

No. 632,789.

**Patented Sept. 12, 1899.**

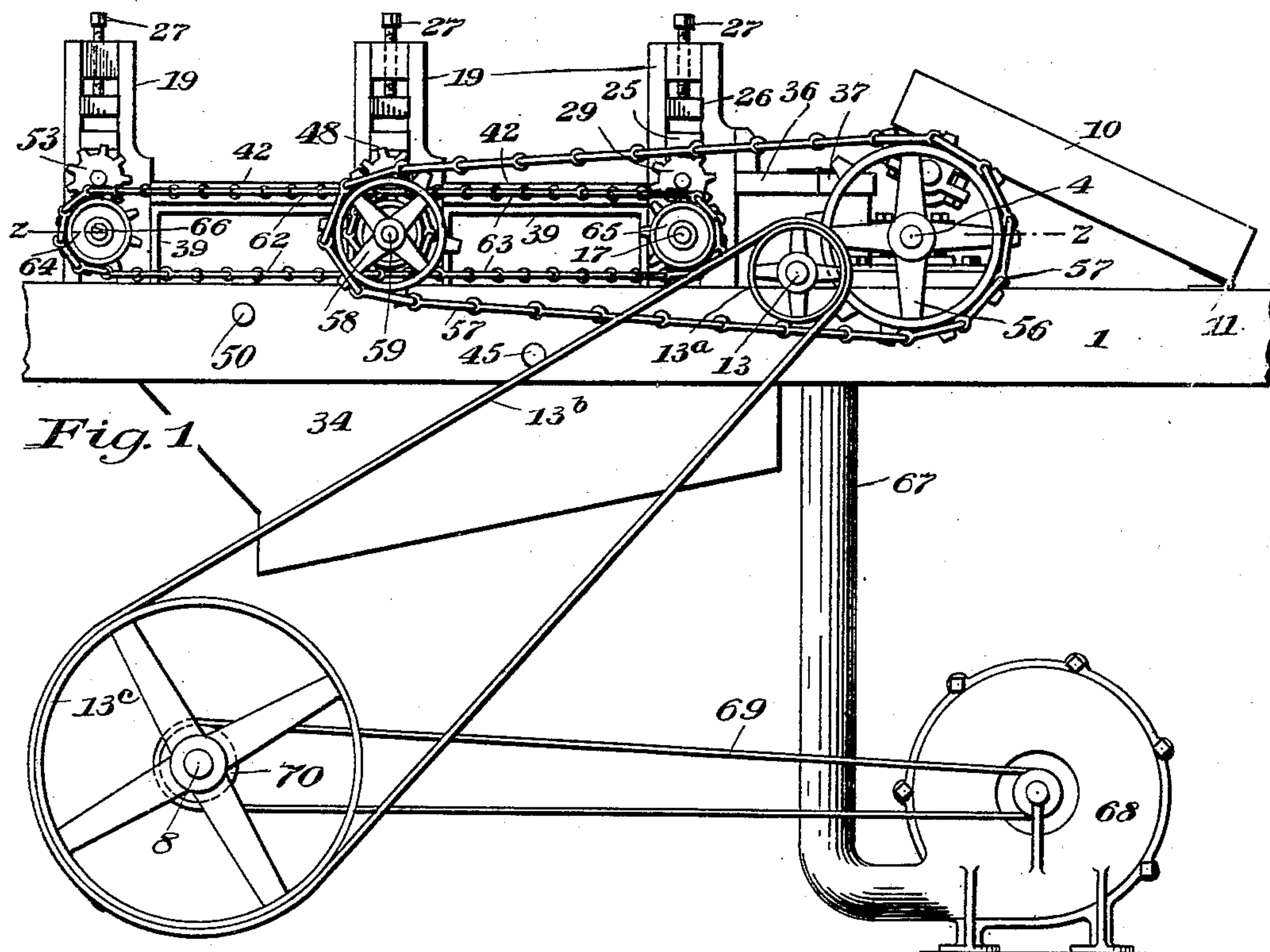
**N. T. REMY.**

# APPARATUS FOR REMOVING PITH FROM STALKS OF PLANTS.

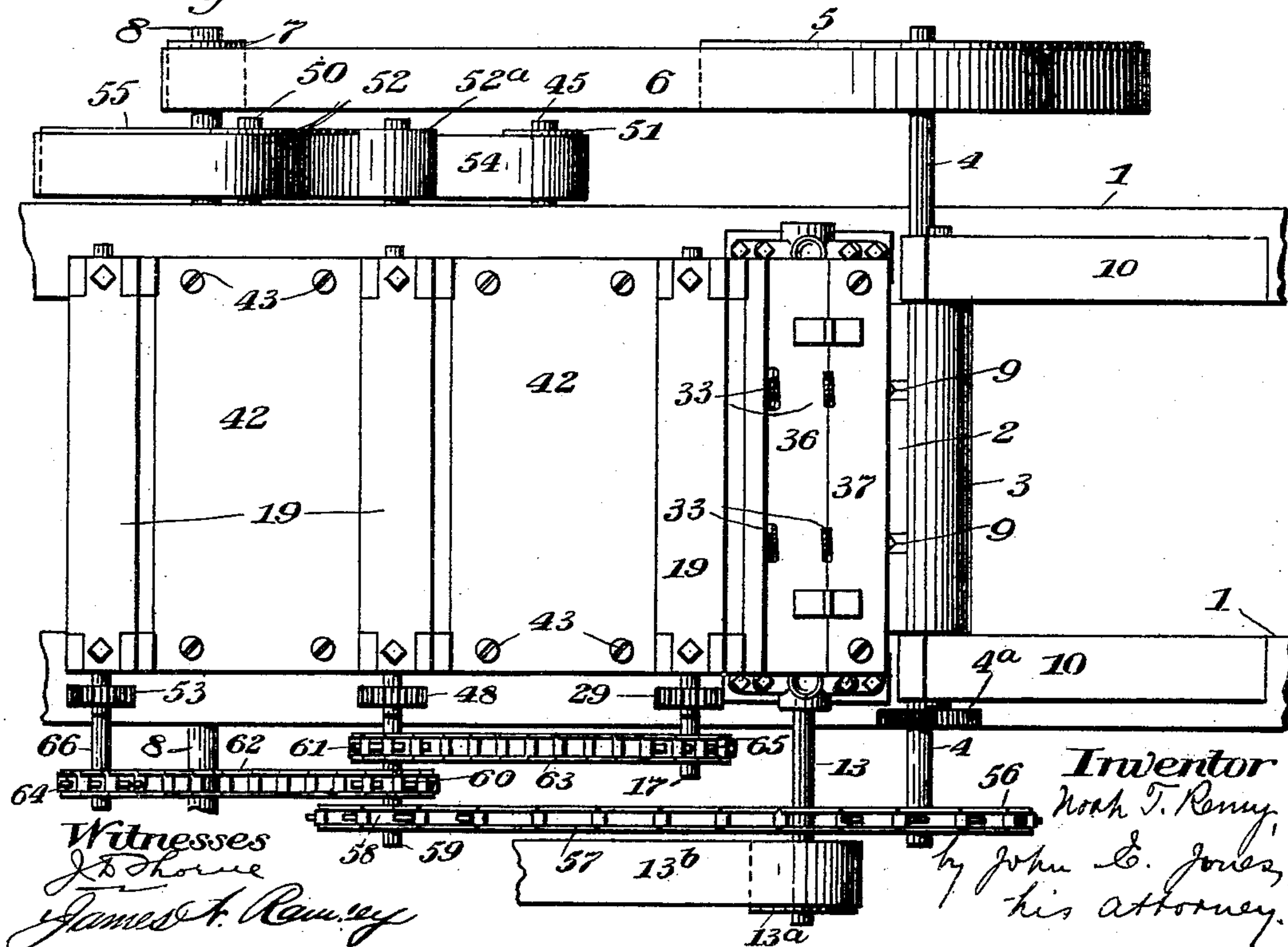
(Application filed Oct. 17, 1898.)

3 Sheets—Sheet 1.

(No Model.)



*Fig. 2*



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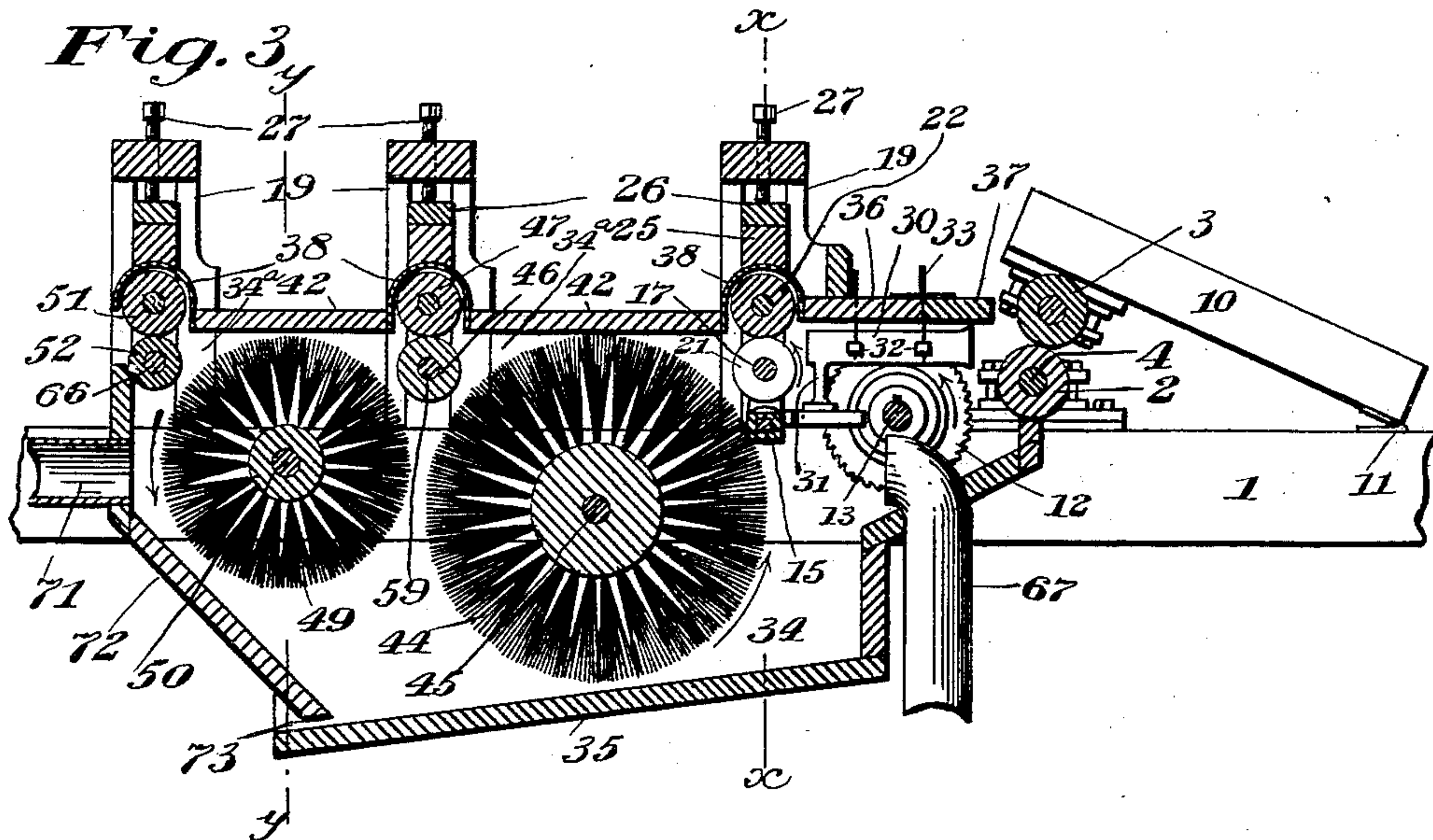
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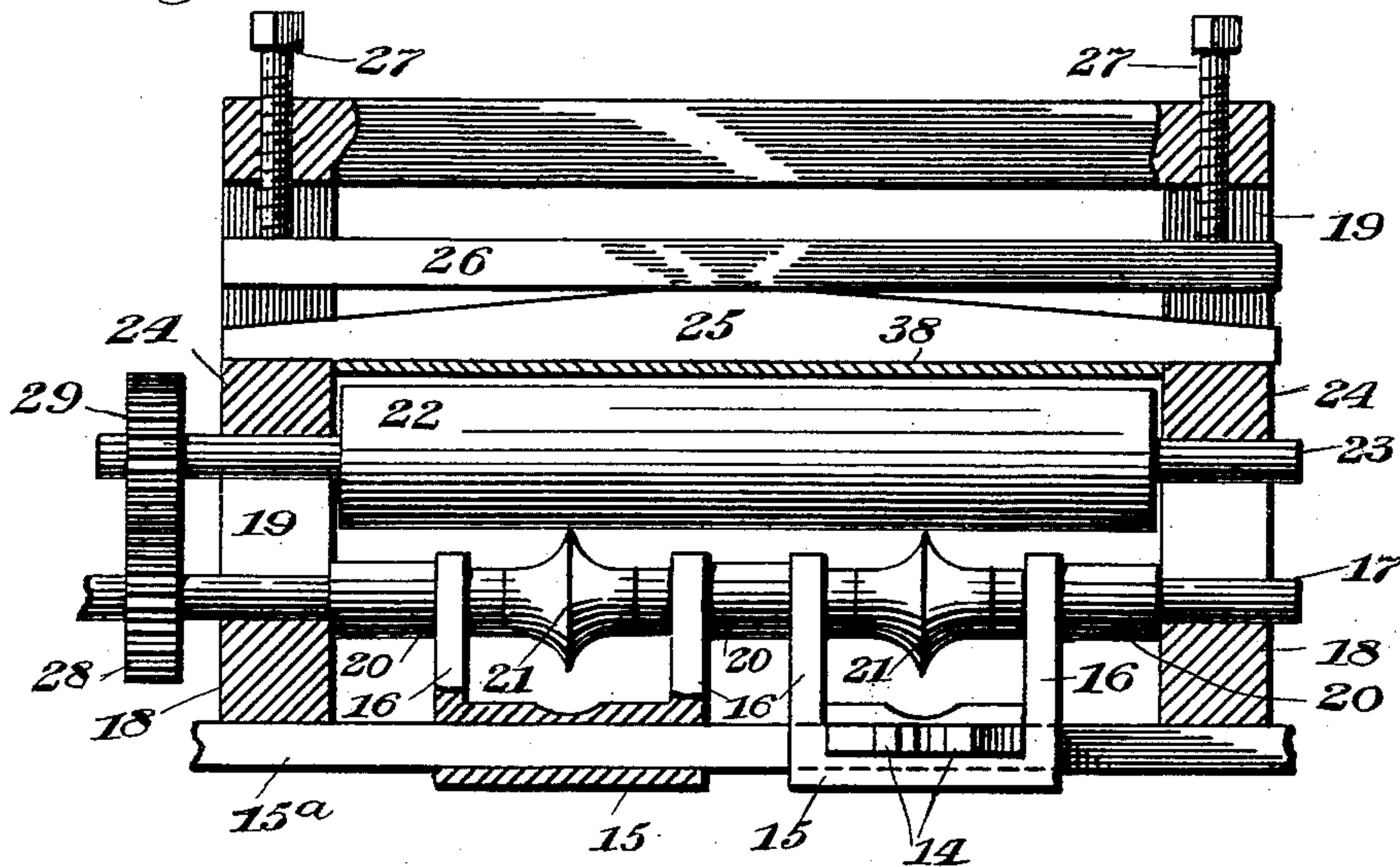
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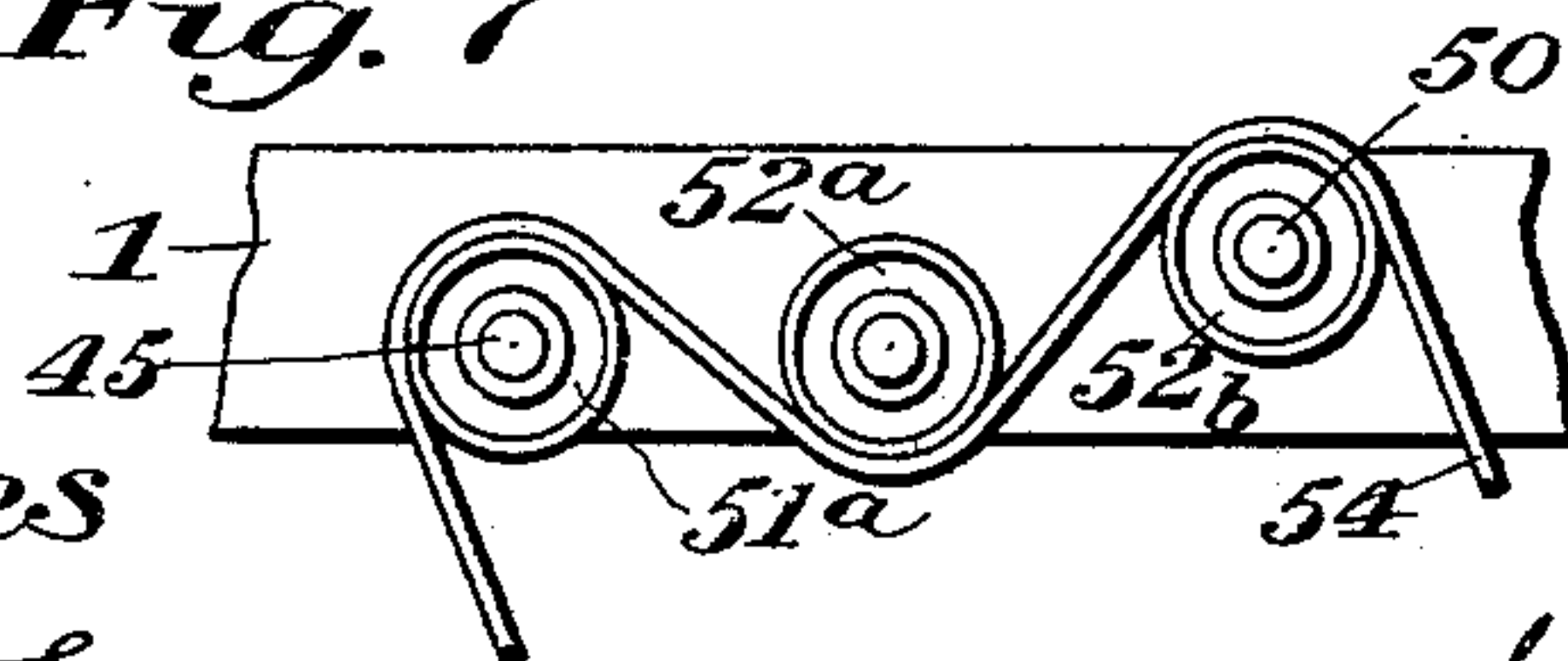
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*Fig. 4*



*Fig. 7*



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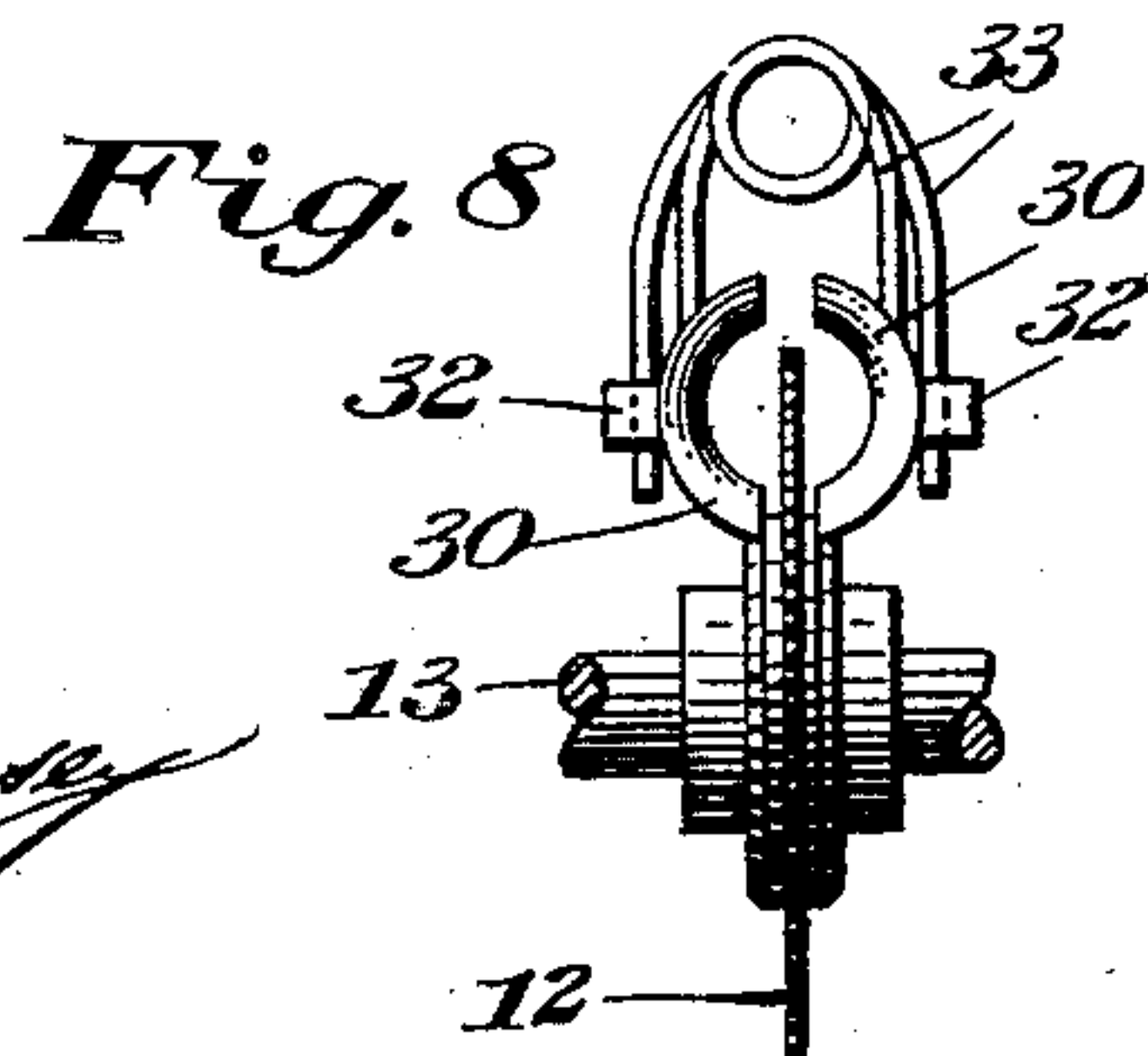
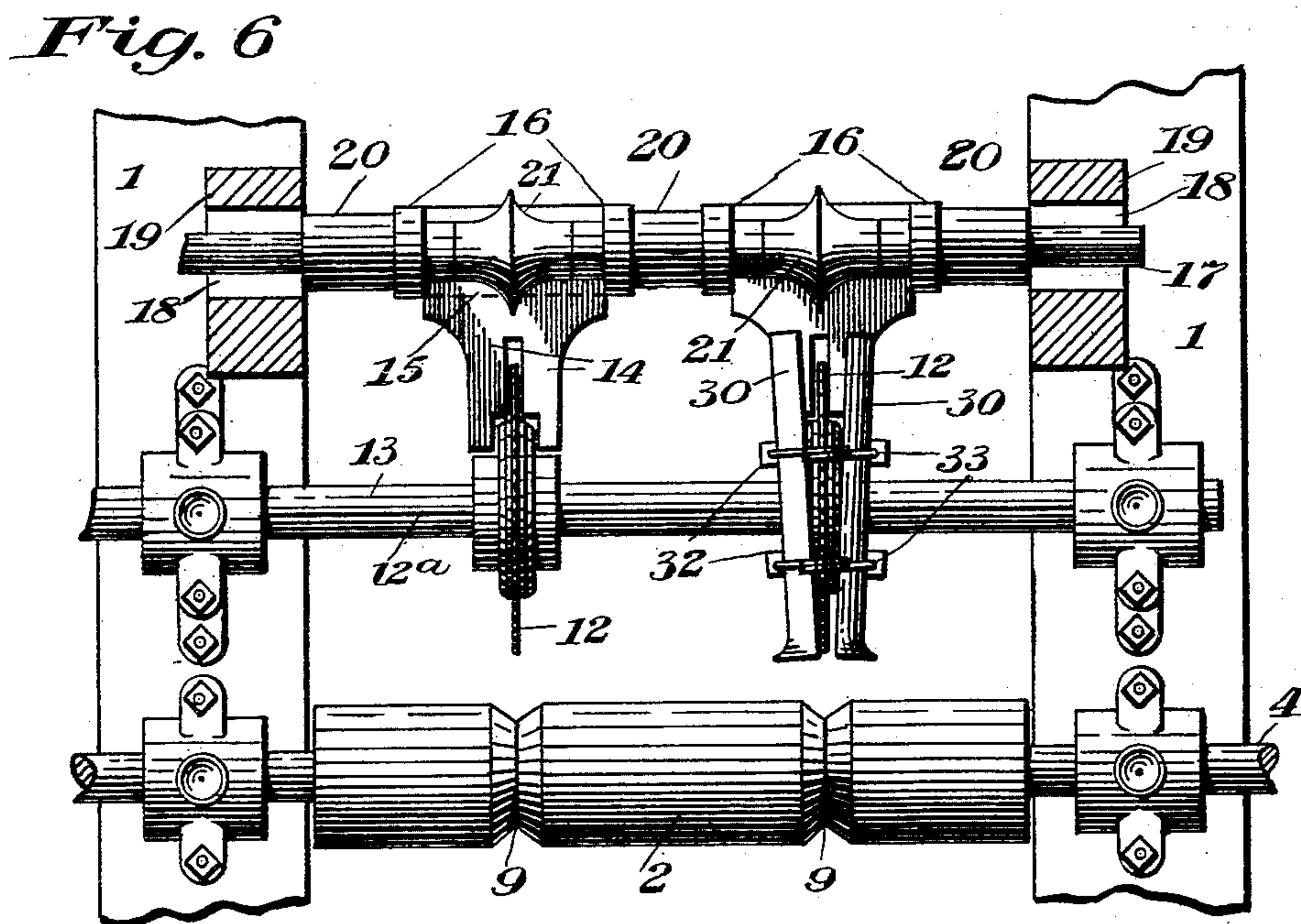
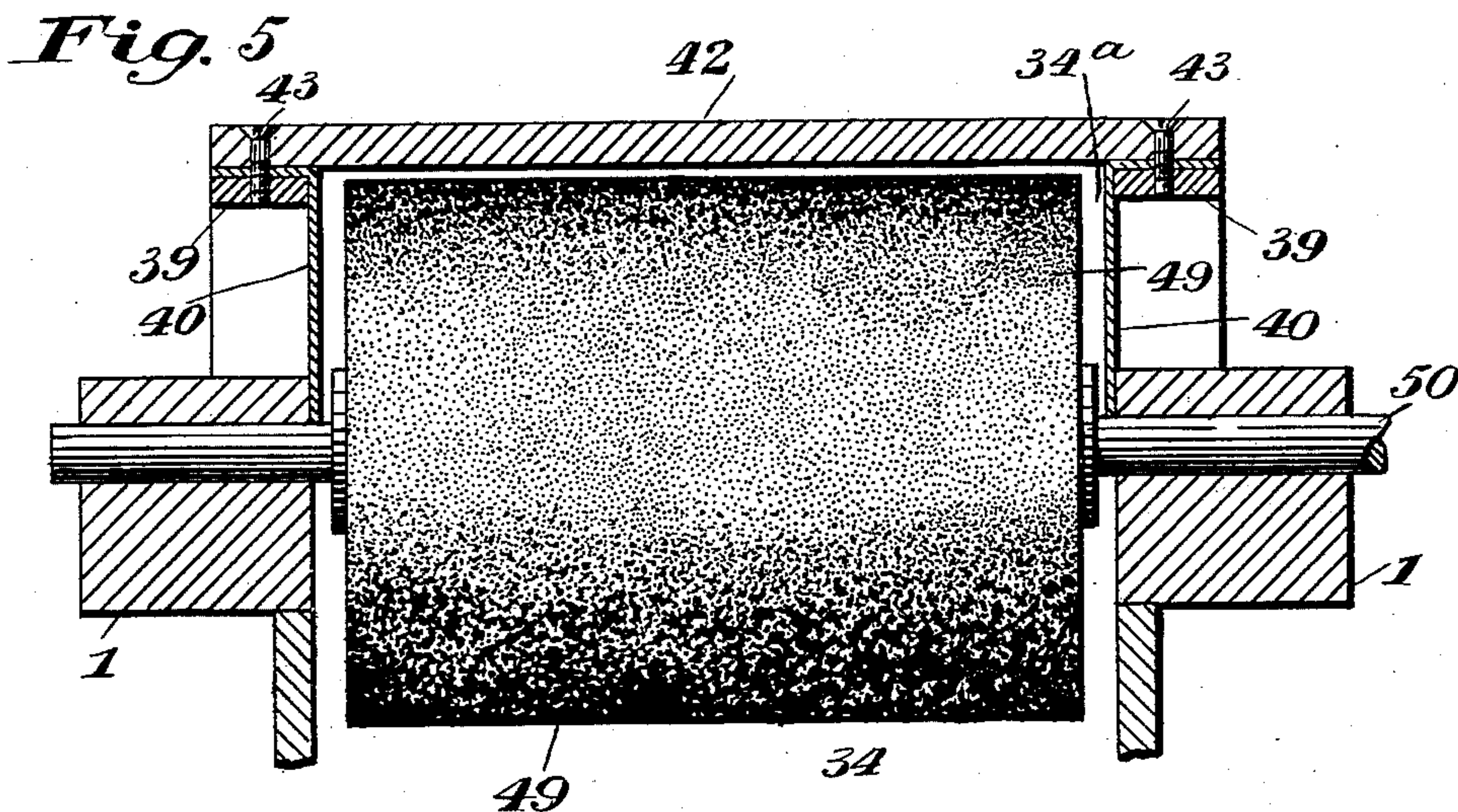
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(No Model.)

3 Sheets—Sheet 3.



Witnesses  
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# UNITED STATES PATENT OFFICE.

NOAH T. REMY, OF OLNEY, ILLINOIS, ASSIGNOR TO THE REMY-MCLEAN CELLULOSE CO., OF SAME PLACE.

## APPARATUS FOR REMOVING PITH FROM STALKS OF PLANTS.

SPECIFICATION forming part of Letters Patent No. 632,789, dated September 12, 1899.

Application filed October 17, 1898. Serial No. 693,752. (No model.)

*To all whom it may concern:*

Be it known that I, NOAH T. REMY, a citizen of the United States, residing at Olney, in the county of Richland and State of Illinois, have invented certain new and useful Improvements in Apparatus for Removing the Pith from the Stalks of Plants; and I do 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 the figures of reference marked thereon, which form a part of this specification—

This invention relates to certain improvements in apparatus for removing the pith from the stalks of plants; and the object of the invention is to provide an apparatus or machine for this purpose which shall be simple and inexpensive in construction and adapted for use in removing and separating the pithy matter from the shell-like portions of the stalks at a single and continuous operation.

The invention consists in certain novel features of the construction, combination, and arrangement of these several parts of the improved apparatus or machine whereby certain important advantages are attained and the apparatus is made simpler, cheaper, and otherwise better adapted and more convenient for use than various other similar devices heretofore employed, all as will be hereinafter fully set forth.

The novel features of the invention will be carefully defined in the claims.

In the accompanying drawings, which serve to illustrate my invention, Figure 1 is a fragmentary side elevation of an apparatus or machine embodying my improvements, and Fig. 2 is a plan view of the same. Fig. 3 is a longitudinal section taken vertically through the upper or main part of the apparatus or machine. Fig. 4 is a transverse section drawn to an enlarged scale and taken through the upper part of the apparatus in the plane indicated by the line  $xx$  in Fig. 3. Fig. 5 is an enlarged section taken transversely through the upper part of the apparatus in the plane indicated by the line  $yy$  in Fig. 3. Fig. 6 is an enlarged partial sectional plan view taken

through the forward part of the machine or apparatus in the plane indicated by line  $zz$  in Fig. 1. Fig. 7 is a fragmentary side view showing a detail of the driving mechanism of the pith-removing devices. Fig. 8 is an enlarged fragmentary front elevation showing the saw or cutter and the guide-plates at the sides of the same.

In the views 1 indicates the frame or table of the apparatus or machine, said frame or table being of any preferred form and carrying at its forward part feed-rolls 2 and 3, between which the stalks to be operated upon are introduced into the apparatus. The lower roll 2 is carried on a shaft 4, journaled transversely of the frame and carrying at its end a pulley 5, over which is passed a belt 6, which is carried down and around a pulley 7, fixed on a driving-shaft 8, mounted in bearings beneath the table or frame 1. The rolls 2 and 3 are connected to move in unison, so as to positively feed the stalks, by means of spur-gears 4<sup>a</sup> on their shafts, and said rolls are by preference covered over or surfaced with rubber, felt, or the like in order to enable them to more firmly grip the stalks fed into the apparatus, and the lower roll 2 is by preference grooved circumferentially, as seen at 9, to form channels to guide the attendant in feeding the stalks to the apparatus. The upper roll 3 is carried on a shaft, the ends of which are secured to weighted arms 10 10, hinged, as seen at 11, to the sides of the frame or table 1, so as to permit of being raised or swung pivotally to lift the roll 3 from off the lower roll 2 to afford access to the machine when desired for purposes of repair or cleaning. The pivoted arms also permit the upper roll 3 to adjust itself to inequalities or bends in the stalks.

12 12 indicate circular saws or cutters aligned with the guide-grooves 9 of the lower feed-roll 2, said saws or cutters being mounted on a shaft 13, journaled transversely across the frame behind the shaft 4 of roll 2. The saws or cutters are adapted to engage the under sides of the stalks fed into the apparatus between the feed-rolls, so as to slit or cut said stalks longitudinally. The saws or cutters are formed with toothed or serrated periph-



eral cutting-surfaces to enable them to readily cut through the hard shells of the stalks fed through the machine. The dimensions and arrangement of the parts are such that  
 5 the saws do not cut the stalks entirely in two, but only slit them by means of a cut passing through one side of the shell and through the pithy matter within, but not passing through the shell at the opposite side of the stalk.  
 10 The saw-shaft 13 carries at one end a pulley 13<sup>a</sup>, over which is passed a belt 13<sup>b</sup>, which is carried down and around a pulley 13<sup>c</sup> on the driving-shaft 8, the direction of the movement imparted in this way to said shaft 13  
 15 being the same as that imparted to the feed-rolls, so that the cutters themselves aid in drawing the stalks through the rolls into the machine or apparatus.

The shaft 13 is provided with a longitudinal feather 12<sup>a</sup>, with which the respective saws or cutters 12 are engaged, so that said cutters are held to turn with the shaft 13 while being adapted for movement lengthwise along the same. The saws or cutters are held against  
 25 movement lengthwise of the shaft 13 by means of fingers or arms 14, arranged in pairs, as clearly shown in Figs. 4 and 6, and projecting forwardly from yokes 15, also mounted for sliding movement on a bar 15<sup>a</sup> of rectangular cross-section arranged transversely of  
 30 the frame 1 to the rear of the saw-shaft 13. Each of the yokes 15 is provided with up-turned lugs or arms 16 at its ends, through perforations in which is passed a shaft 17, extending transversely of the frame, being  
 35 mounted at its ends on blocks 18, arranged in slotted guides 19, which extend vertically up from the frame 1 at each side thereof.

Collars 20 are arranged on the shaft 17 between the arms 16 at the adjacent ends of the  
 40 yokes 15 and also between the arms 16 at the outer ends of said yokes and the bearing-blocks 18, said collars serving to hold the yokes securely in place against movement transversely of the frame on the rod or bar  
 45 15<sup>a</sup> and at the same time to hold the saws or cutters against movement lengthwise along the shaft 13 owing to the engagement of the arms or fingers 14 with said saws or cutters.  
 50 Spreaders 21 are secured upon the shaft 17, preferably by means of a feather, and are held against movement endwise along the shaft by means of the arms 16 of the respective yokes 15, between which arms they are  
 55 arranged. The spreaders 21 are each formed with a projecting circumferential rib or fin, on each side of which is formed a curved and tapered surface, as clearly shown in Figs. 4 and 6, the central ribs or fins being each  
 60 aligned with one of the saws or cutters 12 in a direction lengthwise of the machine or apparatus and serving to enter the cut or slit formed by said saw or cutter in the stalk, while the curved and tapered surfaces by engagement with the portions of the stalk at  
 65 the sides of the slit or cut serve to press or force such portions apart, so as to spread out

the split or slitted stalk and expose the pithy interior thereof to the devices, which will be referred to hereinafter, for removing the pith. 70

As herein shown, the machine or apparatus is provided with but two sets of aligned spreaders and cutters; but it is evident from the construction above described that any number of cutters or saws may be held on  
 75 the saw-shaft 13, an equal number of spreaders being held on the shaft 17 between the arms 16 of the yokes 15, of which a similar number will be provided on the bar or rod 15<sup>a</sup>, the arms 14 of said yokes also serving to  
 80 hold the saws or cutters in place on the saw-shaft. The spacing of the sets of cutters and spreaders may also be varied by using collars 20 of different sizes, or said collars may, if desired, be altogether dispensed with. 85

Over the spreader-shaft 17 is arranged a pressure-roll 22, preferably faced or covered with rubber, felt, or the like and adapted to bear upon the stalks passing through the machine or apparatus, so as to force or press  
 90 said stalks down into close engagement with the spreaders 21. The roll 22 is mounted on a shaft 23, the ends of which are held under bearing-blocks 24, arranged in the slotted guides 19 beneath cross-bars 25 and 26, screws  
 95 27 being provided at the upper ends of said guides for pressing said cross-bars downward. The cross-bars will be made of some elastic material, so that a yielding downward pressure will be given to the pressure-  
 100 roll 22 to cause it to grip the stalks and assist in drawing them through the apparatus. The shafts 17 and 23 are connected to turn in unison by means of gear-wheels 28 and 29, fixed on them, so that the roll 22, and the  
 105 spreaders as well, act as a positive feed for the stalks.

In order to guide the stalks onto the cutters or saws 12 and also to hold said stalks against lateral movement while being slitted  
 110 and acted upon by the spreaders, I provide guide-plates 30, arranged in pairs at opposite sides of each of the saws or cutters, being held on arms 31, extending down from their  
 115 rear ends and secured to the respective arms or fingers 14, by means of which the saws or cutters are held in position. The guide-plates also act to prevent the saws or cutters from cutting entirely through the stalks and also serve to hold the stalks in proper verti-  
 120 cal position while being slitted. They are so adjusted, as shown in Fig. 8, as to form at their upper parts a passage or way into which the cutter or saw does not extend, so that the stalks moving through the said passage  
 125 or way will not be cut through entirely. The guide-plates 30 are curved in cross-section and have their concave faces adjacent their free forward ends, which are arranged in advance of the cutters and in position to receive  
 130 the stalks from the guide-grooves 9 of roll 2, being bent or expanded to form an enlarged mouth, as clearly shown in Figs. 6 and 8. The guide-plates 30 are provided with lugs or



ears 32 at their front ends, and said lugs or ears are perforated to receive the lower ends of spring-wires 33, serving to hold the forward ends of the plates pressed elastically toward each other.

34 indicates a closed chamber formed at the upper part of the frame 1, in the forward part of which chamber the saws or cutters 12 and the spreaders 21 are located, the chamber being provided with an inclined bottom 35, sloping toward the rear end of the apparatus, and having a cover-plate 36, located over the saw-shaft and provided with openings through which the upper ends of the spring-wires 33 project. The said cover-plate is provided with a hinged front portion 37, held in closed position by screws of the like, but capable of being raised to afford access to the front part of the chamber 34 for purposes of repair or cleaning. A curved metal plate 38 extends over the pressure-roll 22, being secured to the under side of the cross-bar 25, as shown in Figs. 3 and 4.

Behind the roll 22 are formed two brush-compartments 34<sup>a</sup> at the top of the chamber 34, with which they communicate at their lower parts. Braces 39, formed of bent metal strips, are arranged at each side of each compartment, as shown in Figs. 1 and 5, and the sides of the compartments are closed by metal plates 40, flanged to fit over the tops of said braces. The tops of the compartments are closed by cover-plates 42, held in place by screws 43, which pass through the flanges of the plates 40 and screw into the braces 39, as clearly shown in Fig. 5. By this construction the sides and tops of the compartments may be conveniently removed to afford access to the brushes arranged therein.

44 indicates the brush in the forward compartment 34<sup>a</sup>, this brush being held on a shaft 45, extending transversely across the frame. The brush 44 is arranged to bear under the stalks passing through the apparatus, and being located immediately behind the spreaders 21 it is obvious that the wires of which the brush-surface is preferably formed will enter the opening formed by the spreaders in the lower faces of the stalks and will operate to remove the pithy matter from within the stalks and to carry such pithy matter down out of the brush-compartment and into the chamber 34 beneath. The cover-plate 42 is arranged but slightly above the brush 44, so that the stalks passed through the apparatus are pressed by the brush up in a flattened form against the under side of said cover-plate and are prevented thereby from being forced up out of engagement with the brush.

Between the compartments 34<sup>a</sup> is arranged a set of guide-rolls 46 and 47, which by engagement with the stalks passing between them serve to draw the same over the brush 44 and to assist in feeding said stalks through the apparatus. The upper roll 47 is pressed elastically downward by means similar to

that employed in connection with the pressure-roll 22, and the shafts on which the rolls are carried are geared to turn in unison by means of gear-wheels 48.

49 indicates the brush arranged in the rear brush-compartment 34<sup>a</sup>, said brush being of less diameter than the forward brush 44 and being held on a shaft 50, extending transversely across the frame, as clearly shown in Fig. 5. At the rear of this compartment are arranged guide-rolls 51 and 52, constructed and operating similarly to the rolls 46 and 47 to draw the stalks through the apparatus and over the brush 49. The stalks on passing through the rolls 51 and 52 are discharged from the machine, and the top or cover plate 42 of the rear brush-compartment serves to keep the flattened stalks pressed down in engagement with the brush 49. The shafts of the rolls 51 and 52 are geared to turn in unison by means of spur-gears 53.

The brushes 44 and 49 are driven in the same direction by means of a belt 54, which extends down around a pulley 55 on the driving-shaft 8 and has its upper end carried over pulleys 51<sup>a</sup> and 52<sup>b</sup> on the ends of the respective brush-shafts 45 and 50 and under an idler-pulley 52<sup>a</sup> on the side of the frame, as shown in Figs. 2 and 7. The shafts 45 and 50 are thus driven from shaft 8 at a uniform speed; but as the brush 44 is greater in diameter than the brush 49 it is evident that its brush-surface will travel in engagement with the stalks at greater speed than the surface of the brush 49 travels in such engagement. This difference in speed is advantageous, since the brush 44, which acts first upon the stalks, is compelled to do heavier service than the brush 49.

In order to actuate the series of guide-rolls 46, 47, 51, and 52, together with the spreaders 21 and the pressure-roll 22, over the same at a uniform speed, so that the stalks shall be properly drawn through the apparatus, I preferably drive said rolls and spreaders from the shaft 4 of the feed-roll 2 by means of the gearing shown in Figs. 1 and 2. As shown in these views, the gearing comprises a chain-wheel 56 on shaft 4 and a chain 57, passed over the same and also passed around a chain-wheel 58 on the shaft 59 of the roll 46. On the shaft 59 are secured chain-wheels 60 and 61, over which pass chains 62 and 63, leading, respectively, over chain-wheels 64 and 65 on the shafts 66 and 17 of the roll 52 and of the spreaders 21. By this arrangement of gearing the several moving parts are driven at the same speed and in the same direction. It will also be seen that the saws or cutters 12 and the brushes 44 and 49 are also driven in the same direction as the spreaders and rolls above referred to, so that these parts also materially assist in drawing the stalks through the apparatus.

In order to withdraw the pithy matter when removed from the stalks from the chamber 34, into which it is deposited by the brushes 44



and 49, I resort to the employment of an air-current arranged to enter said chamber at the forward end thereof through an air-pipe 67, leading from a fan or blower 68 beneath the frame 1 and driven by means of a belt 69 from a pulley 70 on the driving-shaft 8. By means of the air-current the pithy matter is blown rearwardly through the chamber to the back part thereof, where it escapes through an outlet-passage 71, leading to a suitable receptacle. (Not shown.) The rear part of the chamber 34 is also provided with a downwardly and forwardly sloping bottom 72, at the base of which is formed a slitted opening 73, through which any foreign matter or chips broken from the shells of the stalks may escape from the chamber, the air-current being so regulated that such matter being heavier than the pith will not be blown through the outlet-passage 71.

The apparatus constructed as above described is of an extremely simple and inexpensive nature and is especially well adapted for use for the purposes for which it is designed, since it removes substantially the whole of the pithy matter from the stalks at a single continuous operation and without crushing the shell-like portion of the stalks and mixing the same with the pith, as is the case where the stalks are ground or crushed. The apparatus is also adapted to be constructed in a portable form, so as to be capable of being used in the field, and, furthermore, the action of the brushes is such that the pithy matter when removed from the stalks is in the form of a coarse flaky meal, such as is best adapted for compression into blocks or briquets, this being the form in which the pith or cellulose is most generally employed.

By this arrangement of the guides for holding the stalks in position to be slitted by the cutters and the spreaders for opening the slitted stalks it is obvious that the operation of the apparatus is greatly facilitated, the stalks being passed over the pith-removing devices in a flattened undivided form, so as to be held against lateral movement and interference with stalks operated on by the other cutter or cutters of the machine. Furthermore, by slitting the stalks instead of dividing them into two halves or parts it is evident that the spreaders are enabled to operate in a manner which would not be possible otherwise to open the stalks by spreading the side portions thereof apart, so as to expose the pithy interior to the action of the pith-removing brushes. Were the stalks split or divided into two parts they could not be properly presented to the pith-removing devices.

The arrangement of the brushes 44 and 49 to extend entirely across the chamber wherein they are mounted permits them to operate upon the stalks slitted and spread by all of the cutters and spreaders, so that the machine is made simpler and cheaper and the proper removal of the pith is insured in case of lat-

eral movement of the stalks after passing the spreaders.

It will also be obvious from the above description that the machine or apparatus constructed according to my invention is capable of considerable modification without material departure from the principles and spirit of the invention, and for this reason I do not wish to be understood as limiting myself to the precise form and arrangement of the several parts herein set forth.

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

1. In an apparatus for removing pithy matter from plant-stalks, the combination of feeding mechanism, a cutter for slitting the stalks fed by such mechanism, upper and lower guide-rolls arranged to receive the slitted stalks, rotary spreaders arranged between the cutters and the guide-rolls and adapted to enter the slits formed in the stalks by the cutters and to open said slits before the stalks are gripped by the said guide-rolls, means to remove the pith from the slitted stalks, and means to drive the feeding mechanism, guide-rolls and spreaders in the same direction, substantially as set forth.

2. In an apparatus for removing pithy matter from plant-stalks, the combination of a cutter for slitting the stalks fed to the apparatus, a spreader having opposite tapered faces and a central rib or fin to enter the slits of the stalks for opening the slits formed by said cutter, a rotative roll arranged to press the slitted stalks against said spreader, and means to remove the pith from the slitted stalks, substantially as set forth.

3. In an apparatus for removing pithy matter from plant-stalks, the combination of a cutter for slitting the stalks, a spreader having opposite tapered faces and a central rib or fin to enter the slits formed in the stalks by the cutter, a rotative brush to remove the pith from the slitted stalks, and upper and lower guide-rolls arranged to engage the opposite sides, respectively, of each half of the stalks and draw the same over the cutter and also over the brush, substantially as set forth.

4. In an apparatus for removing pithy matter from plant-stalks, the combination of a cutter for slitting the stalks, a rotative spreader for opening the slits formed by the cutter, a rotative pressure-roll for holding the slitted stalks in engagement with the spreader and means to remove the pith from the slitted stalks substantially as set forth.

5. In an apparatus for removing pithy matter from plant-stalks, the combination of a cutter for slitting the stalks, a spreader having a central rib or fin to enter the slit in the stalk and provided with opposite tapered faces to open said slit and means to remove the pith from the slitted stalks, substantially as set forth.

6. In an apparatus for removing pithy matter from plant-stalks, the combination of feed-



ing mechanism, a shaft, a series of cutters mounted for movement endwise thereon, another shaft, a series of spreaders mounted for movement endwise thereon, means for removing the pith from the stalks and means to hold the spreaders alined with the respective cutters, substantially as set forth.

7. In an apparatus for removing pithy matter from plant-stalks, the combination of a shaft having a feather, a series of cutters mounted on the shaft and capable of movement lengthwise along the same, a bar, a series of yokes on the bar, arms on the yokes arranged to engage the cutters and hold them against movement lengthwise on the shaft, means for moving the stalks past the cutters and means for removing the pith from the stalks, substantially as set forth.

8. In an apparatus for removing pithy matter from plant-stalks, the combination of means to slit the stalks, a shaft, a series of spreaders mounted on the shaft in position to enter the slits in the stalks, a bar, a series of yokes on the bar, arms on the yokes to engage the spreaders and hold the same against movement endwise on said shaft, means for moving the stalks through the apparatus, and means to remove the pith from the stalks, substantially as set forth.

9. In an apparatus for removing pithy matter from plant-stalks, the combination of two shafts, a series of cutters on one shaft, a series of spreaders on the other shaft, a series of yokes having two sets of arms, one set to engage the spreaders and the other set to engage the cutters, means for moving the stalks through the apparatus and means for removing the pith from the stalks, substantially as set forth.

10. In an apparatus for removing pithy matter from plant-stalks, the combination of a series of cutters to slit the stalks, a series of spreaders each having opposite tapered faces and a central rib or fin to engage the slitted stalks and a single pith-removing means to engage the stalks operated on by the several cutters and spreaders, substantially as set forth.

11. In an apparatus for removing pithy matter from plant-stalks the combination of a cutter, transversely-curved guide-plates on opposite sides of the cutter and between which the stalks are passed, said guide-plates having their concave surfaces adjacent to each other and their axes of curvature parallel with the direction of feed of the stalks, means to remove the pith from the stalks and means to move the stalks through the apparatus, substantially as set forth.

12. In an apparatus for removing pithy matter from plant-stalks, the combination of two shafts, a series of cutters on one shaft, a series of spreaders on the other shaft, a series of yokes having two sets of arms, one set to engage the spreaders and the other set to engage the cutters, collars between the yokes

for spacing said yokes apart, means for moving the stalks through the apparatus and means for removing the pith from the stalks, substantially as set forth.

13. In an apparatus for removing pithy matter from plant-stalks, the combination of a shaft having a feather, a series of cutters mounted on the shaft and capable of movement lengthwise along the same, a bar, a series of yokes on the bar, collars between the yokes for spacing said yokes apart, arms on the yokes arranged to engage the cutters and hold them against movement lengthwise on the shaft, means for moving the stalks past the cutters and means for removing the pith from the stalks, substantially as set forth.

14. In an apparatus for removing pithy matter from plant-stalks, the combination of a cutter for slitting the stalks, a rotative spreader for opening the slits formed by the cutter and means for removing the pith from the slitted stalks, substantially as set forth.

15. In an apparatus for removing pithy matter from plant-stalks, the combination of means to slit the stalks, a spreader having an edge to enter the slits in the stalks, a driven roll to press the slitted stalks against the edge of the spreader and mechanism for removing the pith from the slitted stalks, substantially as set forth.

16. In an apparatus for removing pithy matter from plant-stalks, the combination of feeding mechanism, a cutter to slit the stalks, a rotative spreader arranged to open the slits in the stalks, means to remove the pith from the slitted stalks, and means for driving the spreader and the feeding mechanism in the same direction, substantially as set forth.

17. In an apparatus for removing pithy matter from plant-stalks, the combination of a plurality of cutters to slit the stalks, rotary spreaders having tapered sides and central fins to enter the slits in the stalks, and a pith-removing brush having its brush-surface arranged to operate on the stalks acted upon by all of said cutters and spreaders, substantially as set forth.

18. In an apparatus for removing pithy matter from plant-stalks, the combination of a cutter arranged to slit the stalks along one side of the shells thereof, a guiding device located at said cutter and through which the stalks are passed and into which the cutter extends, a spreader having a fin to engage the slitted stalks and having tapered faces on opposite sides of said fin, and means comprising rotative brushes each arranged to engage both halves of the slitted stalks for removing the pith therefrom, substantially as set forth.

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

NOAH T. REMY.

Witnesses:

JOHN T. RATCLIFFE,  
R. M. STOTLER.