

(No Model.)

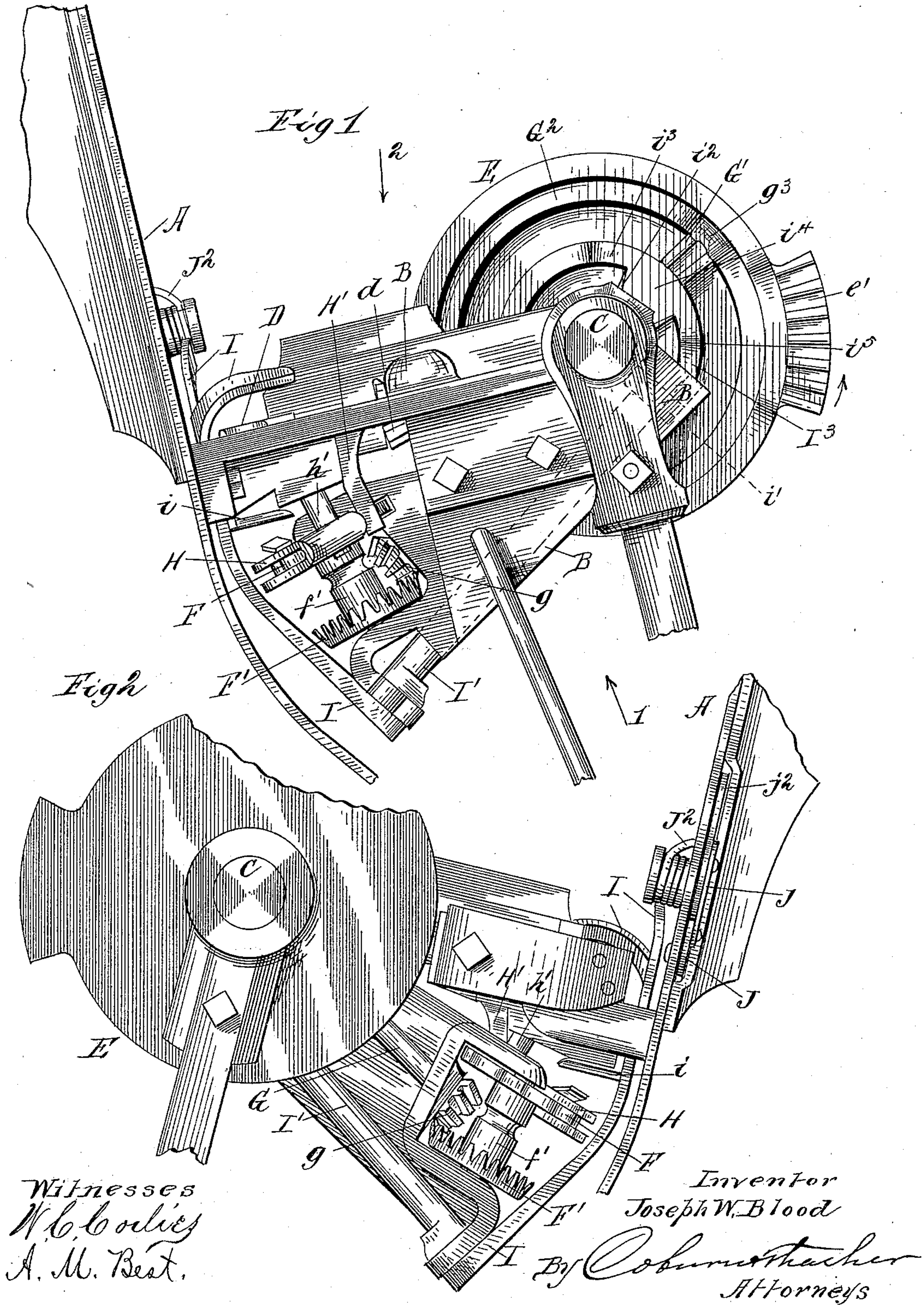
4 Sheets—Sheet 1.

J. W. BLOOD.

GRAIN BINDER.

No. 390,436.

Patented Oct. 2, 1888.



(No Model.)

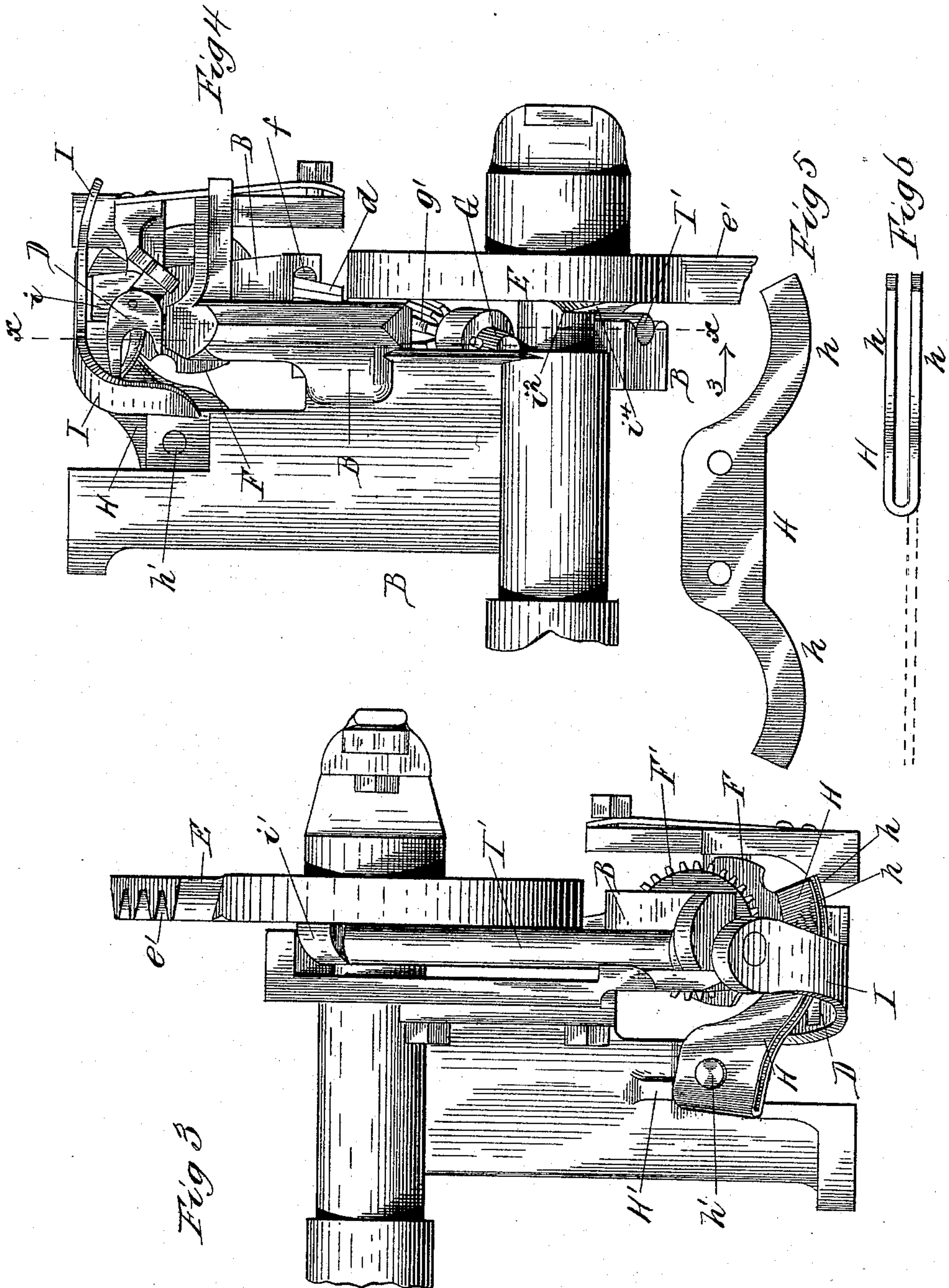
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Witnesses
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(No Model.)

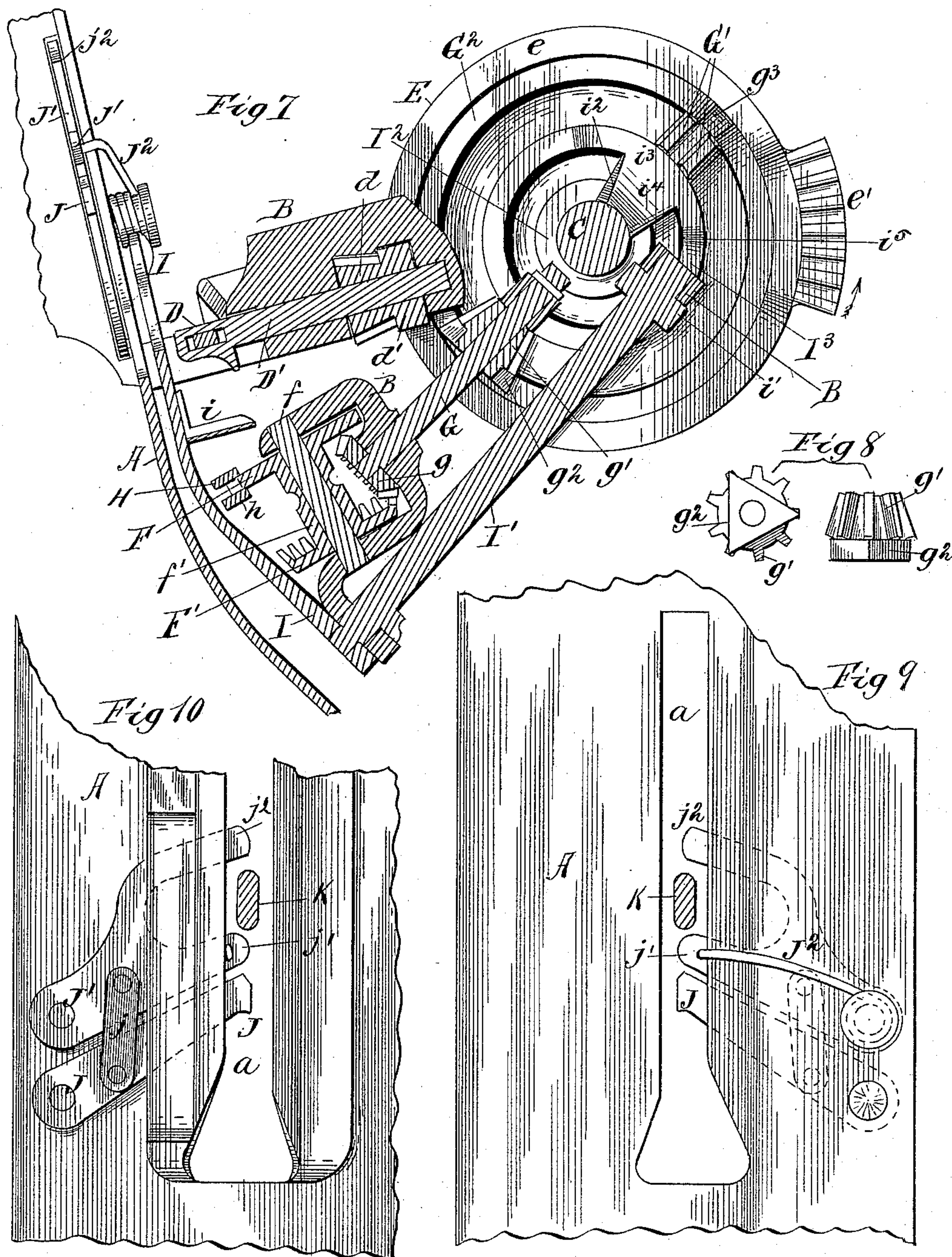
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Fig 11

J¹

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(No Model.)

4 Sheets—Sheet 4.

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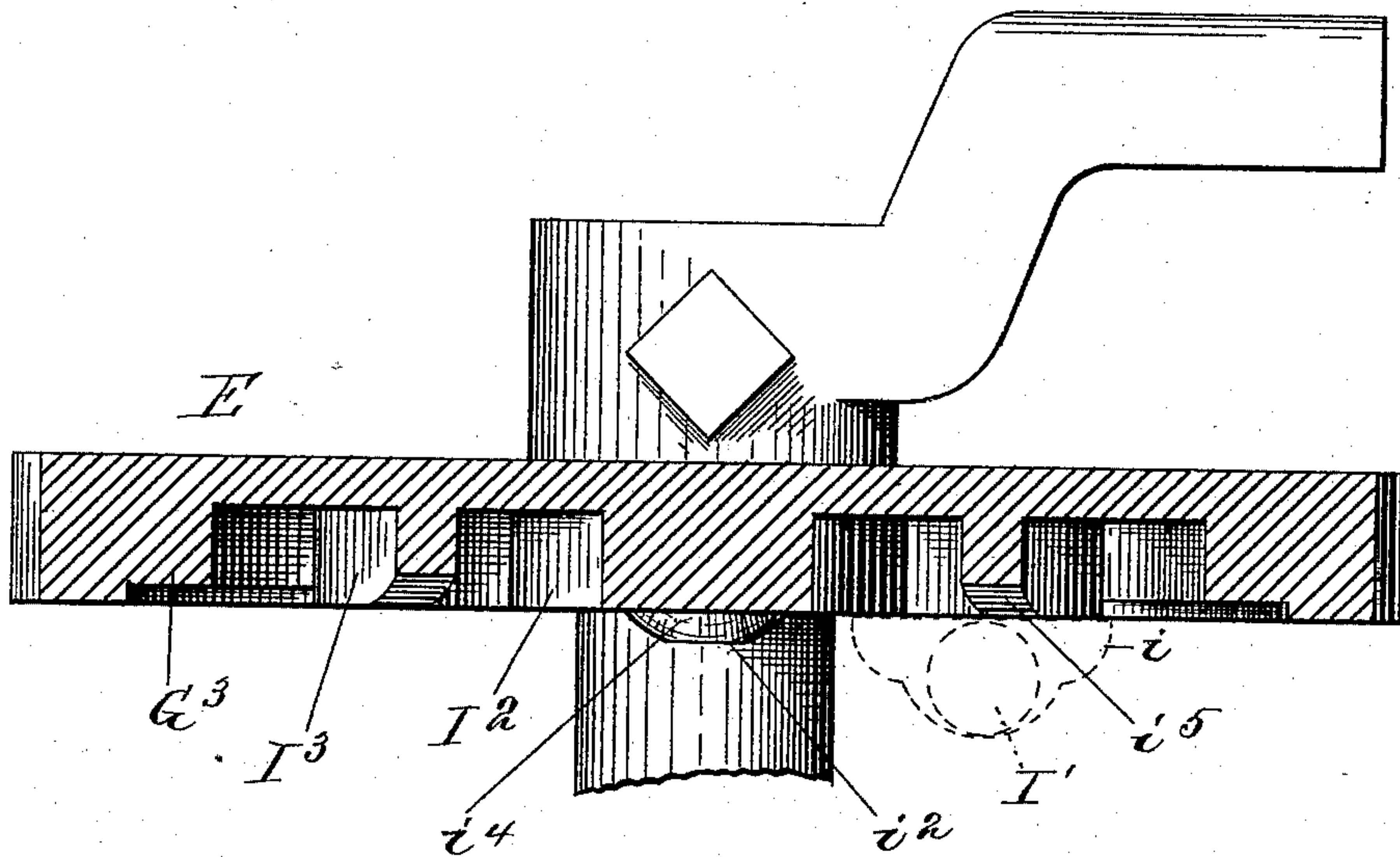


Fig 12

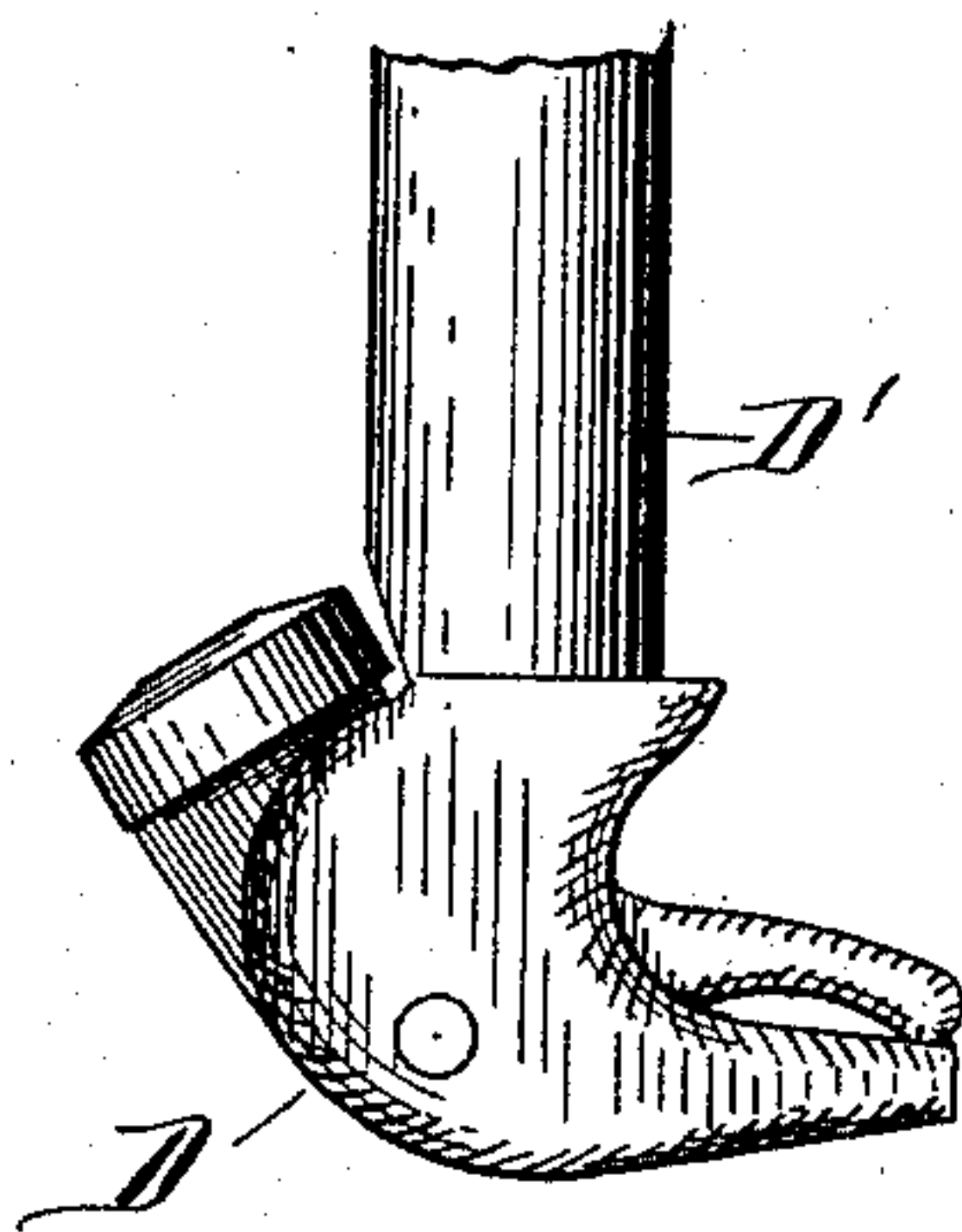


Fig 13

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UNITED STATES PATENT OFFICE.

JOSEPH W. BLOOD, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR OF ONE-HALF
TO THE PLANO MANUFACTURING COMPANY, OF PLANO, ILLINOIS.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 390,436, dated October 2, 1888.

Application filed November 6, 1886. Serial No. 218,220. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH W. BLOOD, a citizen of the United States, and residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented a certain new and useful Improvement in Grain-Binders, which is fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation of a binding-head embodying my invention; Fig. 2, a rear elevation of the same; Fig. 3, a bottom plan view of the same, looking in the direction of the arrow 1 of Fig. 1; Fig. 4, a top plan view of the same, looking in the direction of the arrow 2 of Fig. 1; Fig. 5, a detail plan view of the blank from which the cord-holder is formed; Fig. 6, a detail plan view of the cord-holder after being bent into shape; Fig. 7, a sectional view taken on the line *xx* of Fig. 4, looking in the direction of the arrow 3; Fig. 8, detail views of one of the pinions; Fig. 9, a top plan view of the breast-plate and cord-placer; Fig. 10, a bottom plan view of the same; Fig. 11, a detail plan view of the upper end of the stripper-shaft and its cross-bar detached; Fig. 12, a detail sectional view of the cam-wheel, taken on the line *yy* of Fig. 7; and Fig. 13, a detail view of the knotter-hook detached.

Like letters refer to like parts in all the figures of the drawings.

My invention relates to grain-binders, and more particularly to knotting mechanism therefor, its object being to provide a knotting mechanism which shall be simple and strong in construction and effectual in operation.

My invention consists more particularly in certain improvements in the knot-stripping mechanism and in the cord-placing mechanism.

I will now proceed to describe a construction in which I have practically carried out my invention in one form, and will then particularly set forth in the claims those features which I deem to be new and desire to protect by Letters Patent.

In the drawings I have only shown so much of the binding-head and knotting mechanism as is necessary to an understanding of my invention, it being of course understood that

the main parts of the device are of any approved construction, and therefore need no description here. Such parts, if mentioned at all, will therefore be referred to simply by letter without special description.

A indicates the breast-plate, provided with the usual slot, *a*; B, the knotter-frame mounted on said breast-plate, and C the cam-shaft, actuated in any suitable manner and passing through suitable bearings in the knotter-frame.

D indicates the knotter-hook, which is of the usual bill-hook type, with a fixed and a movable jaw, and is secured to or formed on the lower end of the knotter-hook shaft D', which is provided at its upper end with the usual pinion, *d*, and cam *d'*. The knotter-hook is operated in the usual manner by means of a cam-wheel, E, mounted on the cam-shaft C, and provided with a cam-surface, *e*, and gear-segment *e'* to actuate the knotter-hook.

The knotter-hook D is, as just stated, of the usual bill-hook type, so far as its general construction is concerned; but the two jaws composing the same are of equal length and somewhat shorter than in the ordinary hook, instead of having the lower jaw of considerably greater length than the upper jaw, as in the usual type of hook, this construction being shown more in detail in Fig. 13 of the drawings.

The cord-holding mechanism consists of a cord-holding disk and cord-holder. The former is a notched disk, F, mounted to revolve on a suitable fixed shaft, *f*, in the knotter-frame. The disk F, or its extended hub *f'*, is provided with a bevel-pinion, F', with which meshes a bevel-pinion, *g*, on the lower end of a shaft, G, mounted in suitable bearings in the knotter-frame. Near its upper end the shaft G is provided with a bevel-pinion, *g'*, having on its under side a triangular cam, *g''*, as shown more particularly in Figs. 7 and 8 of the drawings. The cam-wheel E is provided with a short gear-segment, G', (shown in the present instance as consisting of two gear-teeth only,) the said gear-segment meshing with the pinion *g'* to actuate the cord-holding disk. The cam-wheel E is also provided with a cam-surface, G², against which the triangular cam *g''* bears to prevent the shaft G and cord-holding

disk F from rotating when the pinion g' is not in mesh with the gear-segment G' . The cam-surface G^2 is cut away at g^3 , opposite the gear-segment G' , to permit the rotation of the pinion g' and shaft G when the said pinion is in mesh with its operating gear-segment.

The cord-holder H is formed from a blank of elastic or spring steel having substantially the form shown in Fig. 5 of the drawings, and being provided with arms h , which, when the cord-holder is bent into shape, as shown in Fig. 6 of the drawings, will embrace the cord-holding disk at each side thereof. The two arms of the cord-holder are entirely independent of each other and free to move bodily away from the cord-holding disk at each side thereof, being connected only at their extreme ends. Moreover, they inclose the cord-holding disk only at the sides, leaving a clear space underneath the same.

The cord-holder H is mounted upon a suitable stud, h' , projecting from the knotter-frame, and is held in position by means of a lug or stop, H' , projecting from the said frame and extending over its outer end, as shown.

I indicates the stripper, which may be of any approved construction, and has attached to it the knife or cord-cutter i . This stripper is attached to the lower end of a stripper-shaft, I' , mounted in suitable bearings in the knotter-frame. At its upper end the stripper-shaft is provided with a cross-bar, i' , which rests upon two concentric cam-surfaces, I^2 and I^3 , on the cam-wheel E, as shown more particularly in Fig. 7 of the drawings. The inner cam-surface, I^2 , has a raised portion, i^2 , and the outer cam-surface, I^3 , has a corresponding depressed or cut-away portion, i^3 , these two portions of the said cam-surfaces being connected by a plane surface, i^4 .

The cord placer or tucker consists of two arm, J and J' , pivoted on the under side of the breast-plate, as shown in Figs. 9 and 10 of the drawings. These arms are pivoted on different centers and are connected by means of a link, j , pivoted to each of the arms. The arms J and J' project out into the slot a in the breast-plate A, as shown, and are so arranged that while the arm J' lies in the path of and will be actuated by the needle-arm K, the arm J will come in contact with the cord and will carry it downward toward the knotter-hook.

The arm J' is forked, as shown, forming two branches, j' and j^2 , so arranged that the needle-arm will, as it advances, pass between the two branches and come in contact with the lower branch, j' , to operate the cord placer or tucker in one direction, and when it returns will strike the other branch, j^2 , and carry the cord-placer back with a positive movement. A spring, J^2 , suitably connected to the breast-plate and to one of the arms of the cord-placer, is employed to hold the cord-placer in its normal position when the needle-arm is clear of the breast-plate, said spring also aiding in returning the cord-placer to its normal position.

The operation of my improved grain-binder

is as follows: As the needle-arm advances it strikes the branch j' of the arm J' of the cord-placer and carries the said arm J' toward the knotter-hook, and this movement of the arm J' causes the arm J to move in the same direction, but with a more rapid movement than the arm J' , owing to the link-connection and to the fact that the arms are pivoted at different centers. By this means, when the needle arm has made its stroke the arm J' of the cord-placer will have reached the knotter-hook, carrying the cord with it to the said hook. The knotter-hook is then revolved by means of the mechanism described, and at the same time the cord-holding disk will be rotated through the mechanism which I have devised for that purpose and will carry the cord downward and then across toward the open jaws of the knotter-hook in a line midway between the fixed and pivoted jaws thereof. Heretofore these cord-holding disks have moved in the opposite direction and have carried the cord downward, just missing the extremity of the upper jaw and moving at right angles to the said jaw to carry the cord downward until it is in contact with the projecting lower jaw. This movement of the cord-holding disk requires an extremely exact adjustment in order to place the cord between the jaws. With my construction, on the other hand, the cord-holding disk is moved in a direction opposite to that just described, and when carrying the cord between the jaws does so along a line about central between the two jaws, instead of at right angles to the same. By this means the exact adjustment heretofore necessary is dispensed with and the cord is placed between the open jaws with much greater certainty, and the cord-holding disk will always perform its duty even if, from wear or other causes, it should not move in the precise manner intended.

By reason of the motion of the cord-holding disk toward the jaws of the knotter-hook on a line about central between the two jaws I am enabled to employ the form of knotter-hook shown in Fig. 13 of the drawings, in which the jaws are of equal length, since there is no necessity of employing a projecting lower jaw, as is the case when the cord-holding disk revolves in the usual direction. Greater certainty in the stripping of the loop from the knotter-hook is thus obtained, since the same may be readily withdrawn from the hook without any danger of catching upon the projecting lower jaw, the loop leaving the two jaws at the same instant.

The cord-holder operates, in conjunction with the cord-holding disk, to hold the cord in position within the notches of the same. Heretofore these cord-holders have consisted of a rigid body having a swinging movement to and from the center of the disk, being held up to their work by means of a separate spring. With my improved cord-holder, constructed of elastic sheet metal or other spring metal, this auxiliary spring is dispensed with, and there

is no movement of the cord-holder to and from the center of the disk, the spring-arms yielding laterally away from the sides of the disk to accommodate the cord and being held up to their work by their own elasticity. Not only do these spring-arms yield bodily away from the disk, but since they do not inclose the edge of the disk at the bottom thereof the danger heretofore existing of the cord-holder and disk becoming wedged or jammed by pieces of cord or other substances becoming packed within the cord-holder between it and the disk is done away with.

During the operations just described the stripper has been held firmly in position by means of the cross-bar i' on the stripper-shaft I' , which cross-bar rests upon the cam-surfaces I^2 and I^3 . After the knot is tied, however, and ready for stripping, the raised portion i^2 of the cam-surface I^2 comes in contact with the upper end of the cross-bar i' , thereby rotating the stripper-shaft I' and causing the stripper to move across underneath the knotter-hook to strip or aid in stripping the knot. The cut-away portion i^3 of the outer cam-surface, I^3 , permits the lower end of the cross-bar to yield as the stripper-shaft I' is rotated. The stripper is returned to its position by means of an incline, i^5 , at the end of the cut-away portion i^3 of the cam-surface I^3 . It is of course understood that the knife i severs the cord in the usual manner during the movement of the stripper, acting for this purpose in conjunction with a fixed cutting-edge on the cord-holder H or on some other suitable portion in the machine.

It is obvious that various modifications in the details of construction shown and described may be made without departing from the principle of my invention, and I therefore do not

wish to be understood as limiting myself strictly to the precise details hereinbefore described and shown in the drawings.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a grain-binder, the combination, with the stripper I and the stripper-shaft I' , having cross-bar i' , of the cam-wheel E , having concentric cam-surfaces I^2 and I^3 , upon which the cross-bar i' rests, said cam-surfaces being provided, respectively, with a raised portion, i^2 , and a corresponding depressed portion, i^3 , substantially as and for the purposes specified.

2. In a grain-binder, the combination, with the slotted breast-plate A and the needle-arm K , of the cord-placer consisting of two arms, J and J' , pivoted at different centers and connected by a link, j , the arm J' being forked to form two branches, j' and j^2 , between which the needle-arm passes to actuate the cord-placer positively in both directions, substantially as and for the purposes specified.

3. In a grain-binder, the combination, with the slotted breast-plate A and the needle-arm K , of the cord-placer consisting of two arms, J and J' , pivoted at different centers and connected by a link, j , the arm J' being forked to form two branches, j' and j^2 , between which the needle-arm passes, so as to positively operate the cord-placer in both directions, and a spring connected to one of the two arms to hold the said arms normally away from the knotter-hook, substantially as and for the purposes specified.

JOSEPH W. BLOOD.

Witnesses:

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F. B. STONEMAN.