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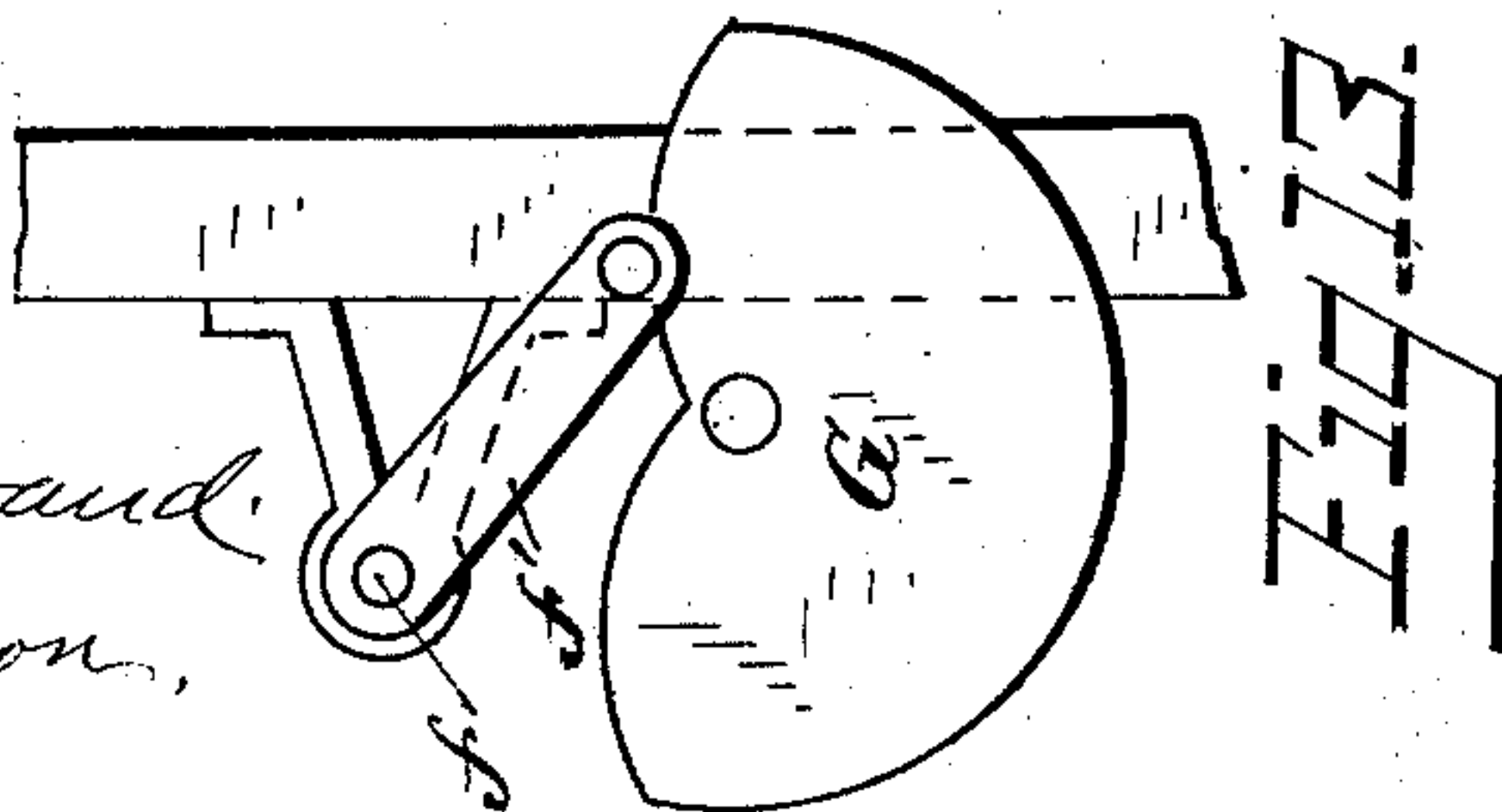
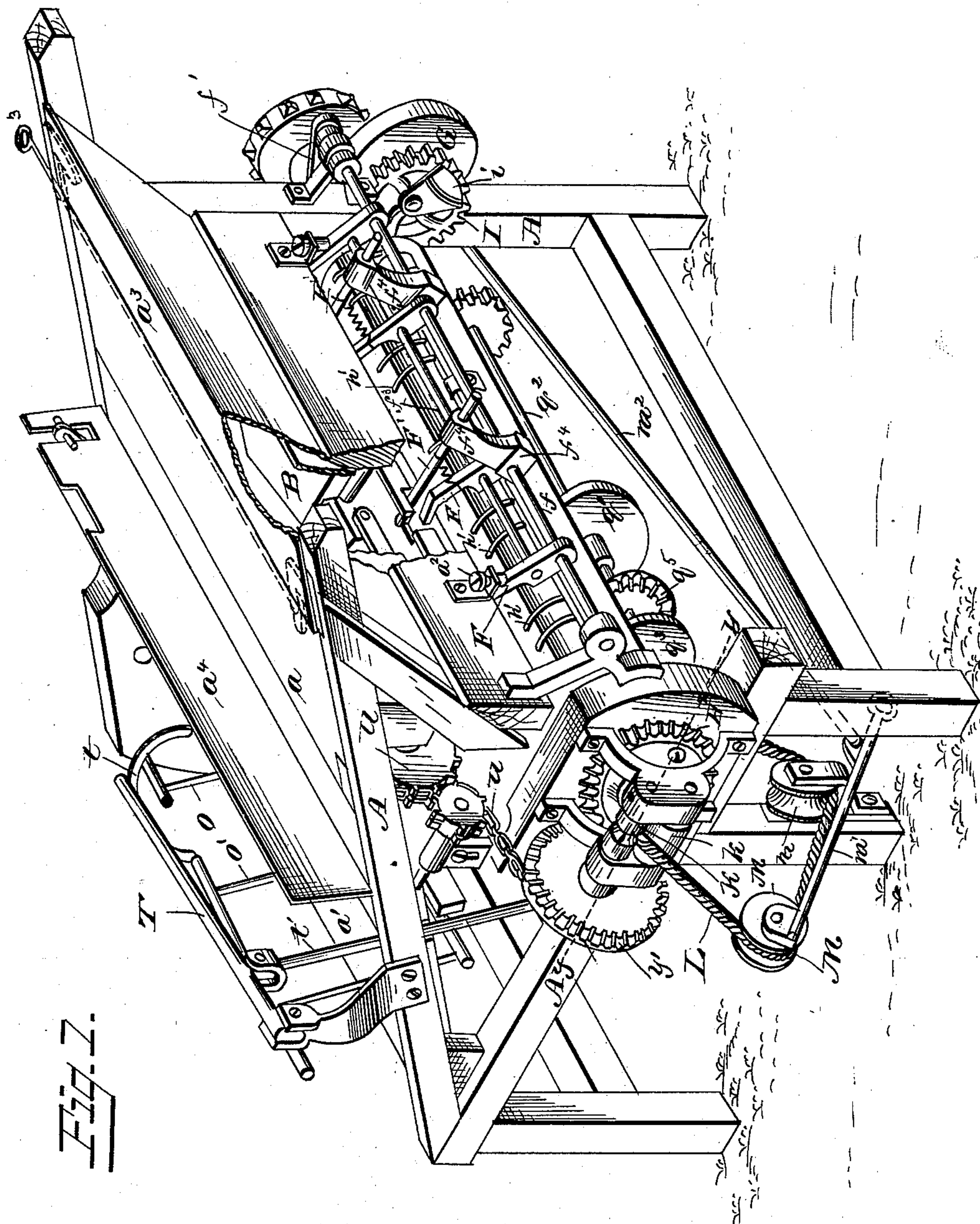
7 Sheets—Sheet 1.

H. TUTTLE.

STRAW BAND GRAIN BINDER.

No. 280,335.

Patented June 26, 1883.



WITNESSES

Frank L. Ourand,
C. J. Williamson,

INVENTOR,

Wm. Little
by L. Deane
his Attorney.

(Model.)

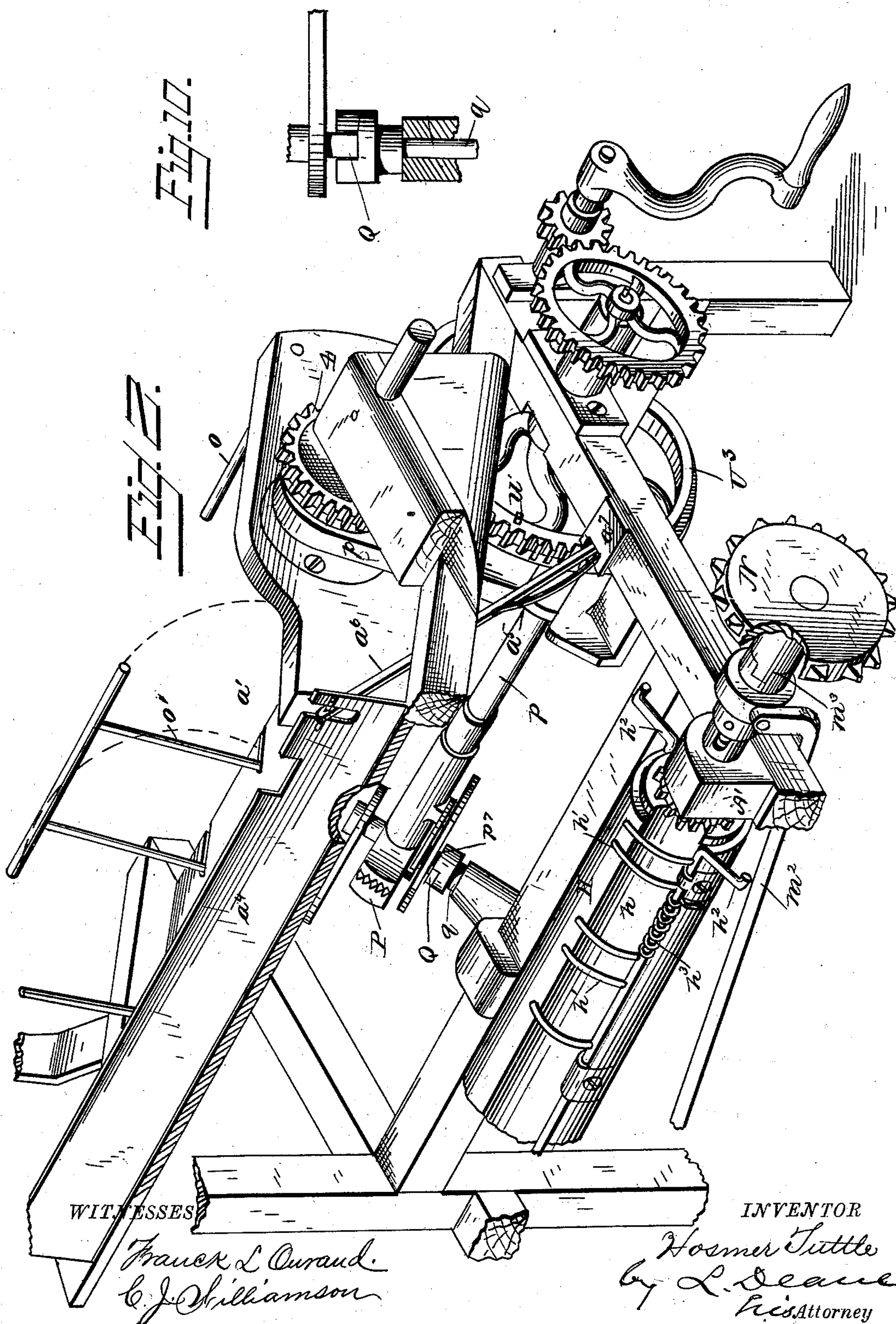
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Frank L. Curand.
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(Model.)

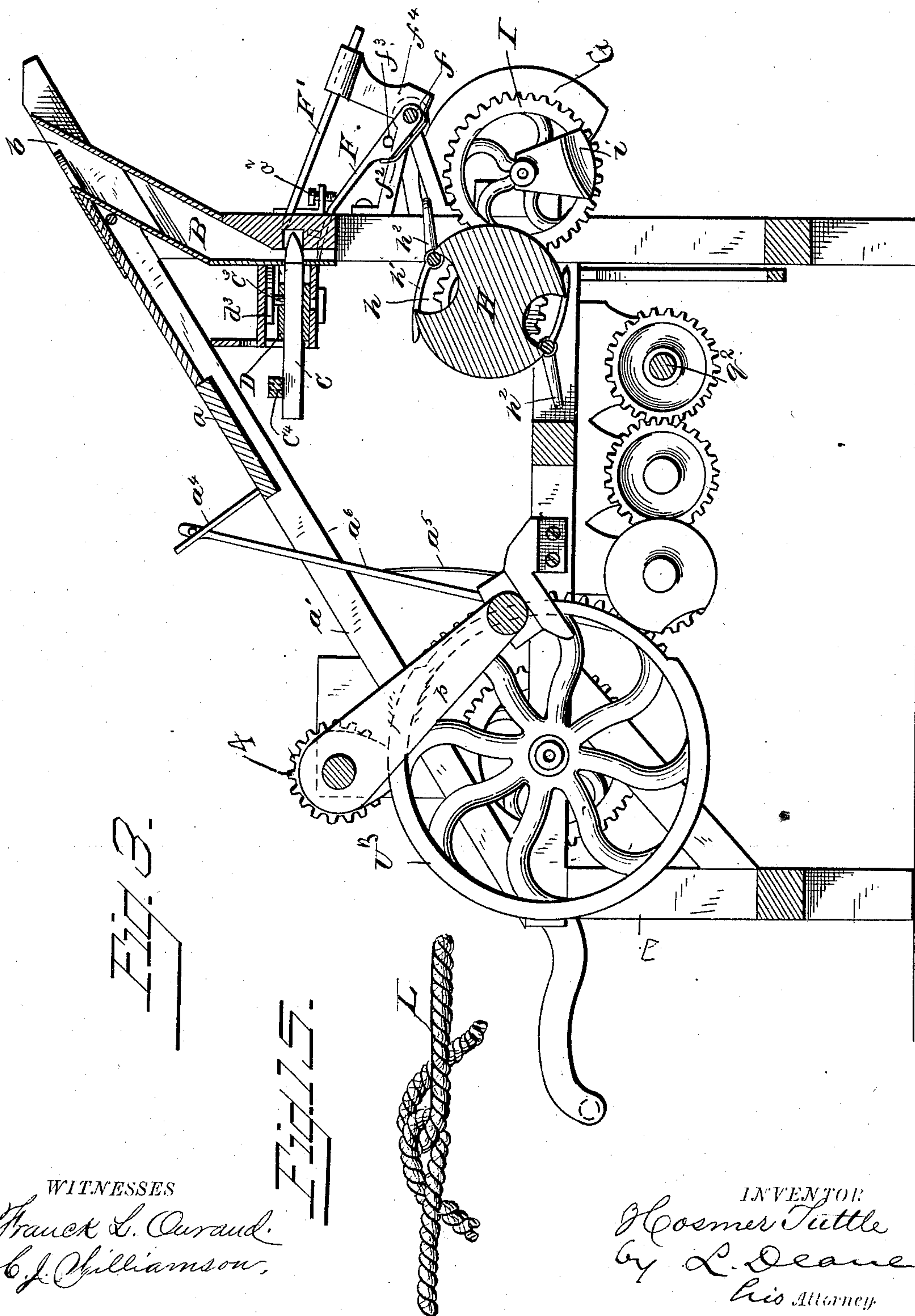
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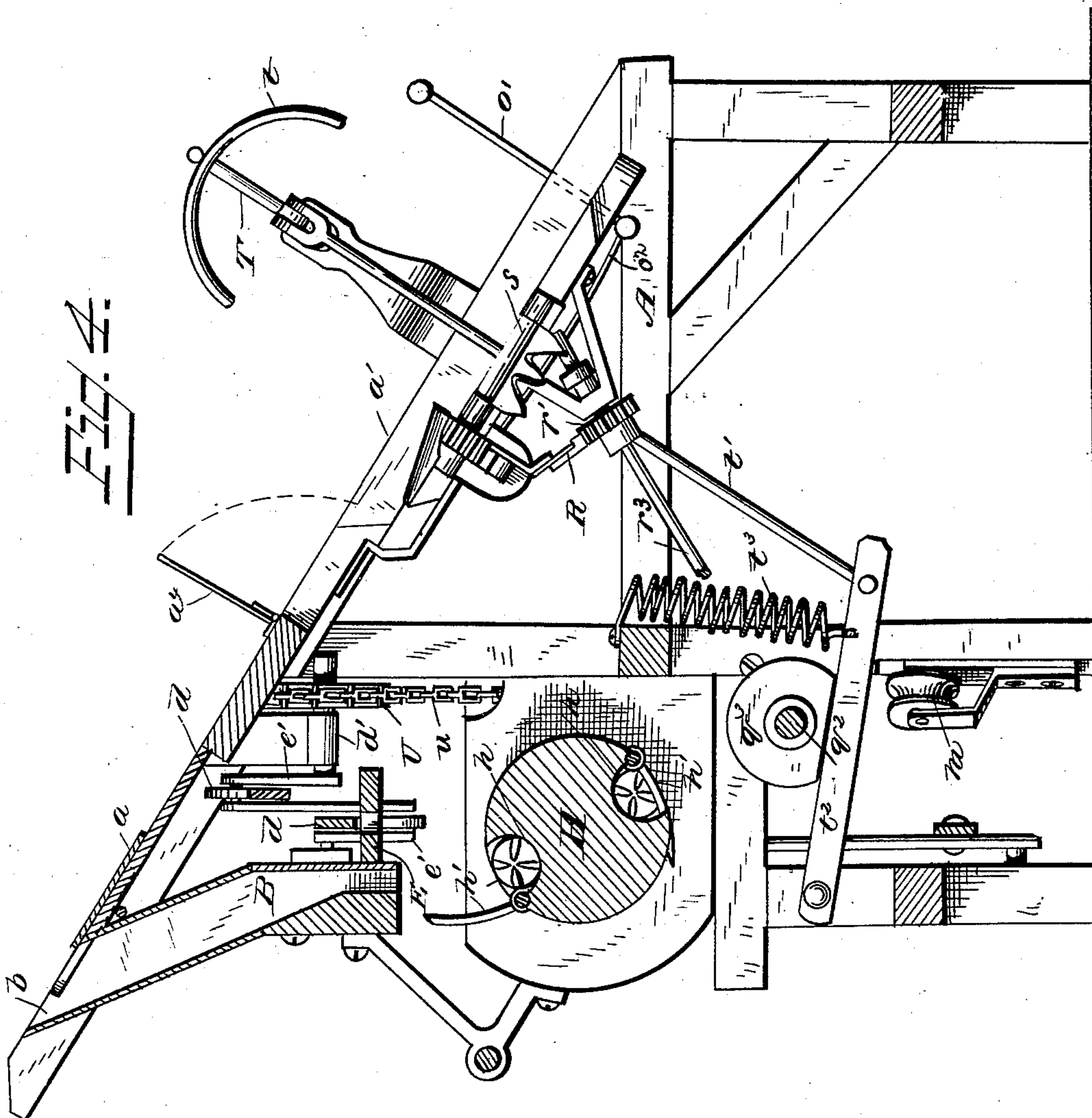
(Model.)

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H. TUTTLE.
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WITNESSES
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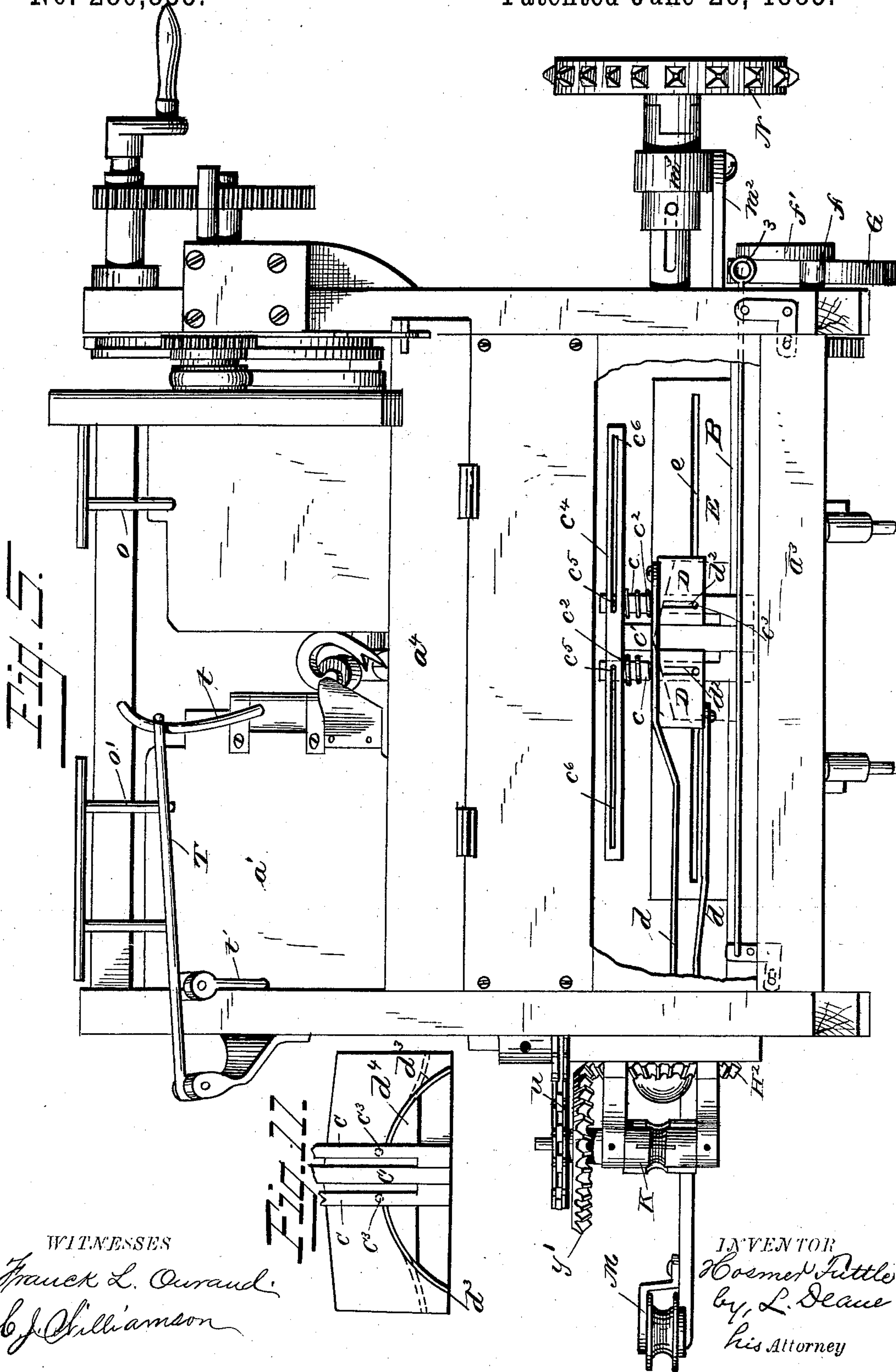
(Model.)

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H. TUTTLE.
STRAW BAND GRAIN BINDER.

No. 280,335.

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(Model.)

7 Sheets—Sheet 6.

H. TUTTLE.
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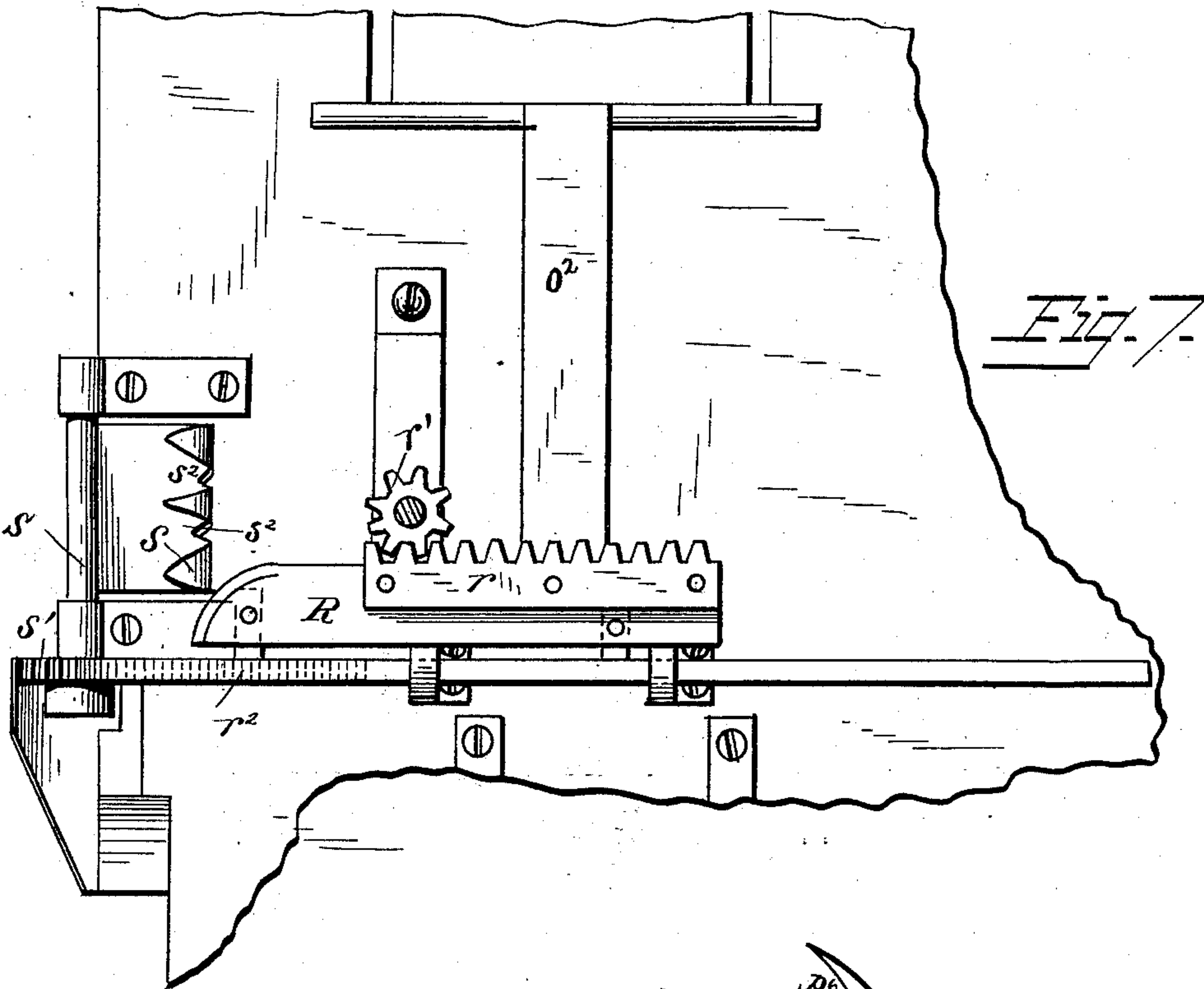


Fig. 7.

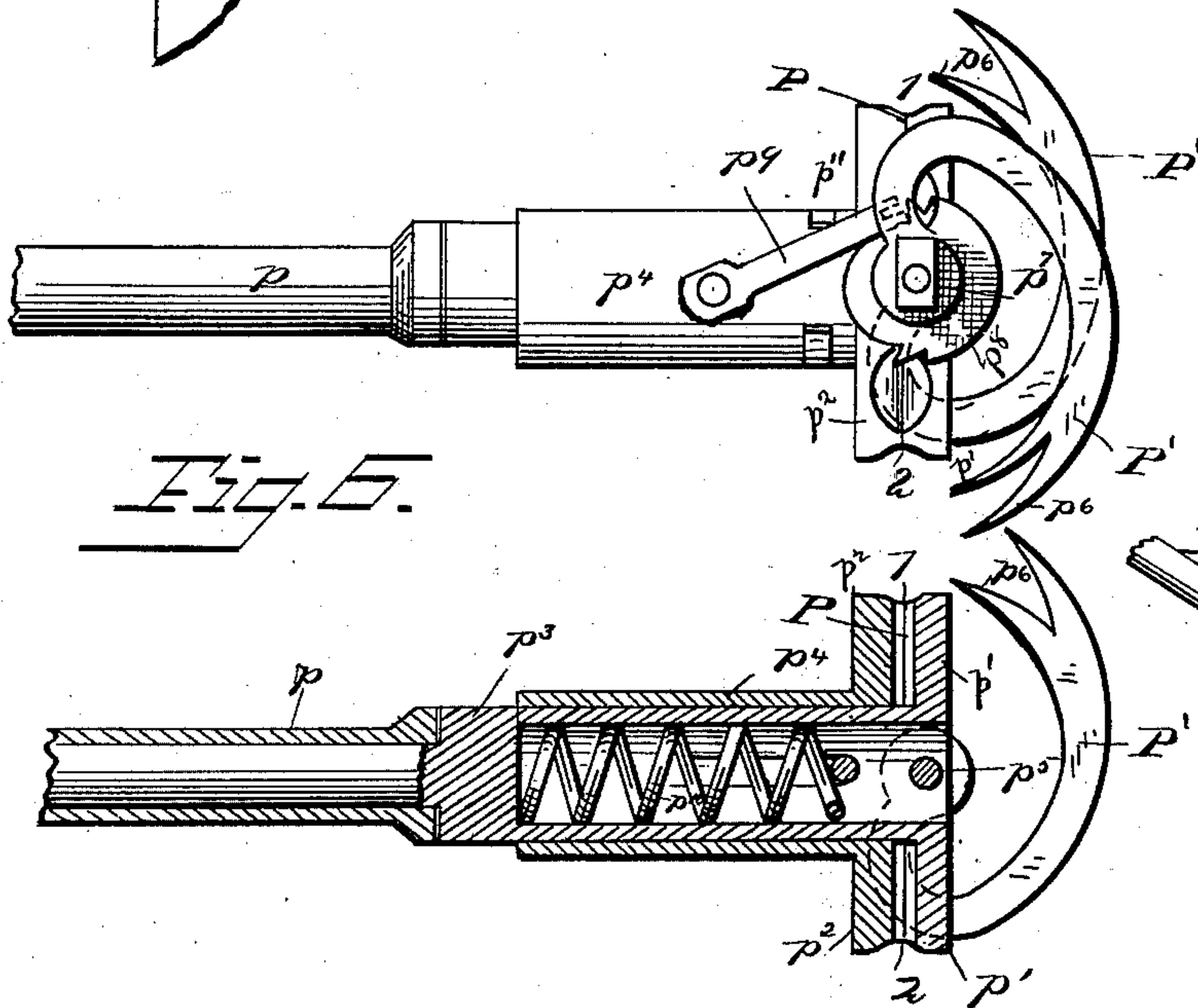
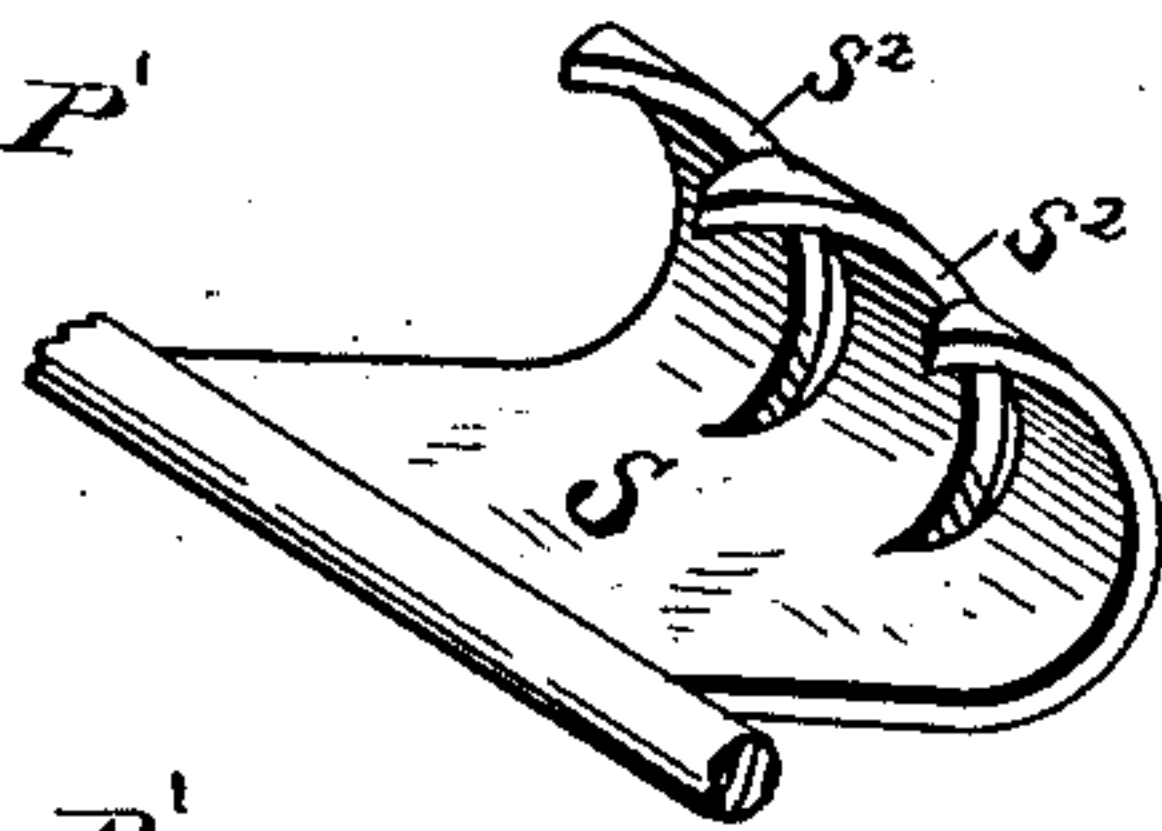


Fig. 6.

Fig. 12.



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(Model.)

7 Sheets—Sheet 7.

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Fig. 8.

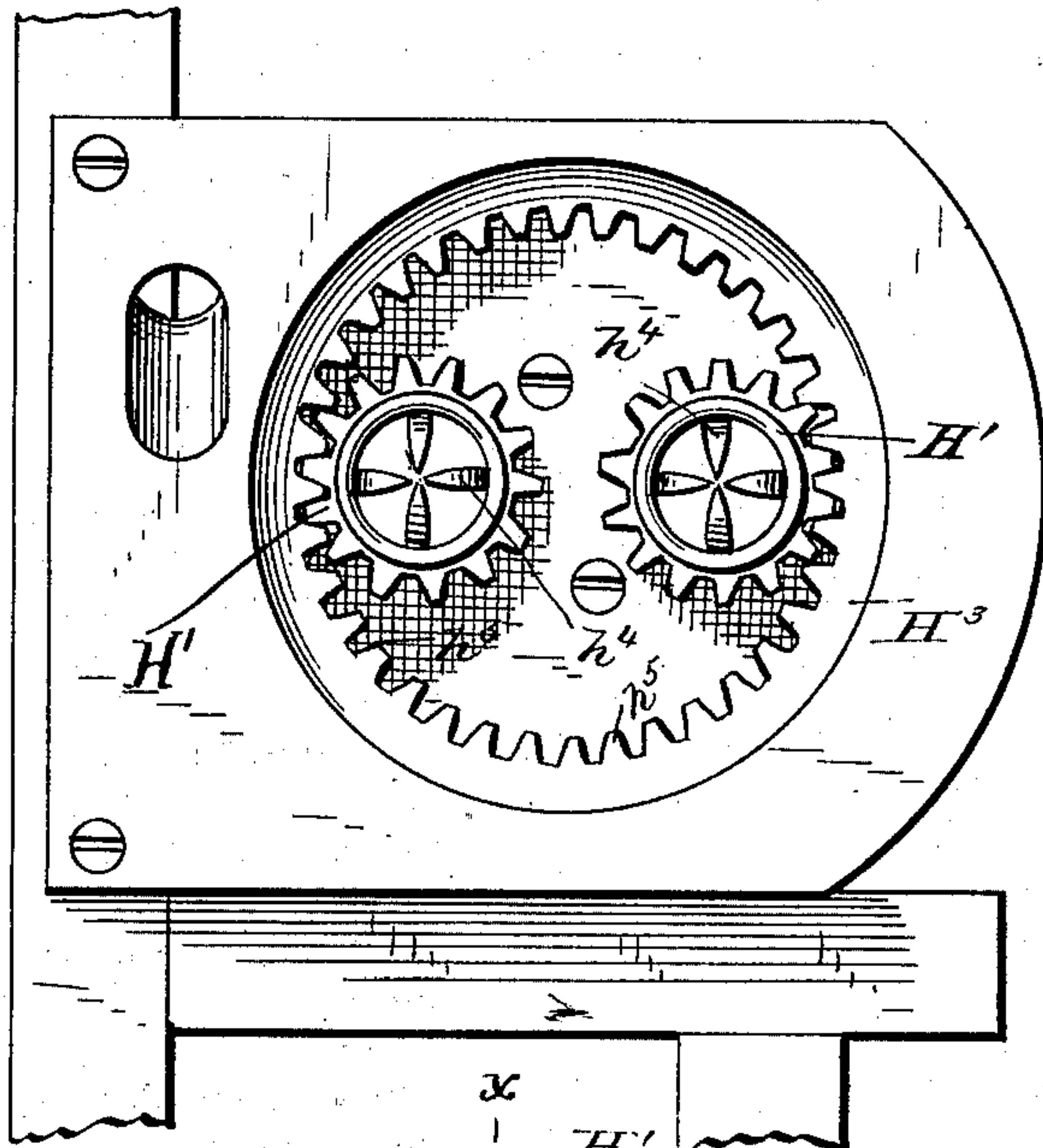


Fig. 9.

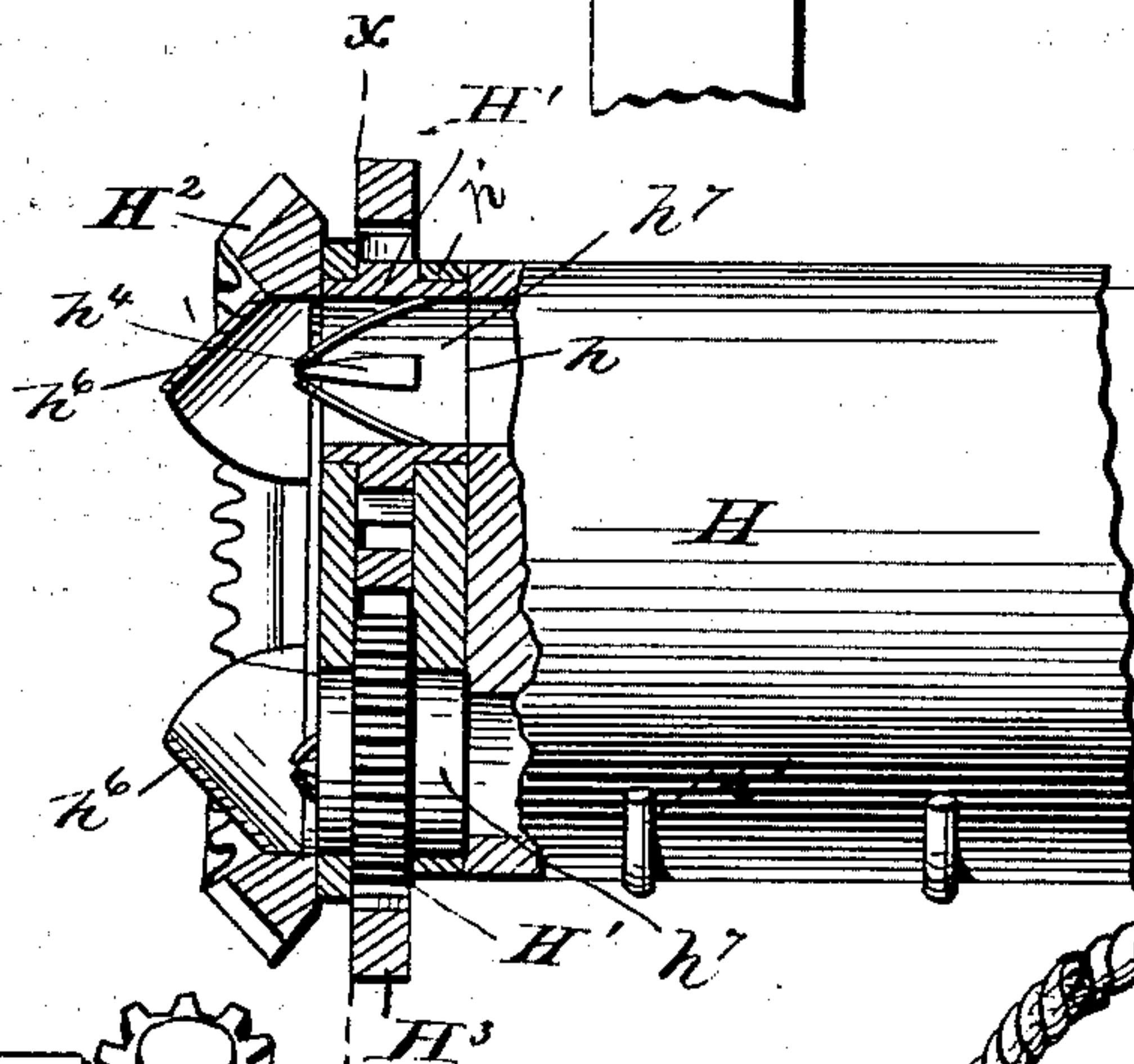


Fig. 16.

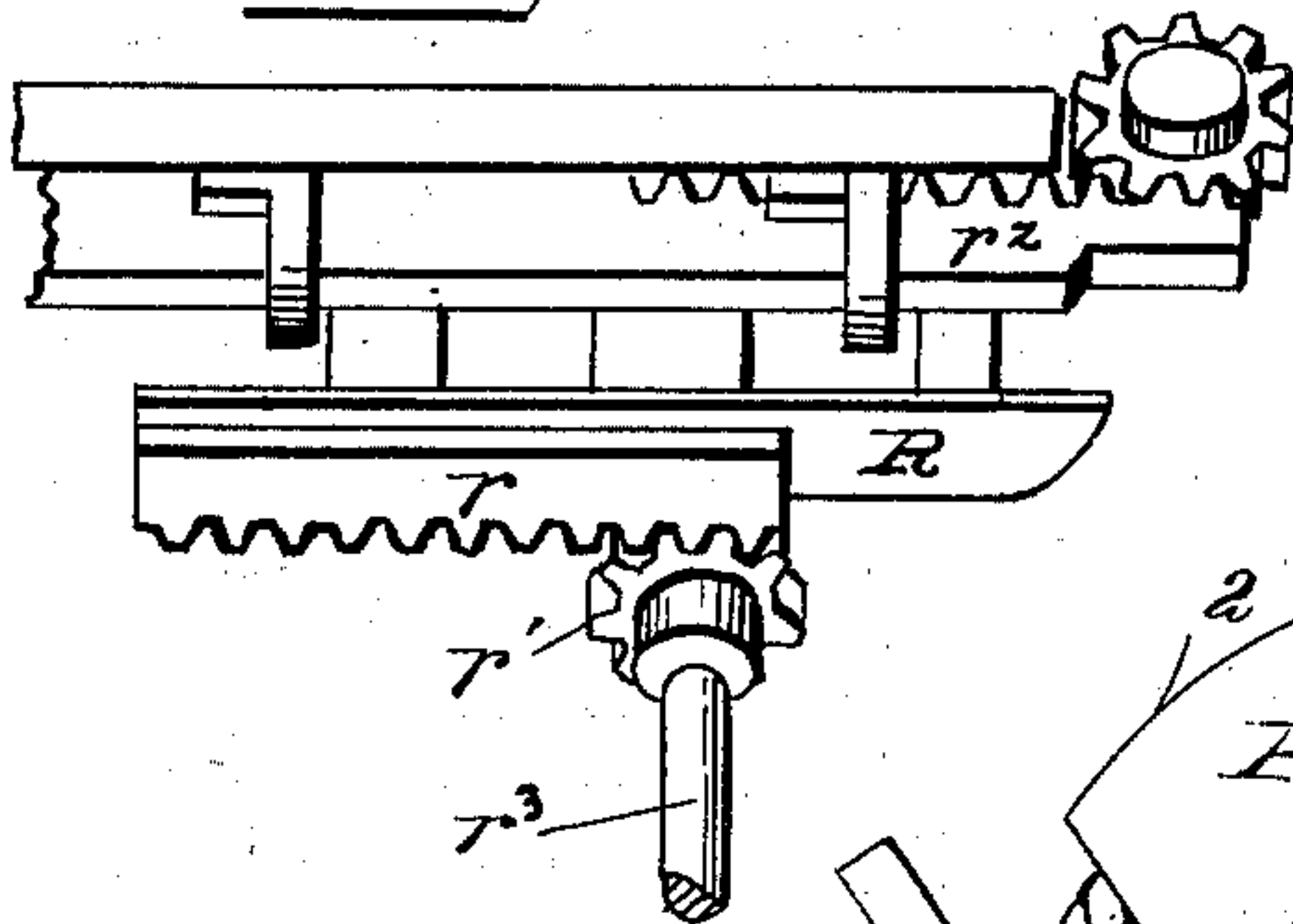
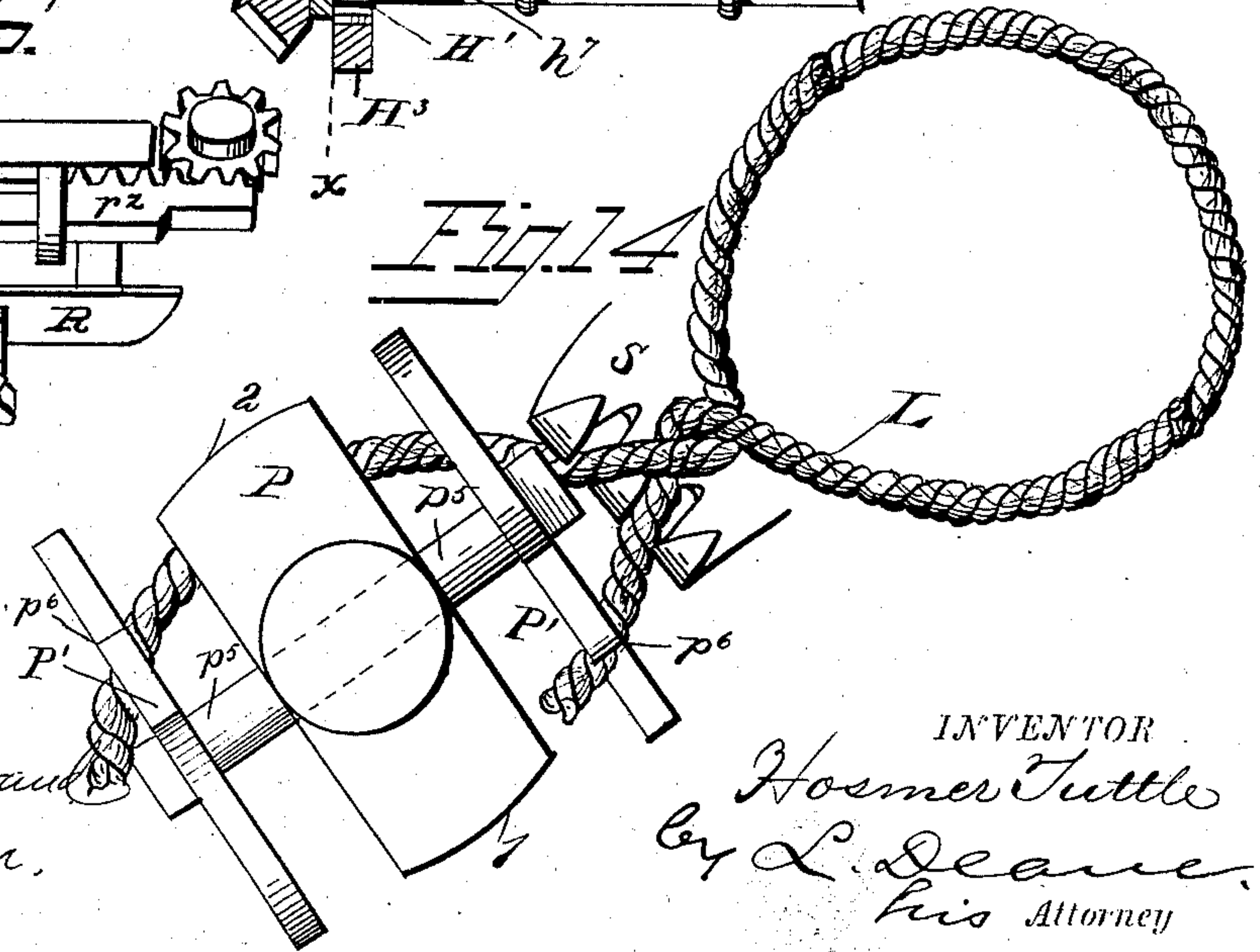


Fig. 14.



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UNITED STATES PATENT OFFICE.

HOSMER TUTTLE, OF CEDAR RAPIDS, IOWA.

STRAW-BAND GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 280,335, dated June 26, 1887.

Application filed May 11, 1882. (Model.)

To all whom it may concern:

Be it known that I, HOSMER TUTTLE, a citizen of the United States, residing at Cedar Rapids, in the county of Linn and State of Iowa, have invented certain new and useful Improvements in Straw-Band Grain-Binders; 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 or figures of reference marked thereon, which form a part of this specification.

Figure 1 is a perspective view from the front of the machine. Fig. 2 is a perspective view from the rear, some of the parts being removed. Fig. 3 is a vertical section from side to side. Fig. 4 is a like view, but looking in the opposite direction. Fig. 5 is a top plan of the machine; Fig. 6, details showing in section and elevation the twisting mechanism. Fig. 7 is a bottom plan of the tucker, &c.; Fig. 8, a front elevation of the mechanism for first twisting of the straw as it emerges from the receiving-cylinder, the wheel H^2 being removed; Fig. 9, a detail in section, on line yy of Fig. 1, of end of receiving-cylinder, to further illustrate parts of the mechanism for making the first twist of the straw band; Fig. 10, a detail to show connection of grasper and twisting mechanism, with the parts that rotate them; Fig. 11, a detail to show mechanism operating the dividing-darts in chamber B; Fig. 12, a detail of tucker. Fig. 13 is a detail of the cam and arm operating the carrier of the straw band; Figs. 14 and 15, details showing the band respectively being fastened and fully fastened; Fig. 16, a detail showing the rack operating the knife or tucker.

This invention belongs to that class of grain-binders known as "straw binders," by which term is intended to convey the meaning of binders in which straw is used to tie or secure the gavel, rather than wire, hemp, rope, or twine. In the use of wire or hemp many difficulties have been encountered—such as, in wire, of the intermingling of bits of the metal in the grain. This sometimes causes trouble to the stock in eating the straw, or in the mill machinery when grinding the grain. With the twine or hemp it has been found that the atmospheric changes of dry or damp cause a

difference of tension in the band; also, crickets or mice can easily eat the twine, and thus cause the gavel to fall apart. The use of straw-rope bands is not open to any of these objections. This band can be made, according to my invention, very easily and very cheaply, and so as to form a very strong and durable means for binding the grain.

I will now proceed to describe my invention.

In the accompanying drawings, A denotes the frame or body of the machine. The elevator (not shown) delivers the grain, as it comes from the cutter, upon the inclined table a , whence it falls down upon the binding-table proper, a' . As this loose grain is thus passing along to the binding mechanism, a small portion of it will fall into the open mouth b , at the upper edge of this part of the machine, and thence drop down into the chamber B, where it will fall upon the dividing darts or fingers $c c'$. The end fingers or dividing-darts, c , are mounted loosely, one in each of the movable blocks D, so as to allow of their movement at right angles to the length of the chamber B, as will be hereinafter explained. These blocks are adapted to play horizontally in grooves e of the supporting-plate E, which is fixed to the machine directly at the lower end of the chamber B. This movement is accomplished by means of rods d , one of which is attached at one end to each of said blocks D, while by means of the crank-arms at the other end they have motion from the shaft d' , which is driven by the wheel U, operated by the band or chain u , connecting with the driving-power of the machine by bevel-gear y' , which meshes with the gear-wheel H^2 on the end of the cylinder H. The blocks D can thus be reciprocated back and forth and carry the end darts or fingers, c , horizontally through the grain, insuring an even separation of the stalks, while the central one, c' , keeps its position, holding up the body of the stalks. When, in the return toward the center, the end ones approach the middle dart, the guide-pin c^3 on each of said end darts, which play in the slots d^2 of the blocks D, engaging on the side springs, d^3 , causes said darts to ride up the incline path d^4 , and thus be retracted from the chamber B. In the reciprocation of the side darts the pins c^5 —one on the end of each dart—play back and forth in the slots c^6 of the head

c^4 , to which the central dart is fixed; and when the side darts are retracted or forced back out of the chamber B by the action of the pins c^3 on the incline d^4 , the central dart, simultaneously with the others, will be drawn out of the chamber, and this allows the stalks of grain to fall upon the supporting and carrying arms F. When the end darts have been thus drawn up said incline d^4 till they reach the center, which is cut away, as shown in Fig. 11, the spiral springs c^2 cause all the darts to be thrust forward simultaneously into the straw-chamber B, and then the end darts are reciprocated back and forth, as above described, and, with the central one, are in due course retracted again.

The carrying-fingers F are fitted loosely at their ends on the shaft f , which has its motion from the crank-arm f' . This movement is caused by the cam-wheel G, over the edge of which a pin in the end of the crank-arm f' rides. (See Fig. 13.) The ends of these fingers F are held under the bottom of chamber B by means of springs f^2 . The fingers F' , which are rigidly fixed at their ends in arms f^4 , which are secured on said shaft f , at certain periods of the operation are turned up and out of the chamber, so that no obstruction is afforded to the passage of the grain; but when the pin in the crank-arm f' rides over the cut-away part of wheel G, the fingers F' drop down and upon the fingers F, which are beneath the chamber B and supporting the grain, and thus grasp firmly the grain-stalks between the two. In this position the two sets of fingers, with the grain between them, carry their load to one of the chambers or grooves h in the cylinder H. This cylinder is mounted at each end in bearings A' , attached to the frame of the machine, and is rotated by sprocket-wheel N on the end of its shaft. The fingers h' , held down by a spring, h^3 , and opened by arm h^2 , which engages at regular intervals for this purpose with spur i on the gear-wheel I, are thrown up, and by the onward movement of the cylinder these fingers h' sweep out the grain from the fingers F F' , and then, as said fingers h' turn down, the arm h^2 having passed by the spur i , the springs on said fingers h' cause the same to close down and shut the grain-stalks in the groove h in the cylinder.

The shaft f , which connects the fingers F, will act as a stay to steady them and keep them in fixed position. The set-screws a^2 , which control the upward motion of arms F, can be used to regulate the position of said arms relative to their distance from the lower end of chamber B, and thus determine what amount of grain shall be taken each time by the fingers F F' . The grain-stalks, which have thus been supplied regularly to fill the chambers or grooves h , are drawn through the forward ends of cylinder H by means of the two rollers K, between which they pass, said rollers being operated by the driving mechanism of the machine. In their passage to these rollers they emerge through the converging spring-arms h^4 , each set of which is

fixed in the short tube h' , of which there is one in each of the two gear-wheels H'. Each tube is so placed as to form the mouth or exit-passage of each chamber h , and each set of spring-arms having sufficient strength to hold the stalks of the grain while they are being twisted. This operation is caused by means of the movable gears H', to which the ends of said springs are fixed, as just stated. These wheels mesh with the fixed wheel H², and as the spring-arms are revolved the grain-stalks are twisted in one direction. Thus from each chamber or groove h a twisted strand of grain-stalks is coming or is drawn out, and these then pass between the rolls K, and are held here firmly in position relative to each other as they are carried along, and while so held their parts, from the rolls K to the ends of the grooves or the cylinder, are twisted upon each other by the revolutions of the cylinder H, operated by wheel N, but in a direction opposite to the former twists, and the result is that the band L so formed is composed of two strands, each twisted separately in one direction, and then twisted upon each other in the opposite direction. It may be found useful to use the guides or hoods h^6 at the ends of the grooves h to assist in directing the passage of the grain-bands to the rolls K. The straw band L is then fed over the tension-pulley M, and thence under the pulley m to the binding mechanism.

The tension-pulley swings on a rod, m' , jointed to the machine-frame. This rod is connected by a rod, m^2 , to the clutch m^3 , which is placed on the shaft of the cylinder H, at the end opposite to the pulley M. When a band is being secured on a gavel, the position of the arm M is nearly vertical, or close to the rolls K, because the slack has necessarily been taken up in placing the band around the gavel; but so soon as that band-securing operation has been completed, and sufficient band has been made to allow the pulley M to swing or fall down by its own weight and the weight of the new band nearly to a horizontal position, it draws the rod m^2 , which action disengages the clutch m^3 , and thus the band-forming mechanism, being thrown out of connection with the driving-power, is stopped; but when the binding mechanism again draws forward the straw band the pulley M is brought up, and this movement at once causes the clutch m^3 to connect with the shaft of wheel N, and the band-forming mechanism is again started. In this way, when a sufficient amount of the band has been made for binding a gavel, the band-making mechanism will be stopped automatically until the binding-arm draws on the band for length enough to bind another gavel, when the band-forming mechanism is again set in motion.

The chamber B will carry a large supply of the grain, stalks or straw, probably enough to last forty rods of the travel of the machine. If the machine goes through weedy ground, the top of the chamber B can be covered by means of the slide a^3 , which can be operated

by a rod, 3, and lever conveniently placed near the driver's foot. The grain, having been duly fed from the apron down upon the binding-table a' , is retained by the stops O on the lower edge of the table till a sufficient quantity has accumulated to form a gavel, when the end of the straw band L, which is held in one mouth of the grasper P, is drawn up to encircle the gavel by the upward movement of the arm p of the grasper. This arm at its outer end is bent at right angles, and the bent end is fixed to gear 4, which meshes with gear U^3 , suitably connected to the operative mechanism, so as to be worked at the proper moment. In the upward swing of the grasper the leaf a^4 in the incline over which the grain descends to the binding-table is turned up, being supported in this position by the rod a^6 , which is held by spring a^5 in the seat a^7 , and constitutes a ledge against which the down-coming grain will lodge, and thus prevent any interference thereof with the operation of fastening the ends of the band on the mass already accumulated on table a' . When the bundle has been bound, a trip, u' , knocks the rod a^6 from its seat, and thus the leaf a^4 will fall and the grain will descend upon the table a' to form a new gavel.

The grasper P is formed of two jaws, p' p^2 , the one p' fixed stationary on the end of the arm p^3 , which is swiveled in the end of arm p , and the other jaw, p^2 , is fixed to the sleeve p^4 , which has reciprocating movement on the end of arm p^3 , as will be hereinafter explained. Through the end of arm p^3 is a pin, p^5 , which passes through the middle of jaw p' , and has fixed on each end the twister-arms P' P', having forked ends p^6 .

In the operation of binding, as the grasper P is swung upward and round the gavel, the tension of the straw band, which is held in one mouth of the grasper, which for present purposes will be called "mouth 1," causes the grasper and twister to make a half-revolution in connection with the swiveled part or arm p^3 on the end of the arm p , to which they are attached, as above described, and thus the mouth 2 of the grasper will be brought uppermost in the position before held by mouth 1. When the band has been carried over the gavel, the square end p^7 of the pin p^5 engages in the socket Q on shaft q . This shaft has motion from teeth on the side of wheel q' , which is mounted on shaft q^2 , and this shaft is operated by driving-wheel u^3 , and any suitable number of intermediate gear-wheels or other mechanism. By properly adjusting the gears the shaft q is only turned when the grasper and twister has been brought into the position just above described—i. e., with the square head p^7 in socket Q. At this time (when the end p^7 has come into position in socket Q) the mouth 2 of the grasper is uppermost—that is, in the position held by mouth 1 of the grasper when it started on its above movement about the gavel. The shaft q is now revolved. This carries the pin p^5 , the twist-

ers, and the cam p^8 . The straw band held in the mouth 1 falls into the fork p^6 of the twister, while the shoulder on cam p^8 , coming against the pawl p^9 , pushes in the sleeve p^4 , and thus the mouth 2 of the grasper is opened and the main line of the straw band falls into it, and as the grasper and twister are further revolved the pawl is released from the cam, and spring p^{10} forces forward jaw p^2 , and thus the mouth 2 firmly holds the straw band. The continued revolution of the grasper and twister causes the end of the band which is in the fork p^6 of the twister to be carried around the main line and twisted about it. Simultaneously now the end of the straw band is cut off near the grasper, and the tucking process is carried out, all as follows:

The knife R is fixed to rack r , which is operated by the gear-wheel r' on the end of the shaft r^3 , which is run by gear-teeth on the side of a wheel, q^5 , on shaft q^2 , said teeth being so placed that the shaft, and consequently the knife, will only be operated at the precise moment the end of the straw band L has been properly twisted on the main line of the band, as above described.

The tucker S, having bent or curved projections, is mounted on shaft s , and operated by the gear s' on its end, meshing with the rack r^2 , which is a part of the rack carrying the knife. When the straw band is cut, as above described, the two ends fall respectively into the notches s^2 of the tucker, while the middle projection of the tucker comes within or inside the twist of the ends of the band, (see Fig. 14,) and in the turning of the tucker these parts are thrust under the band about the gavel, each end of the band being brought back and under its own part of the band, as shown in Fig. 15, and so as to be secured and held fast by the tension of this band, and at this moment the rearward movement of the tucker easily disengages it from the band. To insure the position of the gavel while the tucker is performing its work, the compressor T, pivoted to the frame or otherwise, and having embracing-arms t , of suitable form to come closely upon and about the gavel, is brought tight down upon the gavel by means of rod t' , connected at its other end to lever t^2 , which is operated by the cam-wheel q^3 exactly at the moment the cutting and tucking are being accomplished, and when these operations are over the arm is drawn up by the spring t^3 , so as to allow the gavel, in the forming of which the grain has been taken from against stops o o' , to fall with some momentum against the stops o o' , the latter being held up by a weak spring, o^2 , and the grain end will rest against the rigid stops o , while the butt, with the momentum of sliding down the inclined table a' , will strike so hard against the stop o' as to bend it down. Thus the gavel will fall off upon the ground, but landing on its butt.

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

1. In combination with the chamber B, the supporting and dividing darts $c c'$, substantially as and for the purposes set forth.

2. In combination with the chamber B, the supporting and dividing darts $c c'$ and fingers $F F'$, substantially as described.

3. In a grain-binder, the cylinder H, having longitudinal chambers $h h$, and provided with spring-fingers h' and arm h^2 , in combination with spur i on wheel I, substantially as and for the purpose described.

4. In combination with a cylinder, H, having chambers h , and operating in connection with fingers $F F'$, the spring-fingers h' , suitably tripped by the driving mechanism, substantially as shown and described.

5. In combination with a grain-binder, mechanism, substantially as described, for twisting the strands of a straw band, and mechanism for receiving the strands and twisting the two in a direction opposite the first twist of the several strands, substantially as described.

6. The combination, with a grain-binder, of mechanism, substantially as described, for twisting the several strands of a straw band, mechanism for receiving the strands and twisting the same in a direction opposite the first twist of the several strands, and the rolls K, for holding and drawing out the complete band.

7. In combination with the twisting mechanism and the band-fastening mechanism, the tension-pulley M, swinging on the frame, the rod m^2 , clutch m^3 , and cylinder H, constructed and operated substantially as and for the purposes set forth.

8. The grasper P, composed of jaws $p' p^2$, and twister P' , having jaws p^6 , substantially as described.

9. The swinging arm p , operated as described, and carrying grasper P, composed of fixed jaws p' and movable jaw p^2 , twister P' , cam 8, and pawl p^9 , substantially as set forth.

10. The grasper P and twister P' , as described, having head p^7 , combined with socket Q and shaft q , operated as set forth.

11. In combination with the grasper P, twister P' , and socket Q, all substantially as set forth, the knife R and tucker S, each operated as described.

12. In a grain-binder, fixed and spring stops to control the passage of the bound gavel from the machine, whereby it will land upon the ground on its butt, substantially as set forth.

13. In a grain-binder, the arm p , operated substantially as set forth, having pin p^5 in its end, to which is attached the twister P, the head p^7 , spring p^{10} , and cam p^8 , combined with socket Q and shaft q , operated by wheel q' and shaft q^2 , substantially as set forth.

14. The cylinder H, as described, provided with chamber h , and mounted in bearings A' , in combination with the fixed gear H^3 and revolving spring-arms h^4 , all substantially as described.

15. The cylinder H, as described, provided with chamber h , and mounted in bearings A' , in combination with the fixed gear H^3 , revolving spring-arms h^4 , and the rolls K, for drawing out the straw bands and holding them in fixed position relatively to each other while being twisted together after they have come out of the cylinder H.

16. In a grain-binder, the mechanism for making the strands, combined with the mechanism for twisting the same reversely into a continuous band, all substantially as described.

17. In a grain-binder, the combination, with a receptacle for holding the straws which are to form the band, of dividing-darts, which pierce the body of the straw at or near the middle of its length, and separate small quantities at a time to feed the same to the band-making apparatus, and mechanism for moving said darts from each other toward the ends of the straw, to form a perfect separation of the same, substantially as set forth.

18. In combination with the twisting-cylinder and the band-placing arm, the swinging tension-lever pivoted to the frame, and having a rod connected therewith for operating the sliding clutch of the twisting-cylinder, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

HOSMER TUTTLE.

Witnesses:

G. W. BALLOCH,
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