

No. 673,243.

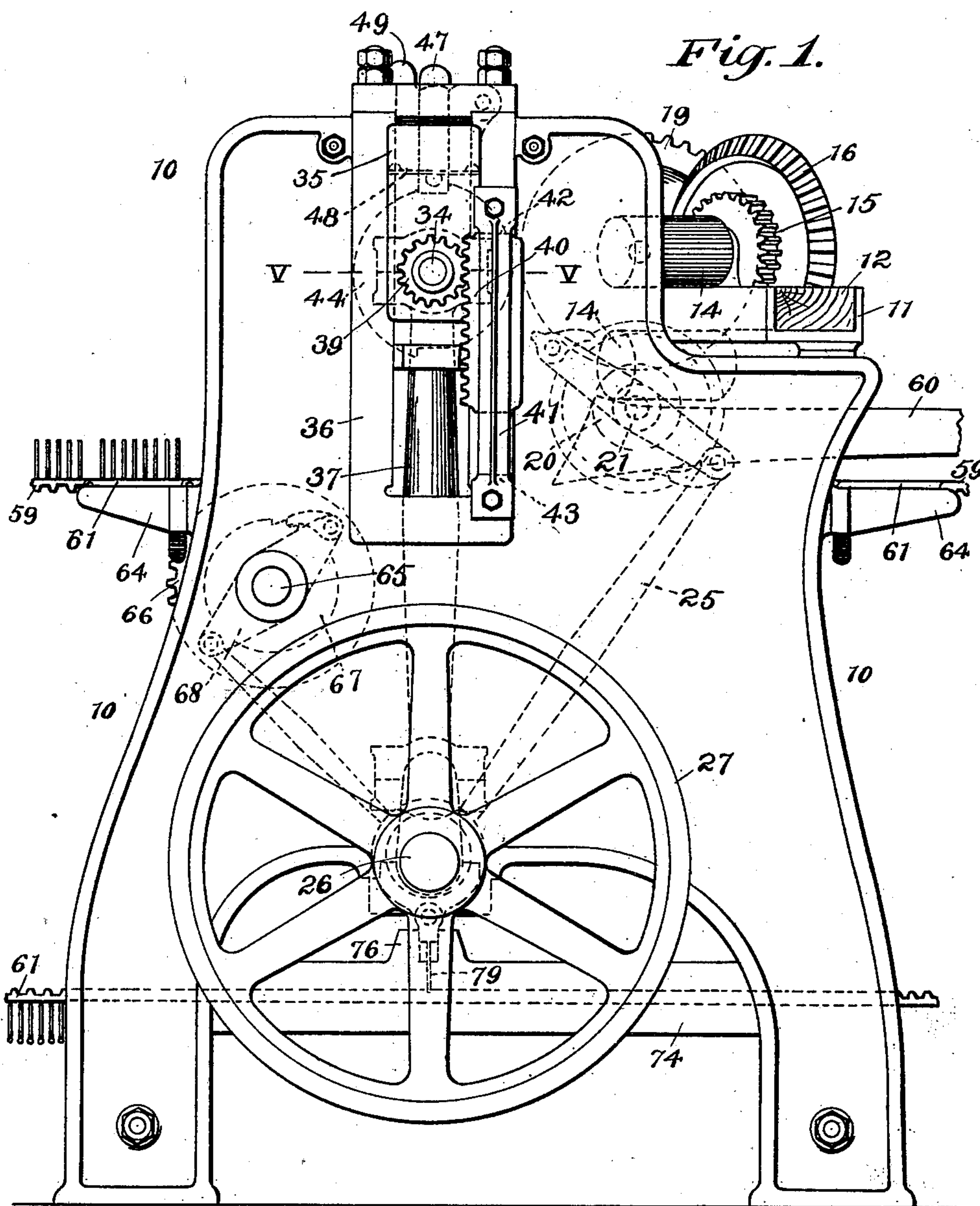
Patented Apr. 30, 1901.

J. A. E. CRISWELL.
MACHINE FOR MAKING MATCHES.

(Application filed June 15, 1900.)

(No Model.)

4 Sheets—Sheet 1.



WITNESSES:

William Foster
A. W. Stanley

INVENTOR

J. A. E. Criswell

No. 673,243.

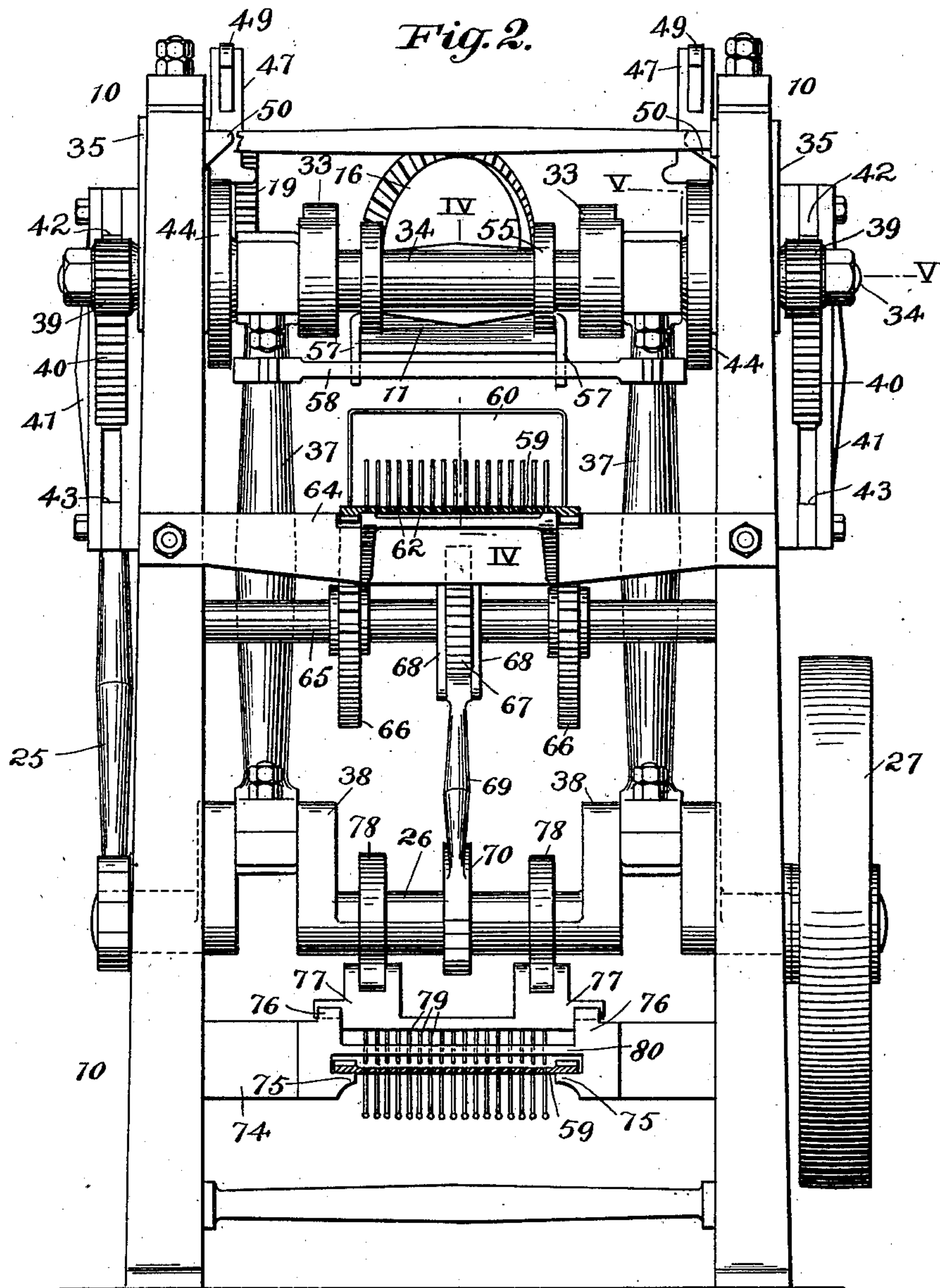
Patented Apr. 30, 1901.

J. A. E. CRISWELL.
MACHINE FOR MAKING MATCHES.

(Application filed June 15, 1900.)

(No Model.)

4 Sheets—Sheet 2.



WITNESSES:
William Foster.
A. W. Stanley.

INVENTOR
J. A. E. Criswell.

No. 673,243.

Patented Apr. 30, 1901.

J. A. E. CRISWELL.
MACHINE FOR MAKING MATCHES.

(Application filed June 15, 1900.)

(No Model.)

4 Sheets—Sheet 3.

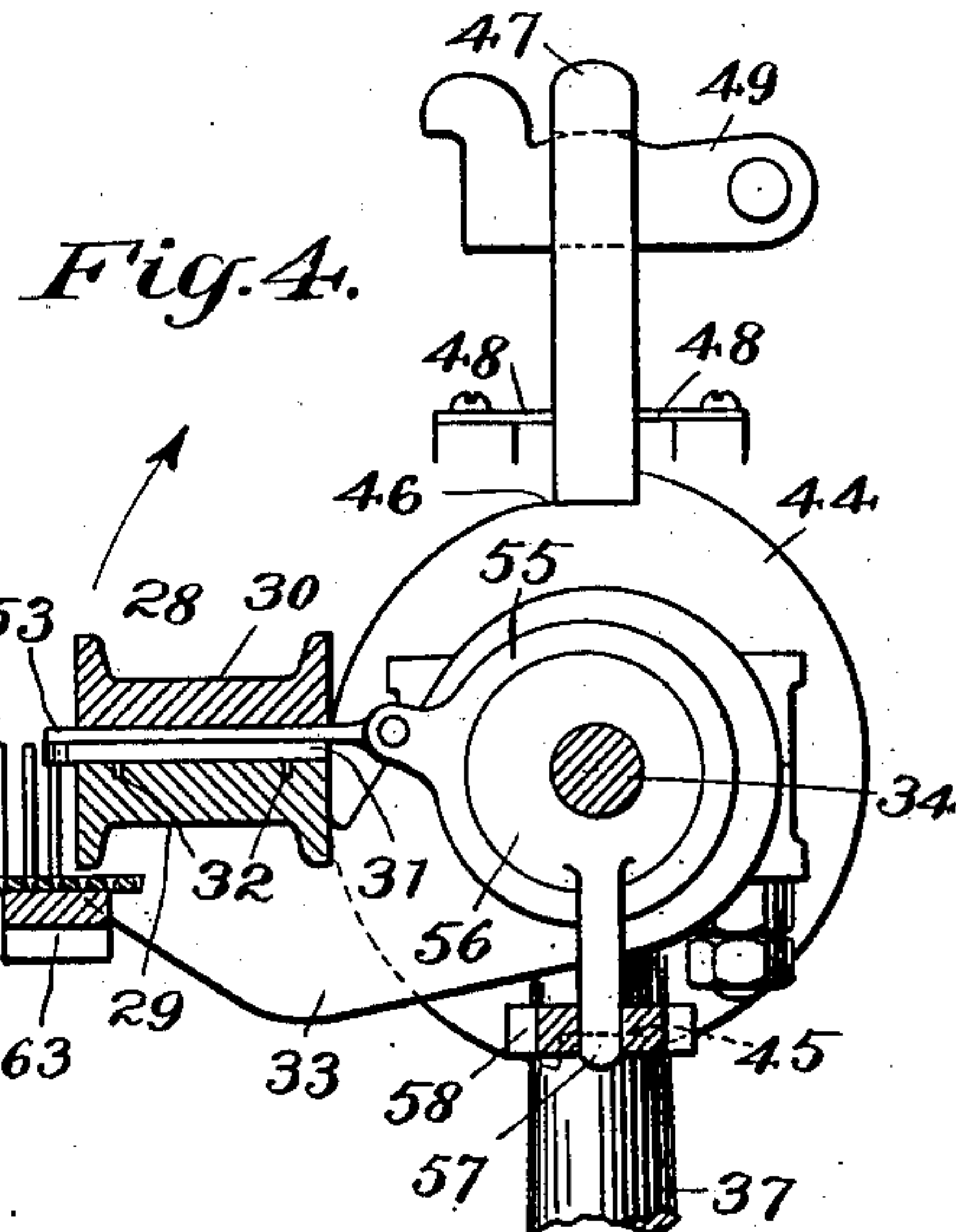
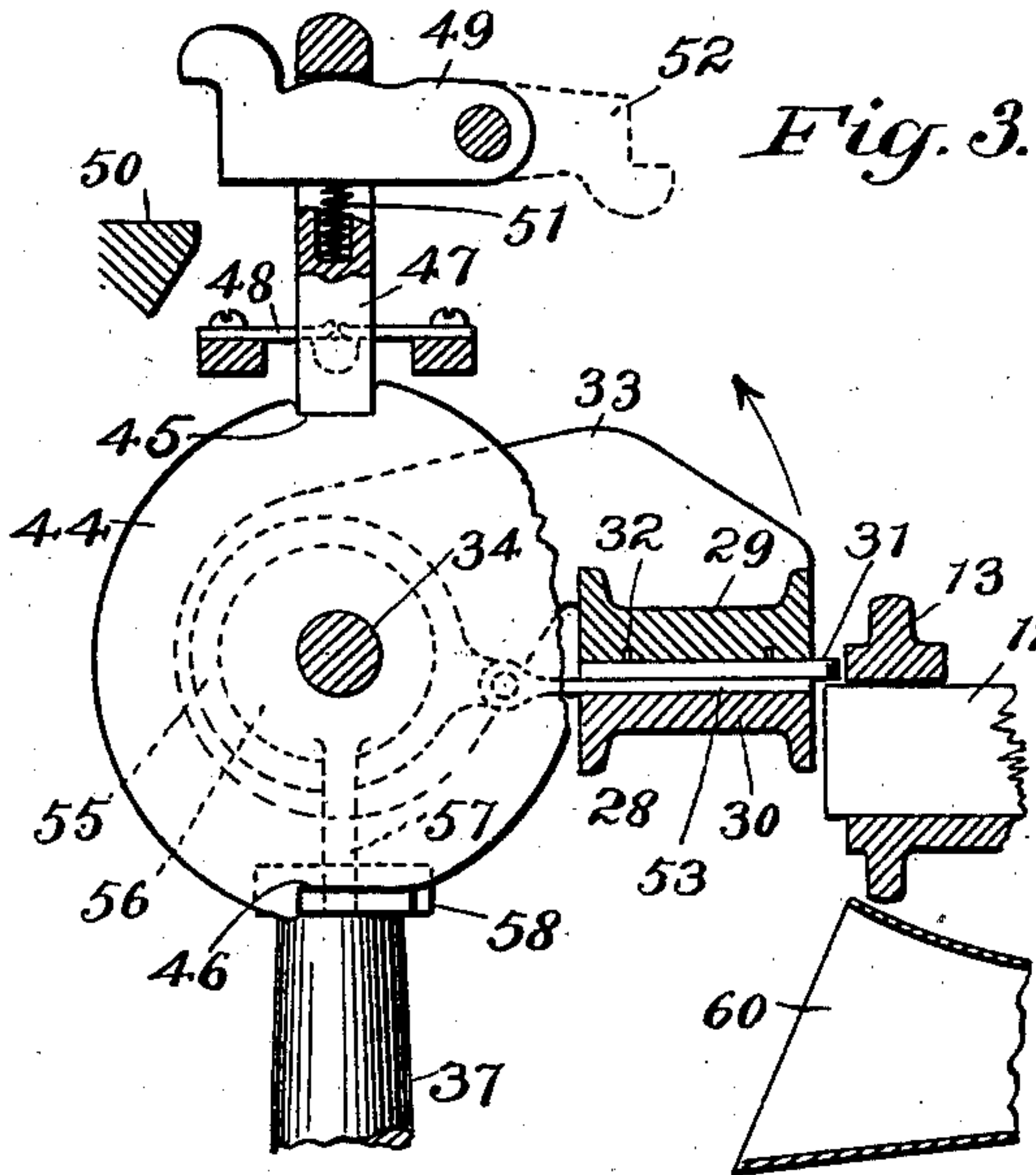


Fig. 6^a

Fig. 5

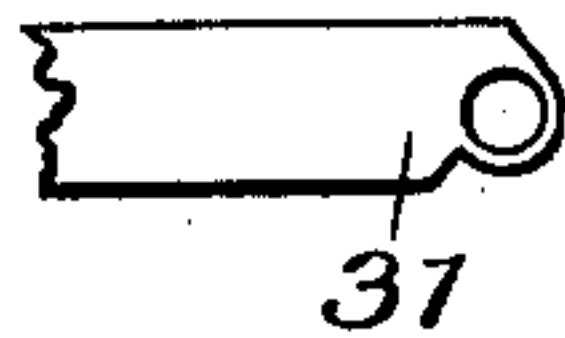
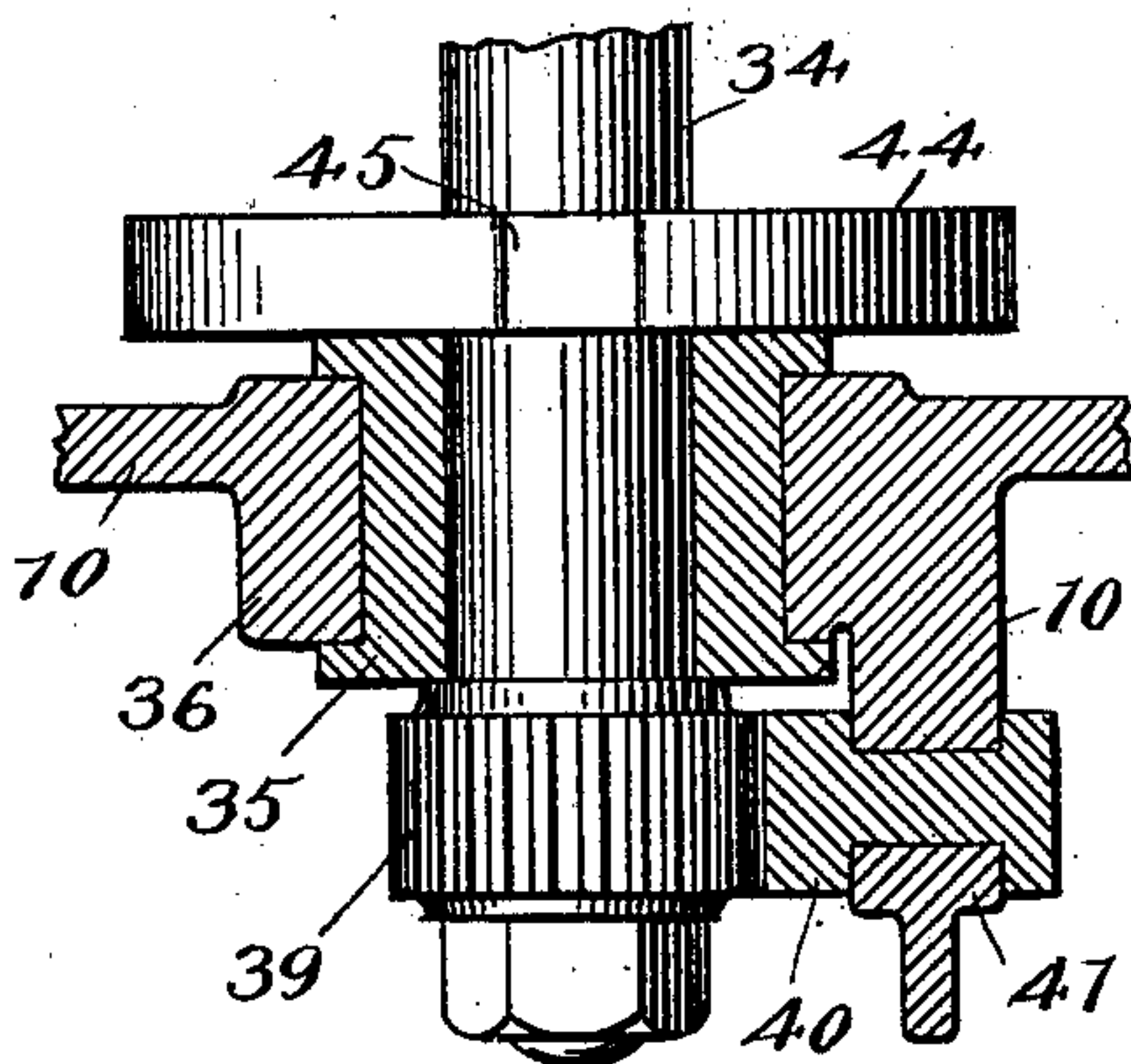


Fig. 6.

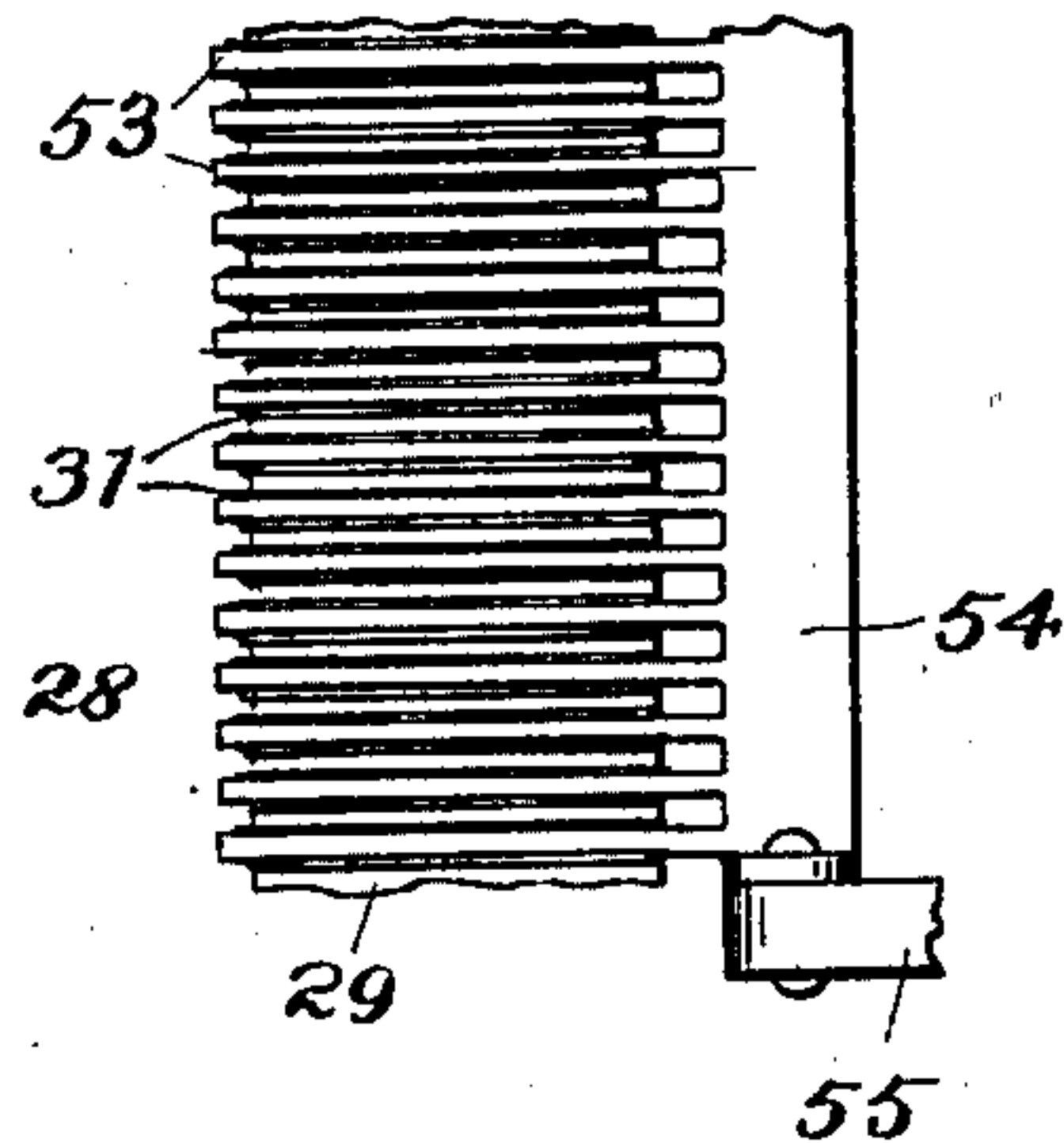
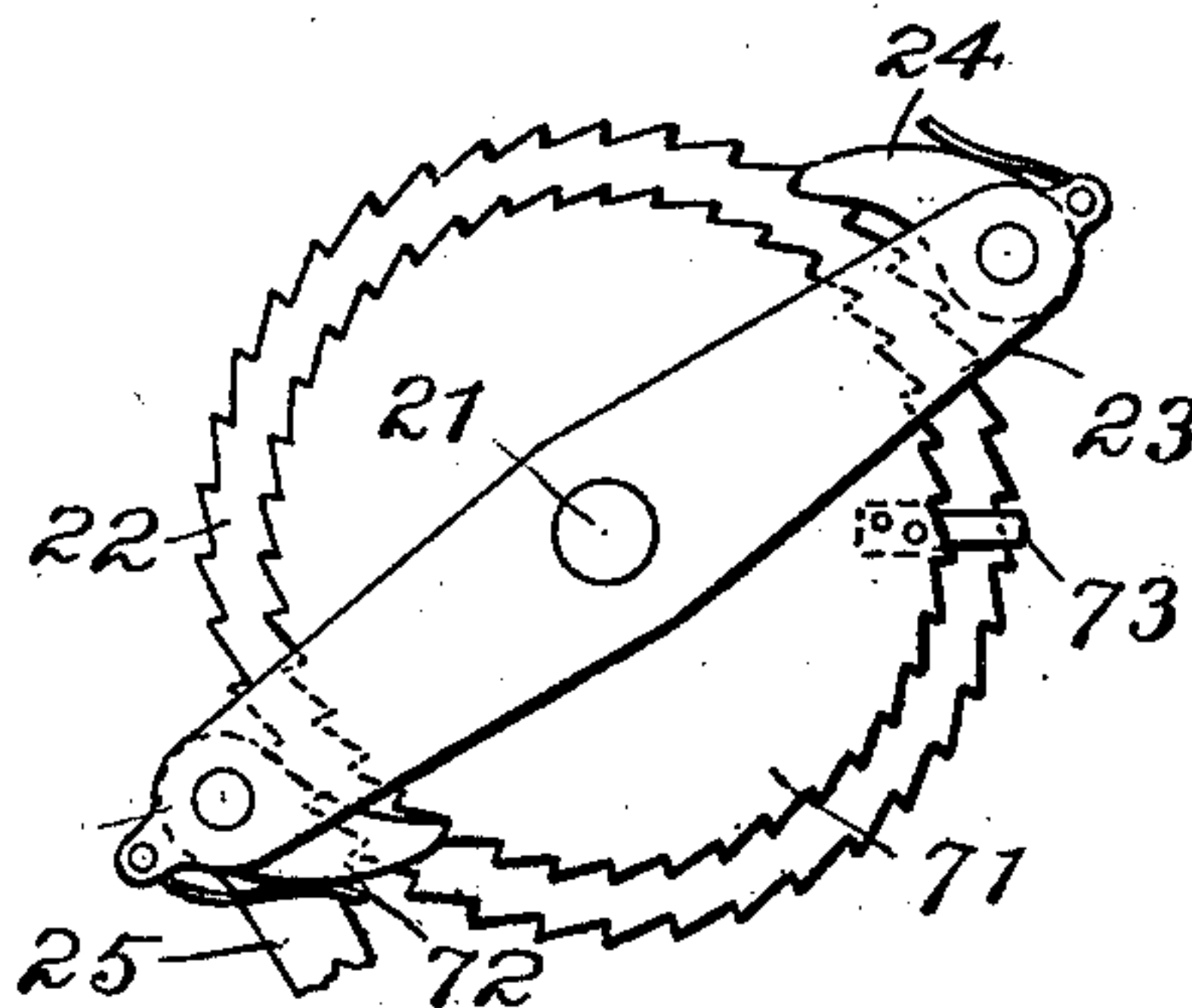


Fig. 7.



WITNESSES:

William Foster
A. M. Stanley

INVENTOR

J. A. E. Criswell

No. 673,243.

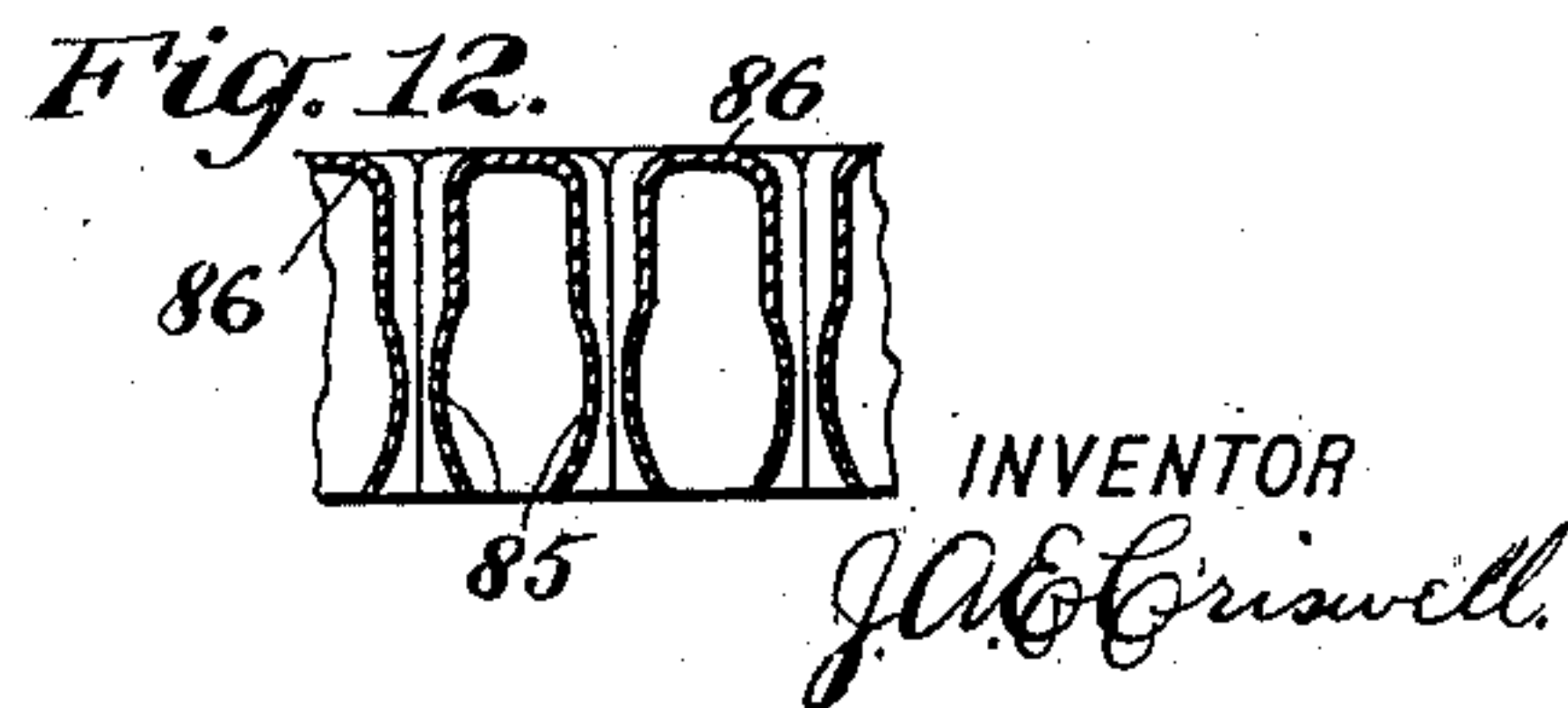
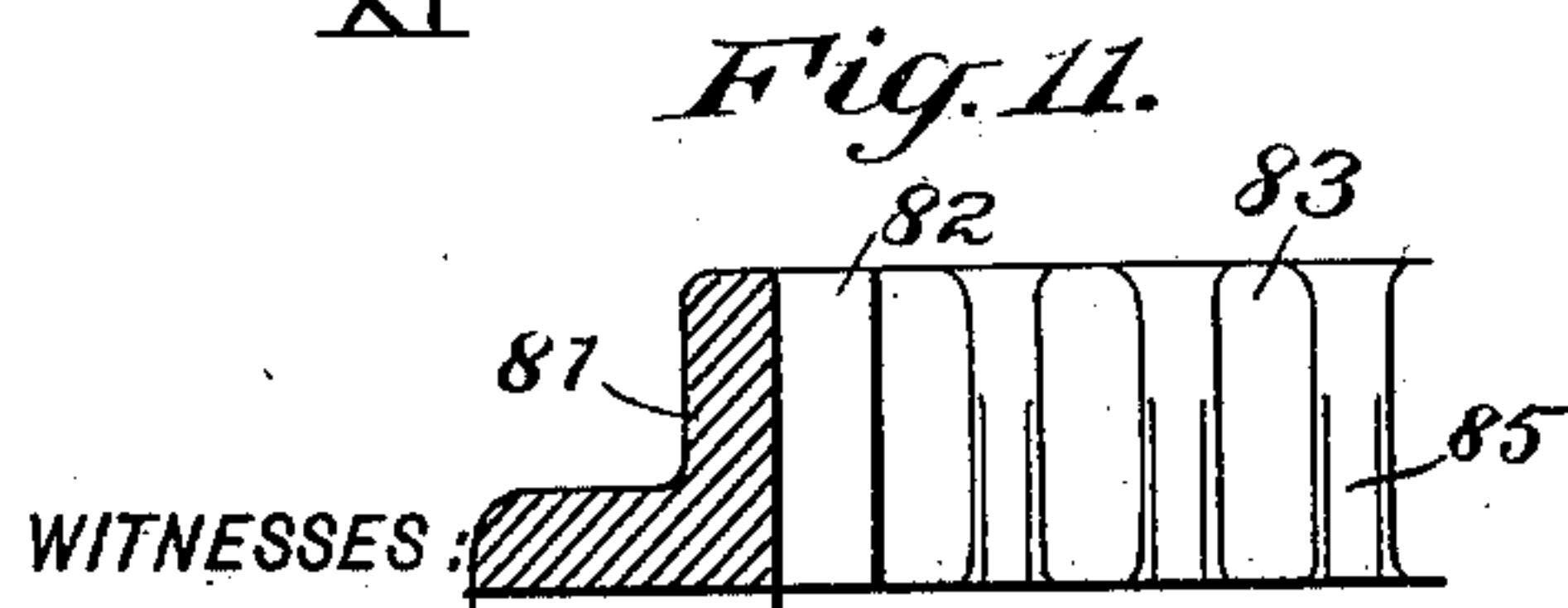
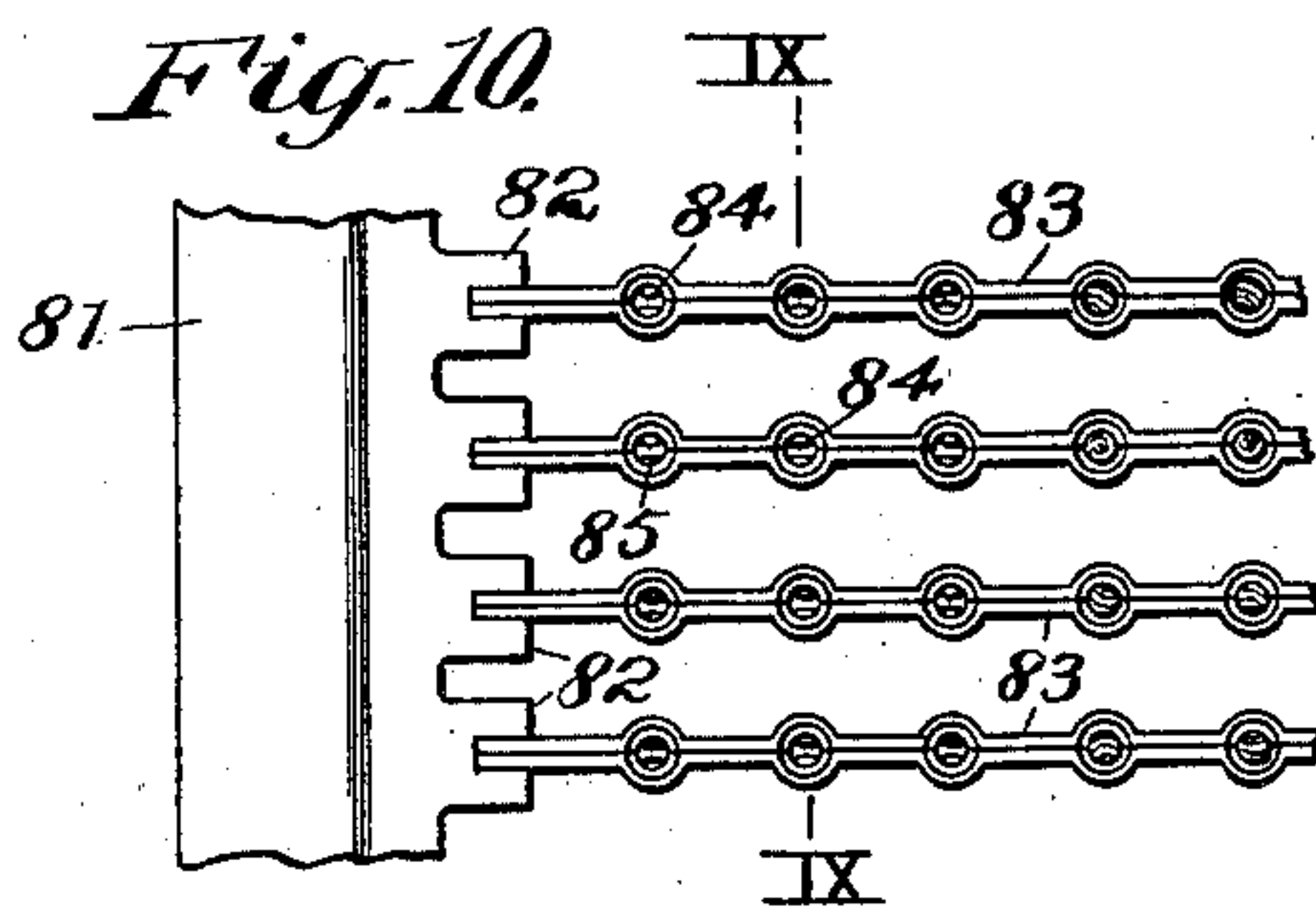
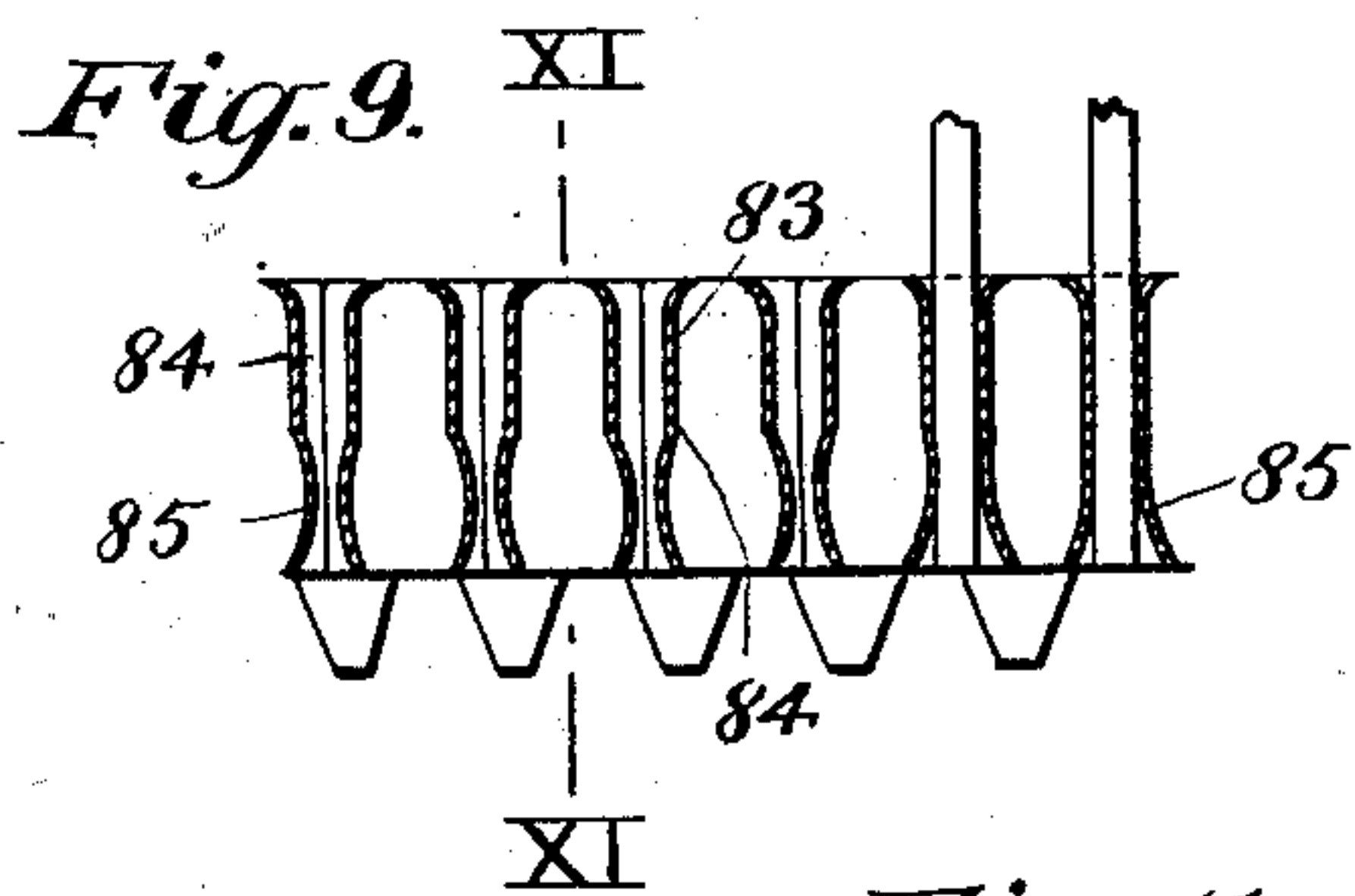
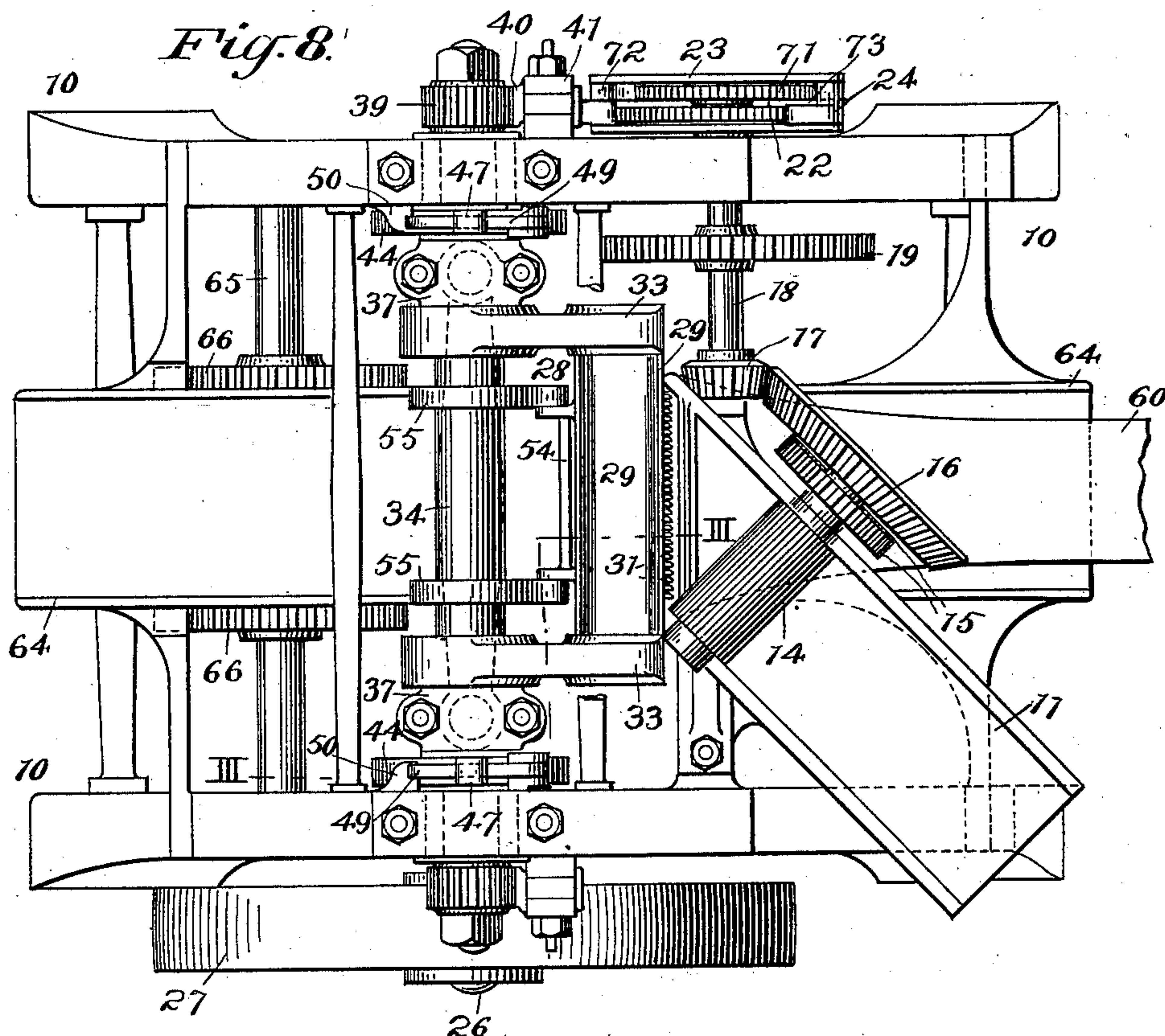
Patented Apr. 30, 1901.

J. A. E. CRISWELL.
MACHINE FOR MAKING MATCHES.

(Application filed June 15, 1900.)

(No Model.)

4 Sheets—Sheet 4.



WITNESSES:
William Foster,
W. Stanley

INVENTOR
J. A. E. Criswell

UNITED STATES PATENT OFFICE.

JAMES A. EKIN CRISWELL, OF BROOKLYN, NEW YORK.

MACHINE FOR MAKING MATCHES.

SPECIFICATION forming part of Letters Patent No. 673,243, dated April 30, 1901.

Application filed June 15, 1900. Serial No. 20,386. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. EKIN CRISWELL, of New York, borough of Brooklyn, county of Kings, and State of New York, have
5 invented certain new and useful Improvements in Machines for Making Matches, of which the following is a full, clear, and exact description.

This invention relates to match-making machines, but more particularly to such as disclosed in my Letters Patent No. 652,476, dated June 26, 1900, in which the splints are cut from blocks of wood.

The primary object of the invention is to
15 provide simple and efficient means by which the splints may be cut from the block and then swung or moved clear of the splint material in position to be forced into holding devices in a suitable carrier.

Another object of the invention is to provide a simple and efficient reciprocatory and oscillatory cutter-head having suitable splint-cutting devices spaced apart by which a number of splints are cut and by which the splints
25 are forced into a suitable carrier during the same movement that the cutters cut the splints from the blocks.

Further objects of the invention are to provide simple and efficient means by which the
30 feeding of the splint material may be stopped at stated intervals to permit the carrier to be moved without receiving splints at predetermined intervals, thus allowing the carrier to comprise a series of linked members and to
35 provide a simple and efficient holding device or carrier for the splints.

The invention will be hereinafter more particularly described with reference to the accompanying drawings, which form a part of
40 this specification, and then pointed out in the claims at the end of the description.

In the drawings, Figure 1 is a side elevation of one form of the machine embodying my invention. Fig. 2 is a front elevation.
45 Fig. 3 is a fragmentary vertical section taken on the line III III of Fig. 8, showing the cutter-head and part of its operating mechanism. Fig. 4 is a fragmentary vertical section taken on the line IV IV of Fig. 2, showing the cutter-head in a different position. Fig. 5 is a fragmentary sectional plan, partly in elevation,
50 taken on the line V V of Figs. 1 and 2. Fig.

6 is a fragmentary sectional plan through the cutter-head, showing the slides for covering the openings in the cutters. Fig. 6^a is a detail plan of one of the cutters. Fig. 7 is a detail view of a part of the mechanism for stopping the feeding of the material to the cutter-head at stated intervals. Fig. 8 is a plan view. Fig. 9 is a fragmentary section of one form of carrier, taken on the lines IX IX of Fig. 10. Fig. 10 is a partial plan view. Fig. 11 is a vertical section taken on the line XI XI of Fig. 9; and Fig. 12 is a vertical section of a carrier, showing a slight extension of that
65 shown in Figs. 9 to 11.

The frame 10 may be of any suitable form and construction and may comprise two or more sections properly held together. On the frame is a trough or hopper 11 for the blocks 12
70 from which the splints are cut, though more than one hopper may be used, if desired. The feed-trough has a cover-plate 13 at its inner end and is provided with feed-rolls 14, which engage the upper and lower surfaces
75 of the blocks of wood to force the latter inward. The shafts of the feed-rolls are journaled in brackets or lugs on the trough 11, and the shafts are geared together by the gears 15. The shaft of the upper feed-roll is
80 provided with a bevel-gear 16, which meshes with a smaller bevel-gear 17 on the shaft 18. This shaft has a larger gear 19, that meshes with a small gear or pinion 20 on the shaft 21, as shown in dotted lines in Fig. 1. On
85 the shaft 21, Figs. 7 and 8, is a ratchet-wheel 22, fixed to said shaft. Arms 23 move loosely on the shaft 21 on opposite sides of the ratchet-wheel, and at one end of said arms is a pawl 24, which engages the teeth of the ratchet-wheel 22. The arms 23 are operated by a rod
90 25 through an eccentric on the main driving-shaft 26, the driving-shaft being provided with a belt and fly-wheel pulley 27. As the driving-shaft 26, rod 25, and arms 23 are operated the ratchet-wheel 22 will rotate the shaft 21, and through the latter shaft and train of gearing described the feed-rolls 14 will intermittently force the blocks of splint material 12 inward.
100

To cut the splints, I provide a suitable reciprocatory and oscillatory cutter-head, as at 28. The cutter-head has the main member 29 and the second member or clamping-plate

30, between which are the cutters 31. These cutters may be of the usual or of any preferred form and are held in grooves in the clamping-plate 30, between said plate and the member 29. The cutters 31 have pins 32 entering holes in the head, and in each end of the head is an arm 33, which is secured to the shaft 34. The shaft 34 is journaled in bearings 35, that move vertically in the guides 36 of the frame. Connecting-rods 37 span the shaft 34 at one end, while the other ends of said rods are operatively connected to the cranks 38 on the main driving-shaft 26. By this means the shaft 34 and the cutter-head receive a reciprocatory movement, though it will be understood that the head and its operating mechanism may be of any suitable construction.

As a means for imparting a rotary or oscillatory movement to the cutter-head various means may be employed. As shown, the shaft 34 has a pinion 39 on each end adjacent to the bearings 35. These pinions mesh with the racks 40. The racks 40 are slidably held on the frame 10 and move along the brackets 41 and the frame, which movement is limited by the stops 42 and 43. The racks and the pinions move together during the downward stroke of the shaft 34 until the lower ends of the racks engage the stops 43. The racks will now remain stationary, and as the shaft and the pinions continue to descend the pinions will rotate the shaft and will swing or give the cutter-head a partial revolution—in this case one-half of a complete rotation. During the upward stroke the same operation will take place, except in a reverse direction, the racks after engaging the upper stops 42 causing the cutter-head to swing back or return in position to again cut splints.

The shaft 34 and the cutter-head are locked against rotary movement during a part of each reciprocatory movement. To secure this, a disk 44 is secured to the shaft 34 at or near each bearing 35. These disks are each provided with two recesses 45 and 46, into which are adapted to fit the ends of bolts 47. The locking-bolts are normally forced downward by springs 48, and passing through openings in the bolts are the levers 49. These levers are pivoted to the bearings 35 at one end and have their other ends located in the path of lugs 50 on the frame, so that during the downward movement of the head and just prior to the racks engaging the lower stops 43 the levers 49 will disengage the bolts 47 from the recesses 45. The bolts 47 have springs 51, which normally force the levers 49 upward and permit said levers to pass by the stops 46 during the upstroke of the cutter-head. The recesses 46 in the disks 44 have a lip only on one side, so that it is not necessary to positively release the bolts 47 during the upward stroke; but, if desired, said recesses may be the same as recesses 45 and the levers 49 extended, as shown in dotted lines at 52 in Fig. 3, so as to strike suitable lugs similar to lugs 50.

It will be seen that the splints after being cut are swung or moved away from the splint material, and during the same movement that the splints are cut the latter will be placed in position to be engaged by the splint carrying and holding means.

The cutter-head is provided with a series of slides 53, which move lengthwise of the cutters and have their ends adapted to cover the openings in the cutters on one side thereof in the usual manner. These slides, Figs. 3, 4, and 6, are formed from or connected to a common bar 54, the ends of which are pivoted to a projecting portion of rings or eccentric-straps 55. The straps 55 span disks or eccentrics 56, which are loose on the shaft 34, but are held from rotating by fingers 57, which enter openings in a cross-bar 58. This cross-bar 58 is secured to the connecting-rods 37. It will be seen that as the cutter-head is rotated in one direction the straps 55, moving around the eccentrics or eccentrically-arranged disks 56, will move the slides so as to cover the openings in the cutters, as in Fig. 4, while a reverse movement will remove the slides away from the cutter ends, as in Fig. 3.

The carrier or holding means may be of the usual or of any suitable form or construction. The carrier 59 may consist of independent plates linked together, as in the drawings, and between the carrier and the trough 11 may be arranged the open end of a funnel-shaped pipe or tube 60, which has its other end connected to an exhaust-fan, (not shown,) by which the waste and defective splints may be withdrawn from the machine. The carrier 59 is of the usual form and consists of a series of sections 61, linked together, each section being provided with a series of holes 62 or splint-engaging devices, which hold the splints when forced therein by the cutter-head, the holes 62 being smaller than the diameter of the splints to compress and hold the latter in the usual manner. The holes 62 are arranged in rows and correspond in number to the cutters and are made to register with the cutters as they are brought in position to stick the splints into the holes, the thrust being taken up by the plate 63, located directly beneath the carrier, or by the table 64, which is secured to the frame and along which the carrier travels.

The carrier may be operated by any suitable mechanism. A transverse shaft 65 is journaled in the frame, and on said shaft are gears 66, which mesh with the teeth on the carrier-links. At 67, Figs. 1 and 2, is a ratchet-wheel, on each side of which is an arm 68. One end of these arms carries a pawl and is operated from the main driving-shaft 26 by the rod 69 and an eccentric 70, thus giving a continuous step-by-step movement to the carrier. The endless carrier 59 enters the machine at the front and passes around suitable idlers or pulleys, (not shown,) then under the cutter-head, and out of the machine, from

which the splints may move in any suitable direction to have the matches completed in the usual or in any preferred manner.

To allow for the space between the different
 5 sections of the carrier to permit them to be linked together or to have them immediately follow each other when separate plates or holding means are employed, suitable means is provided by which the feeding of the ma-
 10 terial is stopped at predetermined intervals. Means for this purpose is not broadly claimed herein, as such is covered in my patent here-
 inbefore referred to. As shown, the shaft 21 is provided with a loose ratchet-wheel 71,
 15 which is rotated by a pawl 72, carried by the arms 23. On the ratchet-wheel 71 is a trip or projection 73, which at a predetermined point will disengage the pawl 24 from the
 20 ratchet-wheel 22. It will be seen that as the arms 23 are moved by the rod 25 the two ratchet-wheels 71 and 22 will rotate in unison, and so feed the blocks of wood inward. As
 25 soon as the top or trip 73 strikes the pawl 24 it will be disengaged from the fixed ratchet-wheel 22, which will then remain idle, thus
 stopping the train of gearing operated by the shaft 21, already described, and consequently the feeding of the splint-blocks. The loose
 30 ratchet-wheel 21 continues to rotate, and as soon as the trip 73 passes by the pawl 24 the latter will again engage the teeth of the
 35 ratchet-wheel 22. The splint material will now be fed to the cutter-head until the trip again disengages the pawl 24, and while the
 40 pawl is disengaged to stop feeding the material the cutter-head operates without cutting splints. The carrier 59 when it returns to the machine with completed matches passes
 45 under and has its edges supported by a guide-plate 74. This plate, Figs. 1 and 2, is secured to the frame and has supporting-ribs
 50 75 for the edges of the carrier. The plate has guides 76, in which the cross-head 77 is vertically movable. The cross-head is piv-
 55 oted to straps 78, which are operated by eccentrics on the drive-shaft 26. A series of punches 79, arranged in a row and corre-
 sponding in number to the holes 62 in the carrier, are carried by the cross-head 77 and
 60 have their ends guided in a cross-bar 80 of the plate 74. The rows of holes with the matches are caused to register with the punches 79, and when the latter are forced
 65 downward a row of matches will be ejected from the carrier.

The invention will be readily understood from the foregoing description when taken in connection with the accompanying drawings.

The trough or hopper 11 being filled with
 60 blocks of a size equal to the length of the splints and the machine operated, the blocks will be fed with a step-by-step movement to the cutter-head 28. The cutter-head will now
 65 have a downward movement and will cut a set or row of splints from the blocks 12. At
 or about the time the splints are cut the le-

vers 49 will release the blocks or bolts 47 from the disks 44. The pinions 39 and racks 40 will move downward with the cutter-head, and shortly after the splints are cut and the
 70 disks 44 are released the racks will strike the stops 43, and by means of the pinions 39 and shaft 34 the cutter-head will be given a partial revolution in the direction indicated by
 75 the arrow in Fig. 3, and on further downward movement the cutter-head will stick the cut splints into the holes of the carrier 59. The slides 53 will cover the openings in
 80 the cutters in the manner hereinbefore described and will form an abutment for the ends of the splints while being forced into the carrier. During the upward stroke of
 85 the cutter-head the cutters will leave the splints in the carrier, and when the racks strike the upper stops 42 the cutter-head will be swung back to its former position ready
 90 to cut another row of splints at the next downward movement. This is repeated, and at the time that one of the spaces between the linked members of the carrier registers with the cut-
 95 ter-head the trip 73 on the ratchet-wheel 71 will engage the pawl 24 and stop the feeding of the splint material, as previously described. The carrier as it is filled with splints
 100 has the matches completed in the usual or in any preferred way, and as the completed matches return to the machine they are
 ejected by the punches 79, but when small sections of plates or other holding means are employed instead of an endless carrier they
 105 may be taken and the matches completed by hand or otherwise.

From the foregoing it will be seen that a simple and efficient machine is provided in
 105 which there is a reciprocatory and oscillatory cutter-head which cuts a row or set of splints and sticks them into the carrier during the
 same movement of the head, and, further, simple and efficient means are provided by
 110 which the carrier may be moved without receiving splints at stated intervals, thus compensating for the space between two adja-
 cent members of the carrier.

In Figs. 9 to 11 there is shown a form of
 115 carrier which may be made in independent sections, or the sections may be linked together to form an endless carrier. Here the carrier has side pieces 81, provided with lugs
 82. These lugs are slotted, and fitting said slots are two opposed metallic plates 83. The
 120 plates 83 are depressed at intervals, and when placed together form recesses or openings 84 for the splints. At or near the lower end of the openings 84 are spring fingers or tongues
 125 85, which are formed by slitting the plates and forcing them inward. The splints when forced past the tongues or fingers 85 will be rigidly held spaced apart.

The plates of the form shown in Fig. 12 are
 130 Ω -shaped in cross-section, thus providing a substantially flush and smooth upper surface and joining each pair of plates in one instead

of having two independent plates, as in Figs. 9 to 11; otherwise the construction of the form shown in Fig. 12 is the same as in the other views referred to.

5 Various changes in the construction and arrangement of the machine may be made—as, for example, the position of blocks, the cutter-head, and the carrier may be such that the splints may be carried and forced into a
10 carrier above the cutter-head, thus avoiding the necessity of reversing the position of the splints for treating them to complete the matches. Means might also be employed to lock the carrier during the sticking of the
15 splints.

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

1. In a match-making machine, the combination with a carrier having independent
20 rows of openings for the splints, and a reciprocatory and oscillatory cutter-head cutting the splints and giving them a partial rotation after being cut to force them into the
25 rows of openings in the carrier, for the purpose set forth.

2. In a match-making machine, the combination with a cutter-head provided with cutting devices, of means for reciprocating the
30 cutter-head, means for oscillating said head during the reciprocatory movements and after the splints are cut, and a carrier receiving the splints from the cutting devices.

3. In a machine for making matches, the combination with a cutter-head provided
35 with cutting devices, of means for reciprocating the cutter-head, means for oscillating said head after the splints are cut, holding means receiving the cut splints, and punches
40 for ejecting the splints from the holding means, for the purpose set forth.

4. In a machine for making matches, the combination with a carrier, of a reciprocatory and oscillatory head provided with cutting
45 devices which cut the splints, rotate them and stick them in the carrier during the same movement of the head, for the purpose set forth.

5. In a match-making machine, the combination with a reciprocatory cutter-head having
50 means for cutting splints, of means for oscillating the head after the splints are cut, means movable over the openings in the cutters to form an abutment for the splints, and
55 a carrier receiving the splints from the cutters, substantially as described.

6. In a match-making machine, the combination with a cutter-head provided with a series of cutting devices, of means for reciprocating the cutter-head, means for oscillating
60 said head during the reciprocatory movements and after the splints are cut, slides movable over the openings in the cutting devices, and a carrier receiving the splints from
65 the cutting devices, substantially as and for the purpose described.

7. In a machine for making matches, the

combination with means for feeding blocks of wood, of a reciprocatory and oscillatory cutter-head having cutters which cut the splints
70 endwise and give them a partial rotation after being cut, and a carrier having splint-holding means receiving the splints endwise after being cut, substantially as described.

8. In a machine for making matches, the combination with means for feeding blocks of
75 wood, of a reciprocatory and oscillatory cutter-head having a set of cutters cutting the splints endwise from the blocks and giving them a partial rotation after being cut, a carrier having splint-holding means receiving
80 the splints endwise from the cutter-head, and punches for ejecting the splints from the carrier, for the purpose set forth.

9. In a match-making machine, the combination with means for feeding blocks of wood,
85 of a reciprocatory and oscillatory cutter-head having cutters spaced apart and each cutting individual splints endwise from the blocks, the splints being oscillated and moved free of
90 the blocks after being cut, means movable over the openings in the cutting devices, and a carrier having splint-holding means receiving the splints properly spaced apart
95 endwise after being cut, for the purpose set forth.

10. In a machine for making matches, the combination with means for feeding blocks of
100 wood, of a cutter-head having cutters spaced apart and each cutting individual splints endwise from the blocks, means for reciprocating the head, means for oscillating the head after the splints are cut to present them in a different position, and a carrier having splint-holding means receiving the splints properly
105 spaced apart endwise direct from the cutter-head, for the purpose set forth.

11. In a machine for making matches, the combination with means for feeding blocks of
110 wood, of a cutter-head having cutters spaced apart and each cutting individual splints endwise from the blocks, means for reciprocating the head, means for oscillating the head after the splints are cut to present them in a different position, means movable over the openings
115 in the cutters, and a carrier having splint-holding means receiving the splints properly spaced apart endwise direct from the cutter-head, substantially as and for the purpose described.

12. A match-making machine, comprising a reciprocatory and oscillatory cutter-head
120 provided with a series of cutters which cut the splints and change their position by the oscillatory movement, a carrier receiving the splints from the cutters after the position of the splints has been changed, and means for carrying off the waste material and bad splints from the cutters.

13. In a match-making machine, the combination with a carrier of a reciprocatory and
130 oscillatory cutter-head provided with cutters which cut the splints in rows and give them a rotary movement after being cut, and ex-

hausting means for carrying off the waste material and bad splints.

14. A match-making machine, comprising a reciprocatory and oscillatory cutter-head
5 having cutting devices which cut the splints and give them a partial revolution, and holding means receiving the splints from the cutter-head.

15. In a match-making machine, the combination with a carrier, of a cutter-head having cutting devices for cutting splints, means for reciprocating the head, locking means for the head, means for releasing the locking means, and means for imparting an oscillatory
15 movement to said head.

16. In a match-making machine, the combination with a carrier, of a cutter-head having cutting devices for cutting splints, means for reciprocating the head, devices locking
20 the head against rotary movement at each end, means for releasing the locking devices, and means for imparting an oscillatory movement to said head.

17. In a match-making machine, the combination with a carrier, of a cutter-head having means for cutting splints, a device locking the head against rotary movement, means for releasing the locking device, and means for imparting an oscillatory movement to
30 said head.

18. In a machine for making matches, the combination with a carrier, of a reciprocatory cutter-head having devices for cutting splints, means locking the head against rotation and
35 comprising a disk, a movable bolt adapted to engage the disk, and means for releasing the bolt, and means for oscillating the cutter-head during the reciprocatory movements of said head.

19. In a machine for making matches, the combination with a carrier, of a reciprocatory cutter-head having means for cutting splints, means locking the head against rotation, means for releasing the locking means, a pinion movable with the head, and a rack having a limited movement and engaging the pinion to rotate the head.
45

20. In a match-making machine, the combination with a cutter-head provided with a series of cutting devices, of means for reciprocating the head, devices locking the head against rotary movement at each end, means for releasing the locking means, means for imparting an oscillatory movement to the
50 head during the reciprocatory movements thereof, and holding means for the splints.

21. In a machine for making matches, the combination with a cutter-head provided with a series of cutting devices, of a device locking the head against rotary movement, means
60 for releasing the locking device, means for imparting an oscillatory movement to said head, and holding means receiving the splints from the cutting devices.

22. In a match-making machine, the combination with a reciprocatory cutter-head having means for cutting splints, means for oscillating the cutter-head after the splints are cut, and a carrier receiving the splints from the cutter-head.
70

23. In a machine for making matches, the combination with a reciprocatory cutter-head provided with cutting devices, means for imparting a partial revolution to said head non-rotating eccentric devices movable with the
75 cutter-head, slides movable over the cutters, and straps or rings movable around the eccentrics and operatively connected with the slides to move the latter during the rotary movement of the cutter-head.
80

24. In a match-making machine, the combination with means for cutting splints, of means for feeding the material to the cutting means, a carrier for the splints, means for giving the carrier a regular intermittent or
85 step-by-step motion, ratchet-and-pawl mechanism for operating the feeding means, a second ratchet mechanism, and means for operating the second ratchet mechanism to stop the first-mentioned ratchet mechanism and
90 the material-feeding means at stated or fixed intervals, substantially as and for the purpose described.

25. In a match-making machine, the combination with means for cutting splints, of means for feeding the material to the cutting means, a carrier for the splints, means for giving the carrier a regular intermittent or
95 step-by-step motion, ratchet-and-pawl mechanism for operating the feeding means, a second ratchet-wheel, means for operating the second wheel, and one or more trips carried by the second ratchet-wheel to disengage the pawl from the first-mentioned ratchet mechanism and thereby stop said mechanism and
105 the splint-material-feeding means, substantially as and for the purpose described.

JAMES A. EKIN CRISWELL.

Witnesses:

WILLIAM FOSTER,
A. W. STANLEY.