam k^2 , is a yoke, k^4 . From the forward inner side of the yoke extend lugs k^5 , between which lugs is mounted a small roller, k^6 , which runs upon the surface of the cam. In practice, however, the roller may be omitted and a spur used instead. A spring, k^{10} , placed between the frame and lever K, serves to keep the roller firmly against the edge of the cam.

The operation of my improved binder is as follows: The sheaf of grain is in position to be bound, and one end of the cord is secured in the griper i^8 at the lower part of the arm D. The binding-arm now rotating strikes the cord near the spool or reel. The cord, catching upon the inclined part of F, slides down said incline and enters the slots in the case F, disk a^3 , and plug e^2 , respectively. The binding-arm B passes onward, the case F carrying the cord about the grain and into the lower end of the arm D, where the cord attached to said end is again secured by the incline and passed into the slots, as before, the sheaf of grain being inclosed by the loop thus formed. Tension may be given the cord in any suitable manner not described herein. At this moment one of the spurs h' on the block G strikes against the inclined lower end of the cam-strip h^2 , and thence moves to the face of same, thereby moving the block G, and thereby rotating the pinion d^8 and setting the hollowed space between the finger g^2 and the next following tooth in position to receive the cord entering the annular recess a^6 . At the same time the wedge-shaped projection d on plug e^2 slides under the cam-strip i^2 on face-plate I, moving the plug e^2 inward and holding the spurs d' d' firmly against the disk a^3 . The case F now passes onward a short distance, the rack g^7 entering the groove F^6 , the teeth of said rack engaging in the teeth of the disk a^3 , moving it slightly. The edge of the rack now presses against the latch c , pressing it inward against the two strands of cord, holding the same tightly against the jaw c^5 . At this moment the projection or roller k^6 in the yoke of the pitman k' drops into the depression k^3 of the cam k^2 . The spring k^7 forces the outer arm of the lever outward, thereby moving the rod i^7 into the arm. The cutting and gripping projection on the head now releases the end of the cord, and at the same time catches the cord below F and draws it into its bed, cutting off the part carried by F and holding the end leading to the spool. The disk a^3 now re-

5 involves, carrying the ends of the cords into the
 respective recesses above and below the disk
 a^3 , the lower strands being carried into the
 space in the pinion d^8 . When the disk a^3 has
 10 made a half-revolution the spur h' passes to
 the wider part of the cam-strip h^2 , moving
 the block G, and thereby causing the finger
 g^2 to be pressed downward against the top of
 the disk a^3 , which disk now makes from this
 15 point one full revolution, carrying the cord
 around the spurs d' d' of the plug e^2 and above
 the finger g^2 . It will be observed that the
 cord will now be above or across the cord con-
 tained in the space between the finger and
 20 teeth. The projection h'' now strikes the edge
 of the cam h^3 , moving the block G to the op-
 posite side of F and into the slot g^8 , thereby
 revolving the pinion d^8 , and pressing the fin-
 ger g^2 down upon the top of the anvil d^9 , the sec-
 25 ond strand of cord being held firmly between
 the finger and anvil, and forming a loop for the
 knot. The rack g^7 now releases the disk a^3 and
 also the latch c , and the spur h'' clears the
 cam-strip h^3 , after which a slight incline in the
 30 forward end of the slot g^8 moves the block G
 backward, releasing the finger g^2 , and allow-
 ing the completed knot to be drawn from the
 case F. The bound gavel is now discharged
 from the machine.

30 Having thus described my invention, what
 I claim as new, and desire to secure by Let-
 ters Patent, is—

1. In a grain-binding attachment, the com-
 bination of the case F, having groove F^6 and
 slot f^2 , with an annular disk, a^3 , recesses a^2 35
 and d^5 , plug e^2 , having spurs d' d' and projec-
 tion d , springs e^3 e^3 , groove e^4 , gripple-latch c ,
 pinion d^8 , having finger g^2 upon its lower side,
 anvil d^9 , block G, having rack g^7 and projec-
 40 tion h' h' , and moving in dovetail way g , all
 arranged in the manner and for the purpose
 substantially as herein set forth and described.

2. In a grain-binding attachment, the up-
 right curved arm D, provided with the spring
 H, curved rack g^7 , cam-tracks h^2 h^3 , slot g^8 , 45
 opening i^3 , and block i^4 , having cutting-edge
 i^5 and gripping-edge i^6 , in combination with a
 suitable rotating binding-arm and tying de-
 vice, substantially as and for the purpose set
 forth. 50

3. In a grain-binding attachment, the com-
 bination of the cam k^2 on shaft b' , pitman k' ,
 yoke k^4 , roller k^6 , lever K, spring k^{10} , rod i^7 ,
 having cutting-head i^8 , with the cutting-block
 55 i^4 and arm D, substantially as described.

In testimony that I claim the foregoing I
 have hereunto set my hand this 2d day of
 October, 1879.

JOSIAH D. HEEBNER.

Witnesses:

MOSES N. FOSKEY, Jr.,
 M. P. CALLAN.