

J. DICK, Jr.
STRAW CUTTER.

No. 177,383.

Patented May 16, 1876.

Fig 1.

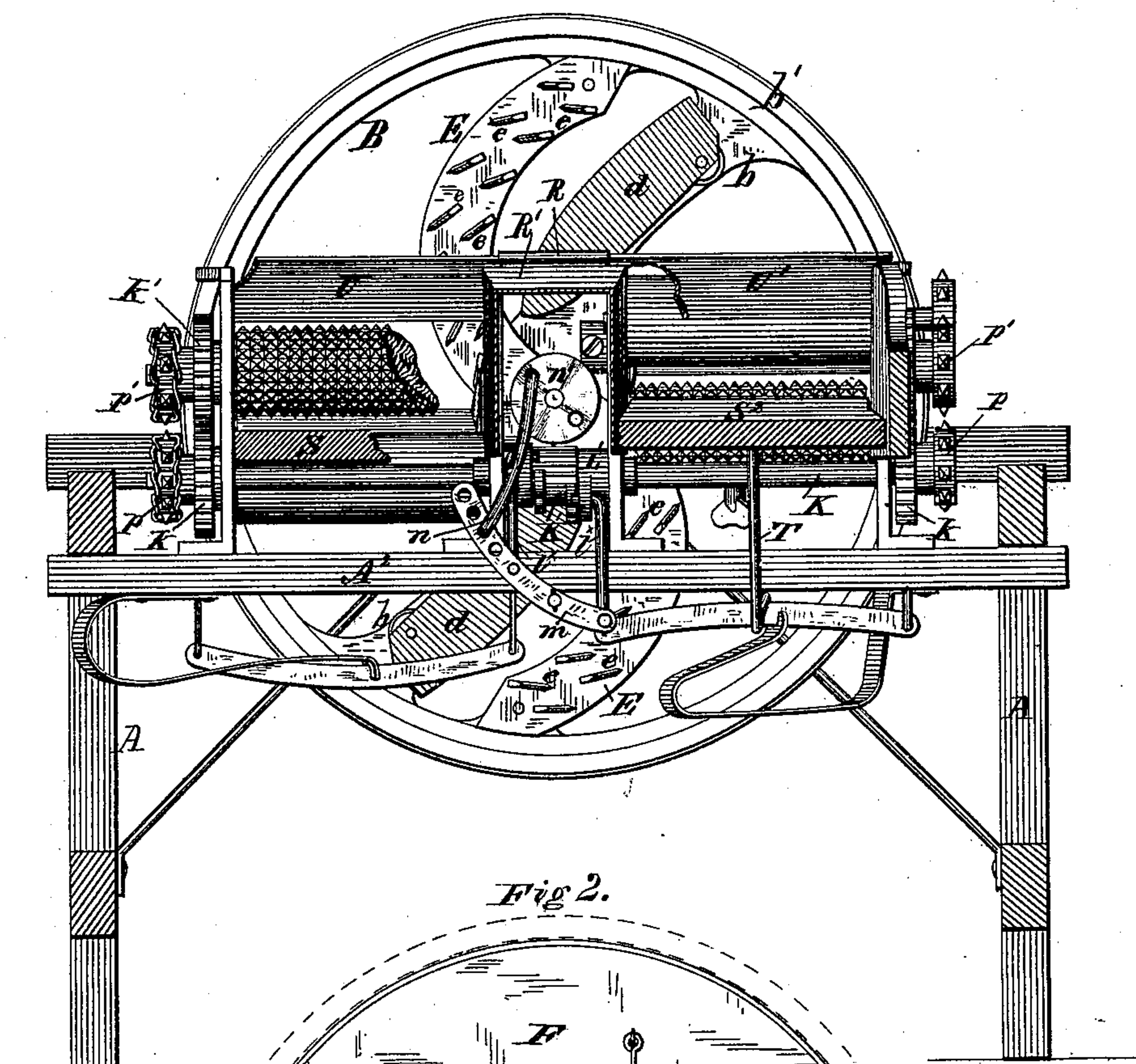
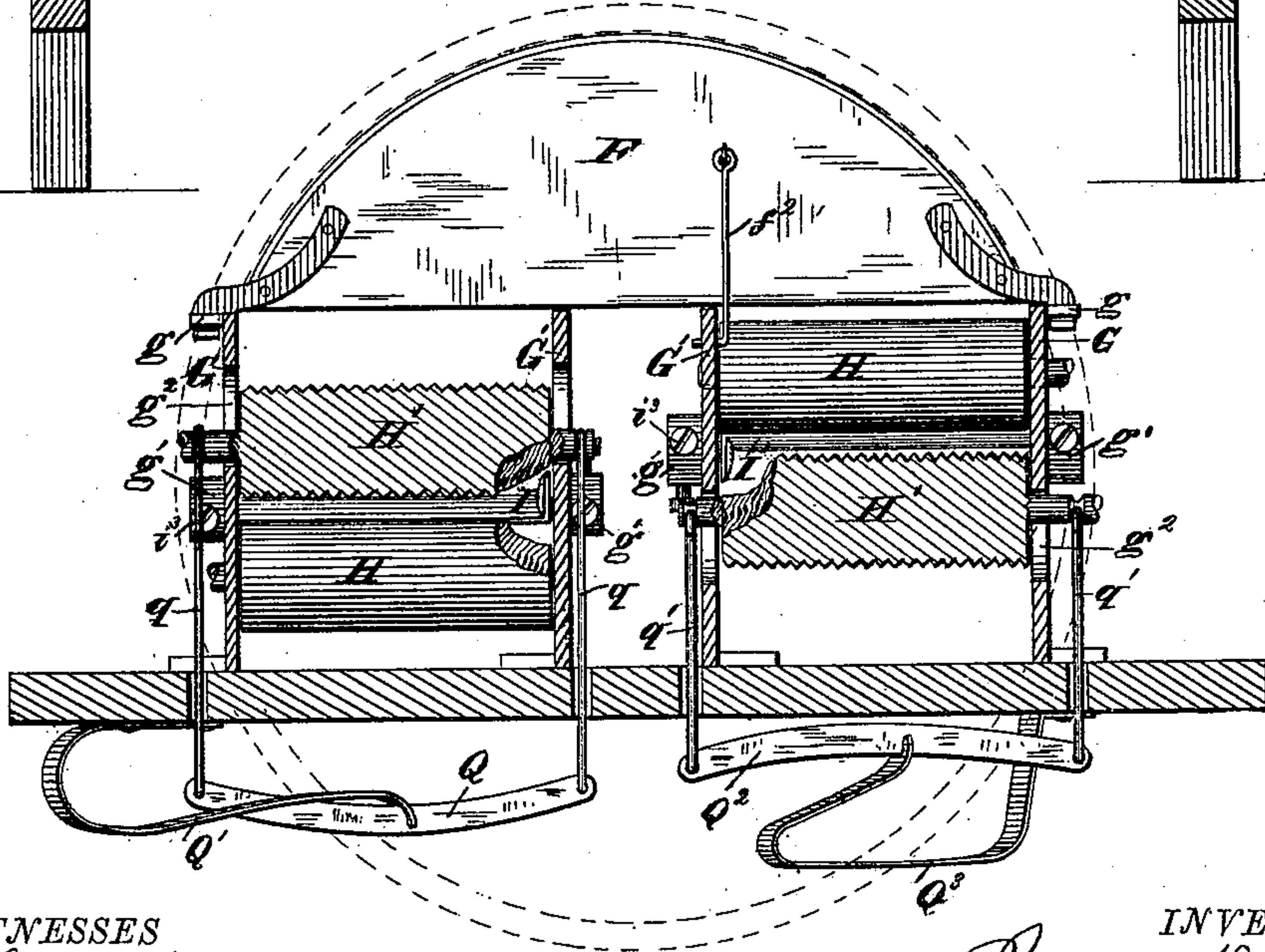


Fig 2.



WITNESSES

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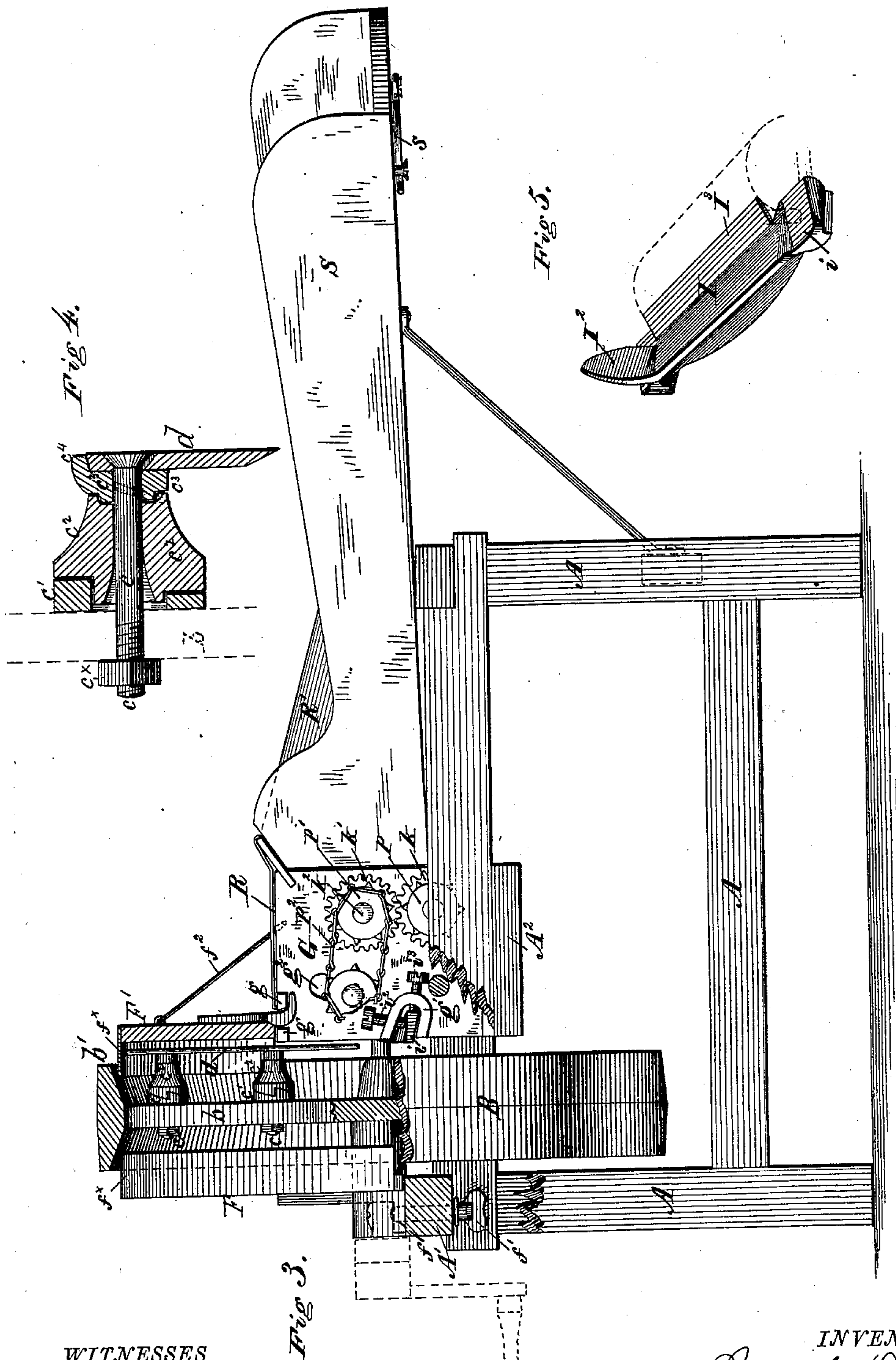
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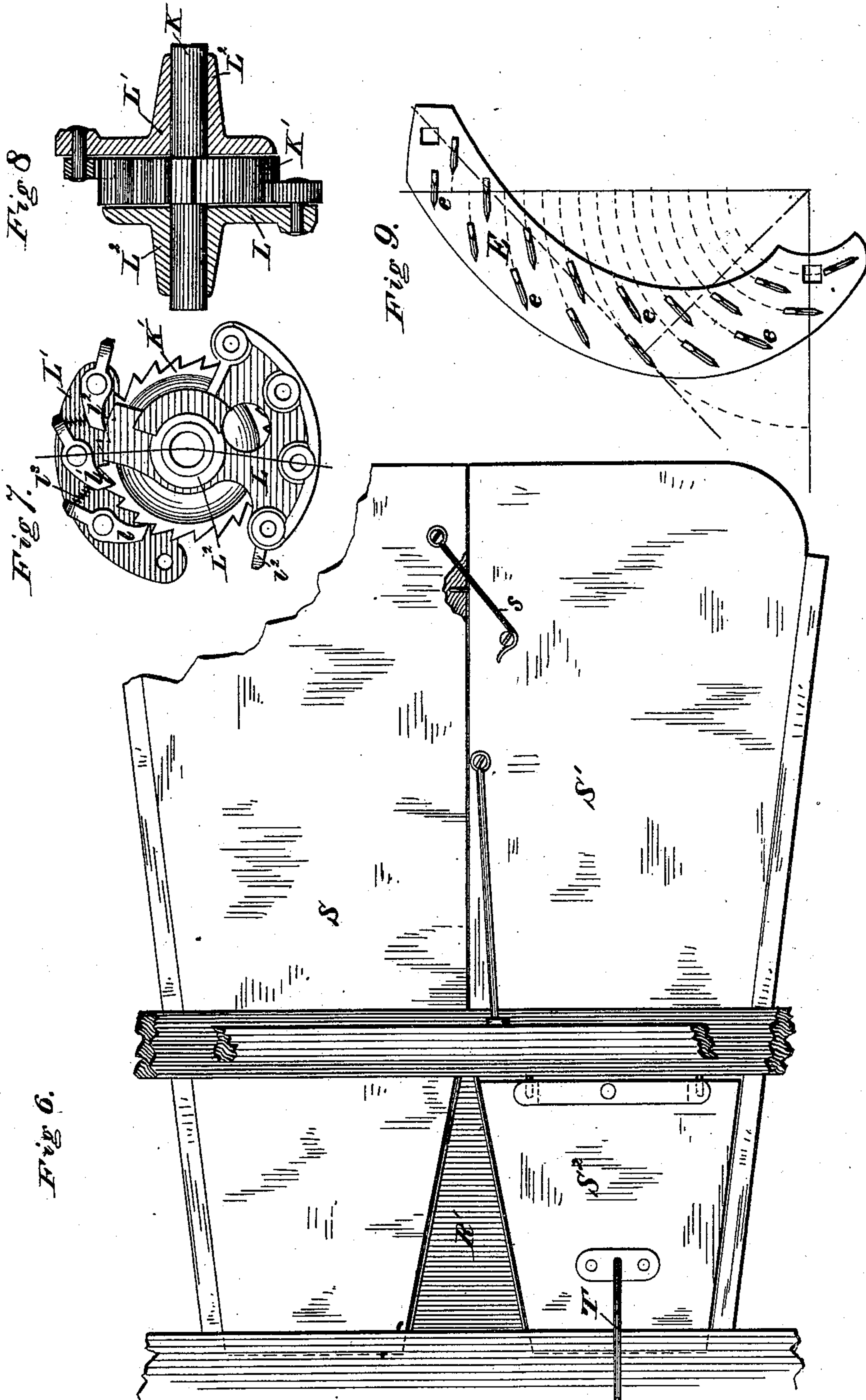
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UNITED STATES PATENT OFFICE.

JOSEPH DICK, JR., OF CANTON, OHIO.

IMPROVEMENT IN STRAW-CUTTERS.

Specification forming part of Letters Patent No. **177,383**, dated May 16, 1876; application filed January 19, 1876.

To all whom it may concern:

Be it known that I, JOSEPH DICK, Jr., of Canton, county of Stark, State of Ohio, have invented certain new and useful Improvements in Cutting-Boxes for cutting hay, straw, and fodder, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 represents a vertical transverse section of my improved machine, taken near the inner end of the feed-boxes, and looking toward the cutting-wheel, with the inclosing-case removed and parts of the machine broken away. Fig. 2 represents a similar section on the feed-rollers, showing the yielding roughened rollers in section and the inclosing-case applied. Fig. 3 is a side elevation, also partly broken away for more clearly showing some of the details of construction and arrangement. Fig. 4 is a section through one of the knife-fastenings, enlarged, showing the means for adjusting the knives. Fig. 5 is a perspective view of one of the stationary cutting-bars detached. Fig. 6 is a bottom view of the cutting or feed boxes. Fig. 7 is a side elevation of the feed ratchet-wheel and pawl-frames. Fig. 8 is a front elevation of the same, partly in section; and Fig. 9 is a front elevation of one of the slitting-knife bars, showing the arrangement of the slitting-knives.

Similar letters of reference denote corresponding parts wherever used.

The invention relates to a construction of hay and straw cutter, principally in parts, adapting the single cutting-wheel and the feed devices for operating in connection with two cutting or feed boxes, and two sets or pairs of intermitting feed-rolls, but embracing other features of construction and arrangement, as hereinafter explained.

In the accompanying drawings, A represents a strong, upright, rectangular frame, of any suitable construction, in bearings upon the upper transverse bars at one end of which the shaft *a* of the cutter-wheel is mounted. The cutter-wheel B has its hub rigidly connected with the shaft, and is provided with curved arms or spokes *b b*, to the outer ends of which the expanded rim *b'*, forming a band-

wheel, is connected. The arms *b b* are perforated to receive bolts *c c*, and upon their inner faces, adjacent to the cutting-boxes, are provided with projecting hubs or annular washers *c¹*, surrounding the bolts *c*, and provided with clutch-faces or a series of inclined planes on the side adjacent to the cutters. The perforation through the hub or washer part *c¹* is enlarged to form a cylindrical socket, in which the stud-journal of a second clutch-faced disk or collar, *c²*, has its support or bearing, the clutch-face on the part *c²* matching that on the hub or washer *c¹*. The outer face or end of the disk or plate is recessed to form a bearing for a cylindrical spur on a flanged plate, *c³*, to the outer face of which one end of the knife *d* is secured by means of the bolt *c* passing through said knife, and through the parts *c¹* *c²* *c³* and arm or spoke *b*, a similar arrangement of parts securing the other end of the knife. The heads of the bolts are countersunk flush with or below the face of the knife, so as not to interfere with its movement in the desired proximity with the stationary cutter. The lip or flange *c⁴* on the part *c³* overhangs the back of the cutter, and prevents the part *c³* from being turned or rotated, and the part *c¹* is formed upon or fastened to the wheel arm or spoke, and the bolt *c*, with the several parts described, being held to said arm by the nut *c^x*, by loosening said nut and partially rotating the disk or collar *c²*, the knife *d*, owing to the clutch-faces or inclined planes intermediate between the parts *c¹* *c²*, can be adjusted to or from the arm *b*, as desired, and again secured by tightening the nut *c^x*. The outer faces of the parts *c³*, to which the knife is attached, are made slightly convex to permit variation in the distance of the two ends of the knife from the wheel-arm, where required. By withdrawing the bolt *c* the knife is disconnected from all its fastening devices, adapting it to be readily ground or sharpened. Two of these knives are employed, attached to opposite radial or curved arms or spokes of the wheel, the cutting-edge of the knives being, by preference, slightly curved, and with the inner end set so as to cut in advance of the outer end.

In front of each of the knives is secured

what I term a "slitting-knife bar," E, attached at its ends to lugs or ears formed on the flanged rim, and on the hub or spokes of the wheel. The inner end of this bar starts out on a line about radial to the wheel, and immediately recedes therefrom in a curved line until it reaches the rim of the wheel in an acute angle thereto on its forward face, its form and relation to the cutting-knife being clearly shown in Fig. 1. The bar E is armed with a number of short knives, *e e*, projecting horizontally from its inner side, arranged in two series, and set at varying angles relatively to each other, but each so placed as to face at right angles a radial line drawn from the cutting-wheel shaft to and touching the forward or cutting edge, as shown by the diagram, Fig. 9.

By this construction and arrangement the slitting-knives *e e* are made to cross the line of the stationary cutting-bar, and to act on the material in rapid succession, no two in the same series acting simultaneously; and being placed in the two series or zigzag and outwardly-receding relation shown and described, each knife is allowed to act and clear itself from the material acted upon before the action of the following knives endangers the clogging of the knives or the wedging of the material between them. The upper portion of the cutting-wheel, with its cutting and slitting knives thus constructed, is incased by flanged side plates F F', the former attached, by an angular strap or foot-piece, *f*, and set-screw *f*¹, to the outer transverse bar A¹ of the main frame, in such manner that it can be readily removed when necessary. The inner cover or inclosing-plate F' is also provided with angular feet or hooks, which enter sockets or between ears *g g*, formed on two of the feed-roll standards G, mounted upon an inner transverse frame-bar, A², the upper portion of said plate being held in place by a hook-brace, *f*², said means of attaching adapting the cover to be readily removed for giving access to the knives or other parts. The cover-plates F' F' have rims *f*^x upon their outer curved faces, which match within the rim or flange of the cutter-wheel B, (see Fig. 3,) leaving said wheel free to serve as the band-wheel, as explained.

The standards G G'—four in number—form the supports for the two sets or pairs of feed-rolls H H' and their driving sprockets or wheels, and also for the stationary bars I I'. For this latter purpose the standards G G' are notched or recessed on their faces adjacent to the cutter-wheel, a horizontal flange or lip, *g*¹, projecting from each of the standards or plates G G' around said notches, and forming sockets for the reception of the ends of the knife-bars I I', said ends being made in wedge form, or inclining downward toward the wheel on their upper faces, as shown at *i*, Figs. 3 and 5.

The curved flange or lip *g*¹ has set-screws *i*² *i*³ passing through it, the former resting upon the inclined upper face of the inclined end *i*, and effectually preventing any accidental out-

ward movement of the knife-bars I I', and the latter, *i*³, resting against the rear face of said ends *i*¹, and serving to force the knife-bars outward when necessary, the screws *i*² having been first backed to permit such adjustment. By this arrangement the knife-bars can be adjusted with great precision, and as required.

The bars I I' have each a curved guard, I², formed upon its inner end, which projects toward the advancing knives, and serves, in the event of the latter becoming accidentally loose or displaced, to insure their proper presentation to the stationary cutting-bars I I'. The rear or outer faces of these knife-bars have their plates I³ attached, which overhang the smooth feed-rolls H, and serve to strip said roller and prevent the advancing material to be acted upon from adhering thereto. Ordinarily these stripping-plates are made of sheet or thin plate metal, which, being cut into the desired form and placed in the mold, have the bars I I' cast upon them; but they may be otherwise connected with said bars, if preferred.

The standard-plates are perforated to form bearings for the shafts of the smooth rolls H, and of their driving shaft or shafts K, the latter extending through from side to side of the machine. (See Fig. 1.) Upon this shaft K, midway of its length, and between the inner standards G' G', is keyed a ratchet-wheel or barrel, K'. (See Figs. 1 and 8.) At the sides of this ratchet-wheel frames L L' are mounted loosely on the shaft by means of sleeves L²; and said frames, made in quadrant or fan shape, are armed on their adjacent faces each with a series of pawls, *i* *i*¹ *i*², which overhang the ends of the ratchet-wheel, and are held engaged therewith by suitable springs *l*³.

The pawl-frames are connected, by links *l*^x *l*^x, with a rocking lever, *m*, pivoted centrally upon the bar A², the links being connected with the opposite arms of said lever at points about equidistant from its pivotal center. One arm of this rocking lever is extended, and provided with a series of perforations, in any one of which one end of a pitman, *n*, may be inserted, the other end of said pitman being connected with a small crank-wheel, *n*¹, on the inner or forward end of the cutter-wheel shaft.

The crank-wheel may have two or more perforations or points of attachment of the rod *n*, and these, as also the perforations in the lever *m*, enable the attendant to adjust the throw of the lever, and, through said lever and its connections, of the pawl-frames L L', for regulating the feed. By this arrangement, as the cutter-wheel shaft is rotated, the pawl-frames L L' are vibrated alternately in opposite directions, and the two sets of spring-pawls *l* *l*¹ *l*², acting alternately on the ratchet-wheel, impart an intermitting rotary movement thereto.

Outside the standards G spur-wheels *k* are secured to the shaft K, which engage with

and drive similar wheels k^1 , mounted on stud-shafts k^2 , attached to said standards G above the shaft K . To the outer faces of the pinions k^1 , or to pinion k^1 , and to shaft K at each end, sprocket-wheels p p^1 are connected, from which the intermitting motion received by them is imparted to the feed-rolls. The shafts of the roughened feed-rolls have their bearings in slots g^2 in the standards—the one slot, where the roughened roller is above the smooth one, being formed in the arc of a circle, of which the stud-shaft k^2 is the center, and the other with the shaft K as a center. By this arrangement the roughened or corrugated roller is permitted to move toward or away from the smooth roller without disturbing the working relation of the driving-chain p^2 , or gear connecting its sprocket-wheel or pinion with the sprocket-wheel or pinion which drives it.

The outer ends of the shafts of the smooth rollers are connected, in like manner, by sprocket-wheels and chain or gearing, with the shaft K or pinion k^1 , and, like said shaft and pinions, the feed-rolls have intermitting rotary motion in reverse directions imparted to them for feeding the straw between them to the cutter. The shafts of the yielding feed-rollers have connected with them, near their ends, pendent links q q' , which, at their lower ends, are connected to the ends of two horizontal bars, Q Q^2 , one of which, Q , is pressed downward by a spring, Q^1 , for holding its roller down to its work, and the other, Q^2 , where the cutting is performed by the upstroke of the rotating knives, is pressed upward by a spring, Q^3 , for holding its roller up to its work. By this arrangement either end of the roller may yield freely independently of the other; and, by the double arrangement of feed-rolls and stationary cutting-knives shown and described, it will be seen that the rotating knives are adapted to act twice in each revolution—one in rising, and again in descending—and upon opposite sides of the cutter-wheel shaft, the two sets of devices for this purpose being separated by the central standards G' G' , between which the feed-ratchet and pawls are placed, as described.

The standards G' G' and the space between them are covered by a plate, R , for protecting the feed devices, and from the forward ends of these standards a triangular covered box, R' , extends forward, and forms the converging inner sides of the inner ends of the two feed boxes or troughs S S^1 . Of these boxes, one, S^1 , with the exception of a portion, S^2 , of the bottom, at its forward end, is bolted or otherwise rigidly connected with the main frame A , and the other, S , having its smaller discharging end fitted between its pair of standards G' G' , has its opposite end connected with the frame or fixed box by a hook, s , (see Figs. 3 and 6,) or other suitable fastening, adapting it to be readily removed and replaced for affording access to the working parts of the machine, or for other purpose.

The portion S^2 of the box S^1 is hinged or pivoted at its forward end to the box or frame, and has its free end upheld by a pendent rod, T , the lower angular end of which rests upon or is connected with the bar Q^2 , which is upheld by the spring Q^3 , as hereinbefore explained, in such manner that as the roller H' , upheld by said spring, yields to the varying bulk of material passing between the rollers, the flooring of the feed-box is permitted to yield with it, and thus maintain its relation to the yielding roller. The inner ends of the boxes S S^1 are covered by inclined deflecting-boards U U' , which serve to compress the materials operated upon, and to direct them properly to the feed-rollers.

The pawls on the pawl-frames L L^1 , as will be seen in Fig. 7, are so spaced relatively to each other, and to the teeth of the ratchet-wheel upon which they operate, as to divide the length of a tooth into as many parts as there are pawls in each set or series. By this arrangement one or another of said pawls will be always in position to engage instantly with the ratchet-wheel whenever the pawl-frame begins its operative stroke, thereby avoiding waste of motion.

The cutter-wheel shaft is provided with a removable crank, (indicated by dotted lines, Fig. 3,) adapting it to be operated by hand when desired; and, whether the machine is operated by hand or otherwise, only one feed-box need be used where but one is required, and in such case, if desired, the other set of feed-rolls can be disconnected from their driving devices, thereby avoiding the expenditure of unnecessary power.

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

1. in combination with the two feed-boxes and the two sets of feed-rollers, the intermediate ratchet-wheel K and pawl-frames L L^1 , arranged and operating substantially as described, for imparting an intermitting feed to the feed-rollers, as set forth.

2. The pawl-frames L L^1 , provided each with the pivoted pawls l l^1 , and arranged to operate alternately on the intermediate ratchet-wheel or barrel K' , substantially as and for the purpose set forth.

3. The feed-boxes S S^1 , the one, S , rigidly connected with the frame, and the other connected with said fixed box s , and made removable, as described.

4. The driving cutter-wheel B , constructed and operating substantially as described, in combination with the flanged incasing-plates F F' , applied substantially as described.

5. The combination, with the rotating cutter-wheel B and cutting-knives d , of the cam-faced hub c^1 and rotating cam-faced adjusting-disk c^2 , applied and operating substantially as described.

6. The curved slitting-knife bars E , provided with the slitting-knives e e , arranged in the described receding relation to each other,

and at right angles to radial lines intersecting them, substantially as and for the purpose set forth.

7. The stationary knife-bars I I¹, provided with the guards I² and stripping-plates I³, in combination with the adjusting-screws i² i³, arranged and operating as described.

In testimony whereof I have hereunto set my hand this 4th day of December, A. D. 1875.

JOSEPH DICK, JR.

Witnesses:

J. N. KINNEY,
A. D. MILLER.