

(No Model.)

C. F. SEARCH.
FEED CUTTER.

3 Sheets—Sheet 1.

No. 604,127.

Patented May 17, 1898.

Fig. 1.

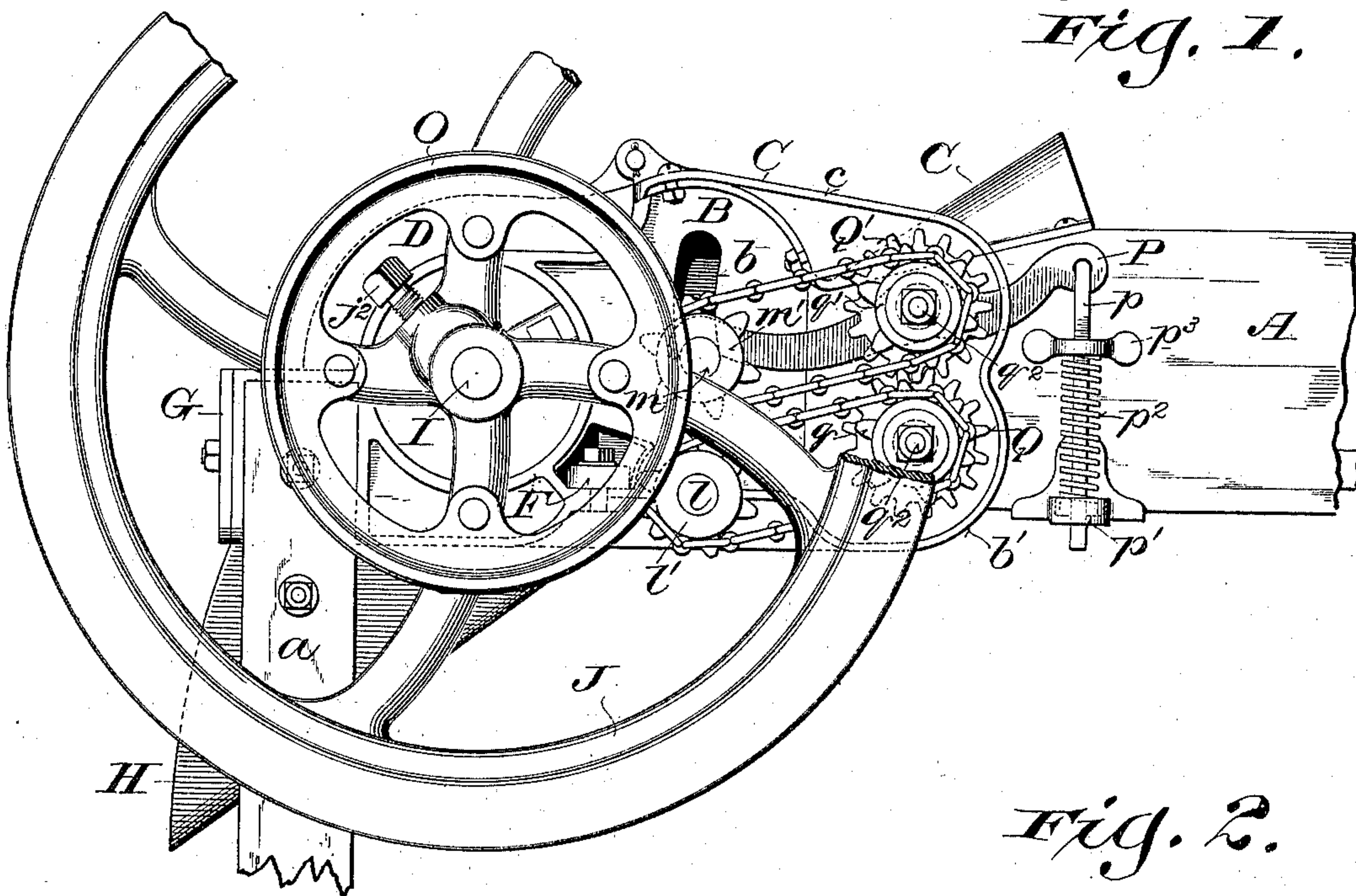
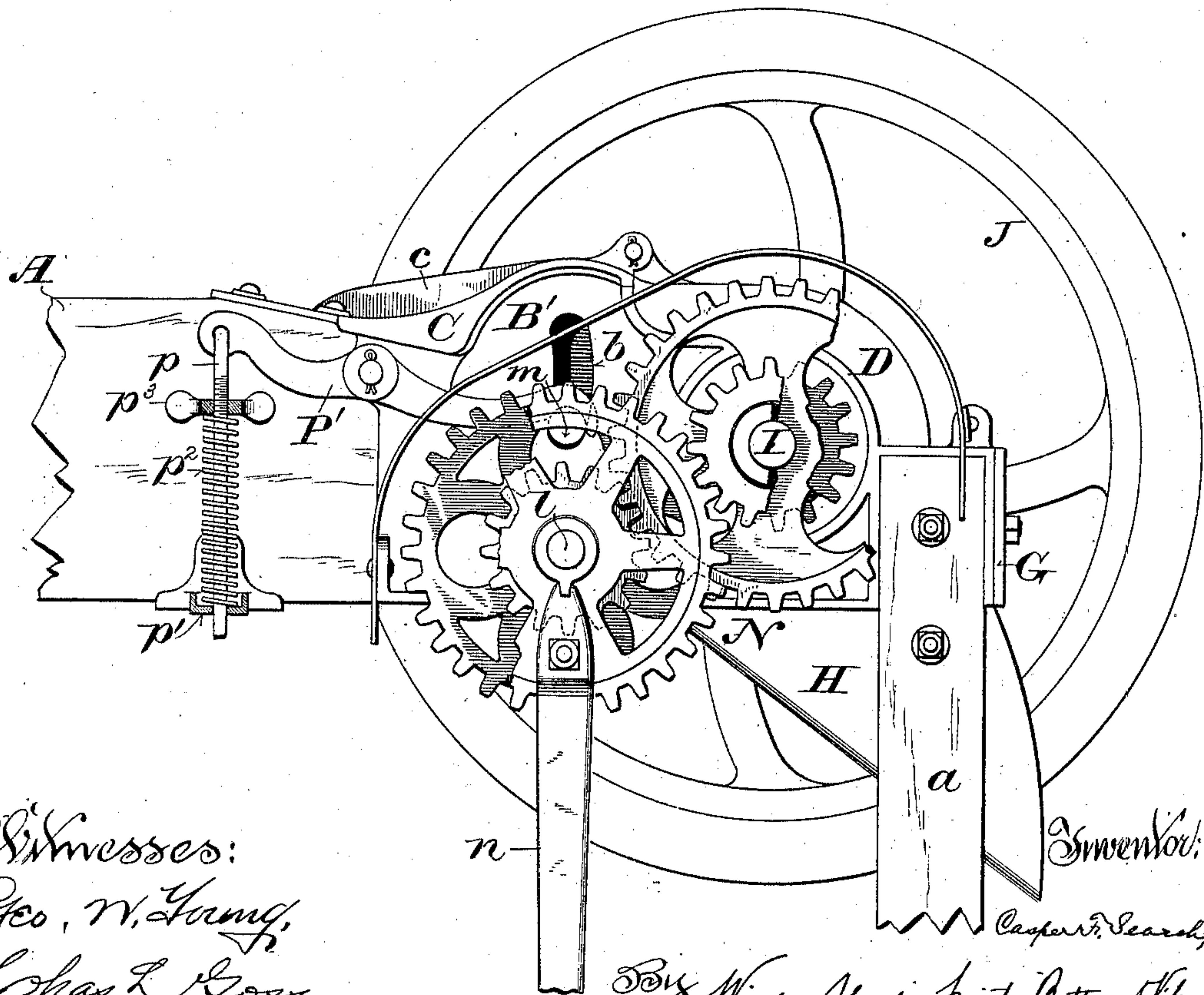


Fig. 2.



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Fig. 4.

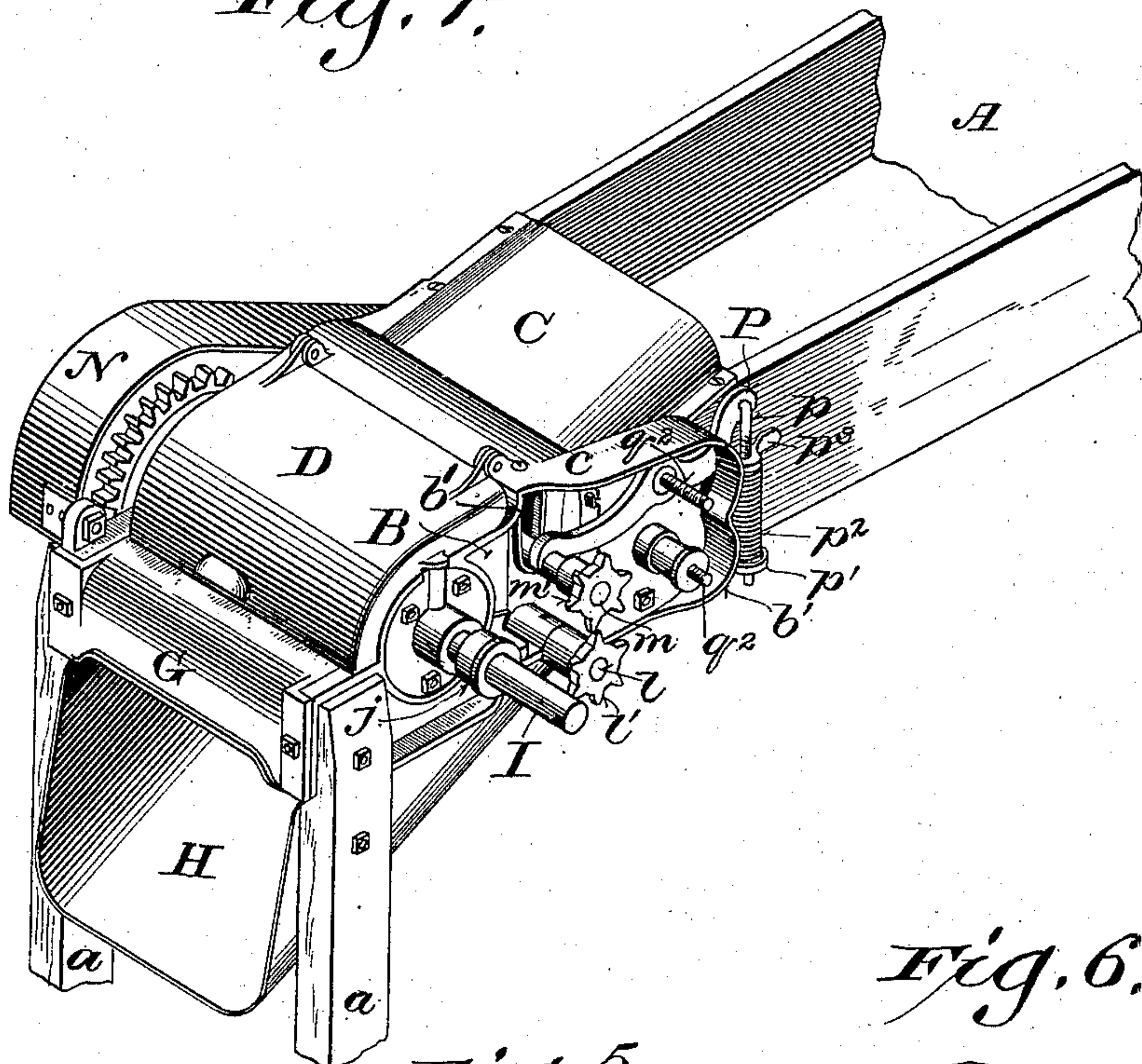


Fig. 5.

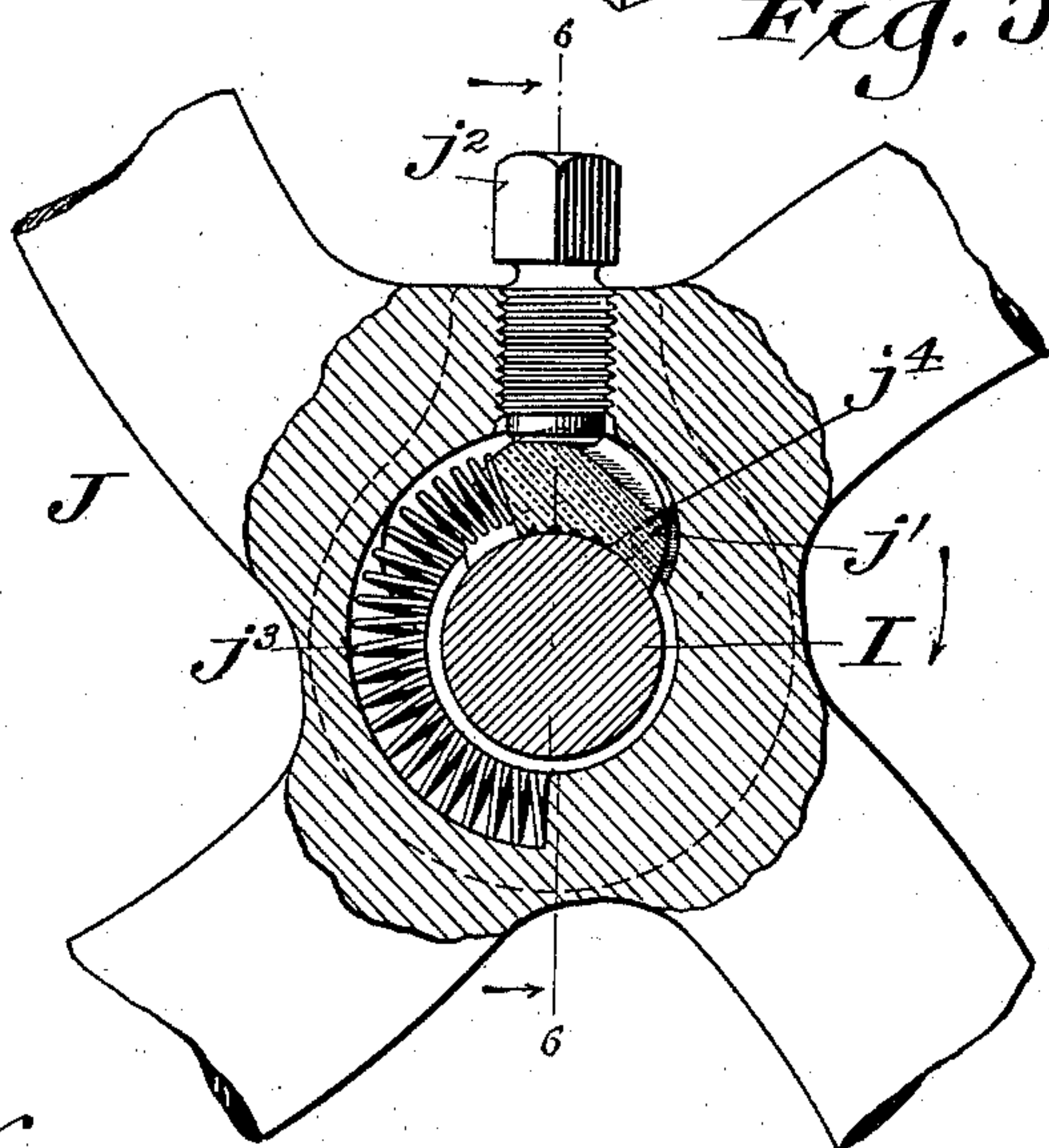
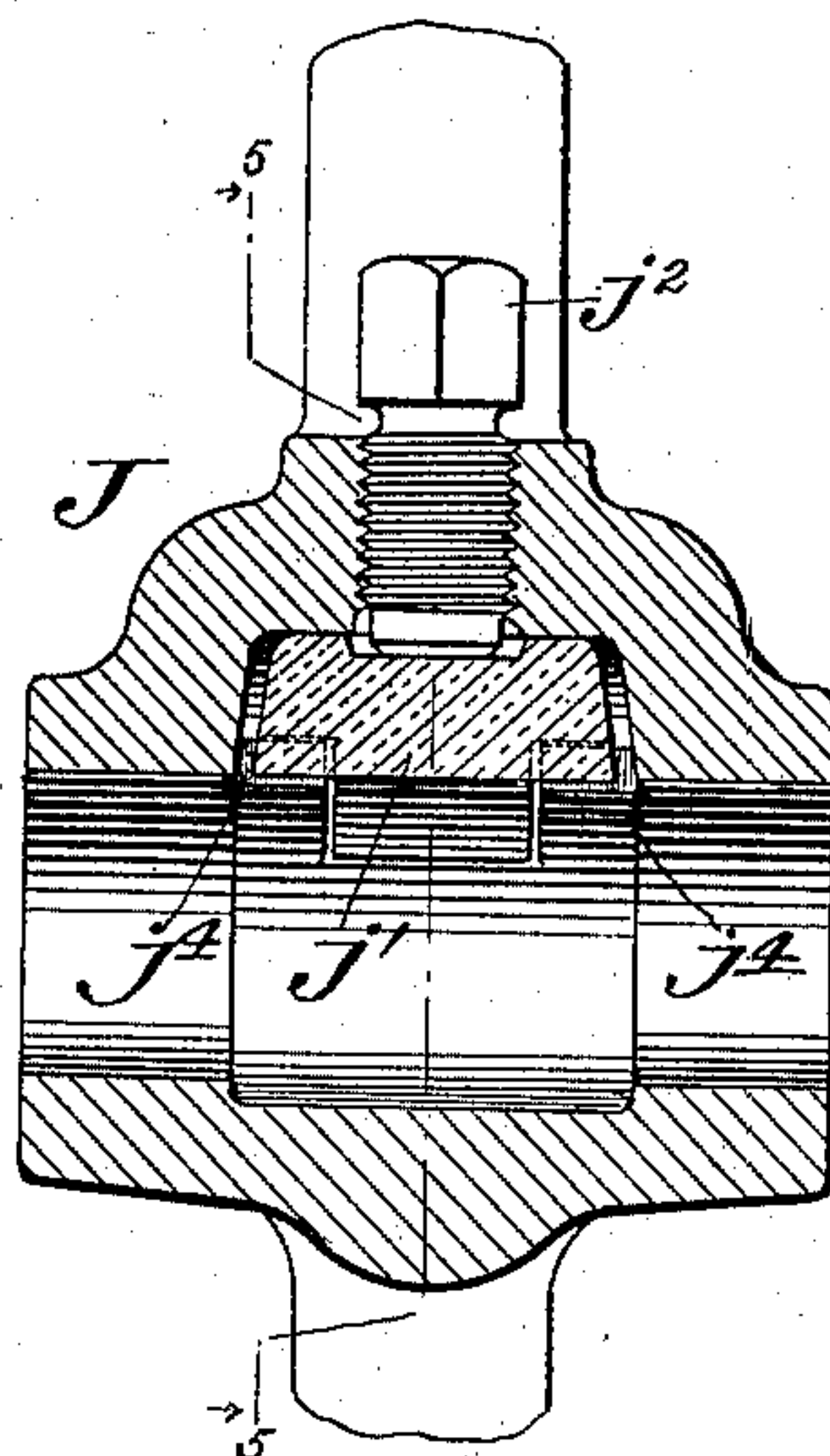


Fig. 6.



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UNITED STATES PATENT OFFICE.

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FEED-CUTTER.

SPECIFICATION forming part of Letters Patent No. 604,127, dated May 17, 1898.

Application filed June 5, 1897. Serial No. 639,504. (No model.)

To all whom it may concern:

Be it known that I, CASPER F. SEARCH, of Oak Park, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Feed-Cutters; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The main objects of my invention are to provide a rotary feed-cutter knife that can be easily ground and sharpened without affecting the adjustment of the cutting edge of the knife with reference to the ledger-plate or cutter-bar with which it works, to prevent obstructions to the knife from injuring the machine, and generally to improve the construction and operation of machines of this class.

It consists of certain novel features in the construction and arrangement of component parts of the machine, as hereinafter particularly described, and pointed out in the claims.

In the accompanying drawings like letters designate the same parts in the several figures.

Figure 1 is a left side elevation of a machine embodying my improvements. Fig. 2 is a right side elevation. Fig. 3 is a vertical longitudinal section, on an enlarged scale, cutting the knife and feed-rollers at right angles to their axes. Fig. 4 is a perspective view showing the top and left frame-plates, the balance-wheel and a part of the gearing connecting the roller-shafts being removed; and Figs. 5 and 6 are details of the safety device or clutch for preventing injury to the machine when the cutter strikes obstructions, Fig. 5 being a section of the balance-wheel hub at right angles to its axis on the line 5 5, Fig. 6, and Fig. 6 a section cutting the axis of the hub lengthwise on the line 6 6, Fig. 5.

Referring to Figs. 1, 2, and 4, A designates a portion of the hopper, which is made in the usual manner of wood and supported by the usual legs, two of which, *a a*, are shown at the front end of the machine.

B is the left frame-plate, (shown in Fig. 1,) and B' the right frame-plate. (Shown in Figs.

2 and 4.) These plates are made of cast-iron and formed or provided with suitable bearings for the cutter and feed-roller shafts. They are connected by a top plate C, which is made flaring over the throat of the hopper and serves as a cover for the feed-rollers. To the front side of this plate is hinged a curved door D, which closes over and protects the cutter. The side plates are also connected below the hopper by a cross-bar E and by a cutter-bar or ledger-plate F and in front of the cutter by a cross-plate or guard G. A sheet-metal chute H is provided below the cutter.

The parts above mentioned form together a housing which incloses the cutter and feed-rollers.

I is the cutter-shaft, upon one end of which the balance-wheel J is mounted, its hub being held thereon between a collar *j* and a cotter. (Shown in Fig. 4.)

K is the cutter, which consists of a number of knives *k*, bolted at their ends to the arms of heads *k'*, which are secured on the shaft I and formed with seats for the attachment of the knives, inclined inwardly and backwardly from the cylindrical path described by the cutting edges of the knives, and with shoulders against which the back edges of the knife-blades abut, as shown in Fig. 3. Each knife is bent spirally and is set obliquely or at an inclination to the shaft I and at its outer edge is turned or bent forward in the direction of its rotation. The outer face of each knife next to its cutting edge from 1 to 2 is formed to the segment of a cylinder whose center is the axis of shaft I and radius the distance from said axis to the working edge of the cutter-bar or ledger-plate F. From the point 2 each knife-blade is inclined inwardly toward the cutter-shaft and is made flat or straight crosswise.

The forward bend of the knives next to their cutting edges and the cylindrical formation of their outer faces admit of grinding and sharpening them without disturbing or affecting the adjustment of their cutting edges with reference to the working edge of the ledger-plate until their cylindrical faces from 1 to 2 have been nearly ground or worn away. The forward bend or turn of the knives also pre-

serves acute-angled cutting edges until they are ground down to the plane of their inner faces. The construction of the knives as above explained with cylindrical faces, which pass throughout their entire extent close to the ledger-plate, avoids the necessity of grinding out nicks or notches, which would otherwise leave spaces between their working edges and the working edge of the ledger-plate, so that the knives would fail to cut at those points. The inward inclination of the knife-blades from their cylindrical faces and the inclination of the front face of the cutter-bar F below its working edge afford ample clearance and prevent clogging. The backs of the knives rest against shoulders on the heads k' , so that when they are removed for sharpening and replaced the adjustment of their cutting edges will not be disturbed. The spiral formation of the knives or their oblique setting with reference to the cutter-shaft I causes them to make a shearing cut with the ledger-plate. The upper face of the cutter-bar F, which forms or serves as a ledger-plate, is chilled and hardened in casting.

The construction and arrangement of the cutting apparatus above described greatly increase the efficiency of the machine, enabling a machine of a given size to do more work with less expenditure of power than machines with knives constructed and arranged as heretofore, since whatever the condition of the knives may be—whether they are dull, nicked, or sharp—the cutting edges throughout their entire length pass close to the working edge of the ledger-plate, and are thus compelled to completely sever the feed and are prevented from drawing it between the outer faces of the knives and the ledger-plate, especially when the feed is green or wet, and thereby clogging and causing the cutter to turn hard.

L is the lower feed-roller, which projects upwardly through an opening in the bottom of the hopper just behind the ledger-plate F. Its shaft l has fixed bearings in the frame-plates B B'.

M is the upper feed-roller, which is ribbed or corrugated lengthwise in the usual way, as shown in Fig. 3. Its shaft m projects through and is guided in arc-shaped openings b in said frame-plates, whereby either or both ends of said roller are allowed to yield upwardly, allowing for variations in the quantity and nature of the feed or material passing between the rollers.

On the side of the machine opposite the balance-wheel the cutter-shaft I is connected with the shaft l of the lower feed-roller by a train of speed-reducing gears N, as shown in Fig. 2. When the machine is to be operated by hand, a crank n is attached to one of these gears. For the operation of the machine by other power the balance-wheel is provided with a belt rim or pulley O, which may be cast separately and bolted to its arms, as shown in Fig. 1.

P P' are levers pivoted or fulcrumed to the

frame-plates B B' and bearing at their front ends upon the upper side of the upper feed-roller shaft m . To their opposite ends are pivoted the upper ends of vertically-disposed spring-rods p , which are guided at their lower ends in ears p' , attached to the hopper A. These rods are surrounded by spiral springs p^2 , bearing at their lower ends against the ears p' and at their upper ends against winged nuts p^3 , threaded on said rods. These springs force the upper feed-roller toward the lower feed-roller with a yielding pressure. The upper feed-roller is driven from the lower feed-roller by chain or link belt gearing. (Shown in Fig. 1.)

Two intermeshing spur-gears Q Q', formed or provided with sprocket-gears q q' , are mounted upon studs q^2 q'^2 , which are formed with or secured to and project outwardly from the frame-plate B, parallel with the roller-shafts, as shown in Fig. 4. The spring-lever P is pivoted or fulcrumed upon the upper one of these studs. The adjacent ends of the roller-shafts are provided with sprocket-wheels l' m' , which are connected by link belts, as shown in Fig. 1, with the sprocket-wheels q and q' , respectively.

The top plate C is formed with an extension c , which projects over the gearing connecting the two roller-shafts, as shown in Fig. 4. The frame-plate B is cast next to the hopper A with a flange b' , which forms a continuation of the extension c on the top plate and constitutes therewith a housing for protecting the gearing that connects the roller-shafts and preventing straw or stalks from becoming entangled with and clogging said gearing. By mounting the gears Q Q' and sprocket-wheels q q' upon the frame-plate B they are advanced out of the way of projecting straw or stalks in their passage through the hopper to the cutter, and are thus less liable to become entangled and clogged therewith. This construction also insures the proper location of said gears with reference to the roller-shafts which have bearings in the same casting and facilitates the construction and assemblage of the component parts of the gearing. By this arrangement of gearing I am able to form the housing therefor integrally with the top plate C and frame-plate B, and thus dispense with a separately-formed cover which it is necessary to provide when the connecting-gears for driving the upper roller are mounted separately upon the side of the wooden hopper A in a position more exposed to entanglement with straw and stalks in the hopper.

Referring to Figs. 5 and 6, showing the safety device for preventing injury to the machine in case the cutter encounters obstructions that would otherwise break it or its connections, j' is a friction-block loosely held in a recess in the hub of the balance-wheel J, opening into the bore of the hub and circumferentially elongated. The inner face of this block is made concave to fit upon the

shaft I and is toothed or corrugated to prevent its slipping thereon when it is forced into engagement therewith by the set-screw j^2 , threaded in a radial hole in the hub of said wheel. When the block j' is thrust forward against the front end of the recess and the screw j^2 forced against its outer face, as shown in the drawings, it is clamped upon the shaft I and causes said shaft under ordinary conditions to turn with the balance-wheel and driving-pulley. A spiral spring j^3 , bearing against the rear end of a circumferential extension of said recess and against the back of said block, forces and holds the latter normally against the front end of the recess in position to be engaged by the set-screw j^2 . The outer face of the block in advance of the seat for the set-screw is preferably beveled or inclined inwardly toward the shaft I, as shown in Fig. 5, to insure the disengagement of the friction-block whenever the cutter encounters an obstruction that might break or injure it. The hub of the balance-wheel is formed at the forward end of the recess with shoulders j^4 , which engage undercut notches in the front face of the friction-block j' and retain it in place when the balance-wheel is removed from the cutter-shaft, it being necessary to compress the spring and force the friction-block back in order to remove it through the bore of the hub. This is a feature of special convenience and importance, as it prevents the accidental removal and loss of the block j' and spring j^3 in moving, handling, or shipping the machine and retains said parts in place ready for use at all times and under all conditions. Whenever the cutter strikes an obstruction offering sufficient resistance to injure the machine, the balance-wheel, turning in the direction indicated by the arrow in Fig. 5, forces the tip of the set-screw j^2 off from its seat over the inwardly inclined or beveled face of the friction-block j' , which slips back against the tension of the spring j^3 , releasing its hold upon the shaft I and permitting said balance-wheel to turn freely upon said shaft and the cutter to remain stationary. The friction-block is reset by partially unscrewing the set-screw j^2 , which allows the spring j^3 to thrust said block forward into place, where it is clamped upon said shaft by tightening the set-screw upon it.

I do not wish to be understood as limiting myself to exact details of construction herein shown and described, as they may be modified

in various ways within the spirit and intended scope of my invention. 55

I claim—

1. In a feed-cutter the combination with a knife of a shaft through which the knife is actuated; a driving or balance wheel mounted upon said shaft, a friction-block inserted in a recess in the hub of said wheel, a set-screw threaded in the hub of the wheel and adapted to force said block against said shaft and to lock the wheel thereon, the outer face of said block being inclined toward the shaft in advance of the set-screw, whereby obstruction to the knife causes the set-screw to ride over said incline, release said block and permit the wheel to turn upon said shaft, substantially as and for the purposes set forth. 60 65 70

2. In a feed-cutter the combination with the knife, of a shaft through which the knife is actuated, a driving or balance wheel mounted upon said shaft and having an internally-recessed hub, a friction-block inserted in the recess in said hub and retained therein by engagement with a shoulder in the hub, a screw set radially in the hub of the wheel and adapted to bear at its inner end against the outer face of said block, and when forced against it to hold the wheel from turning on said shaft, and a spring pressing forward against the back of said block, substantially as and for the purposes set forth. 75 80 85

3. In a feed-cutter the combination with the knife, of a shaft through which the knife is actuated, a driving or balance wheel mounted upon said shaft, a friction-block loosely fitted in a recess in the hub of said wheel and a screw set radially in said hub and adapted to force said block, when placed in the front end of the recess, against the shaft and to hold the wheel from turning thereon, said recess being extended behind the set-screw to receive the block when it is forced out of engagement with the set-screw by an obstruction to the knife, thereby allowing the wheel to turn upon said shaft without injury to the machine, substantially as and for the purposes set forth. 90 95 100

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

CASPER F. SEARCH.

Witnesses:

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M. L. EMERY,