

J. RICHARDSON & J. F. NEEF.
DYEING MACHINE.

APPLICATION FILED NOV. 13, 1908.

Patented July 13, 1909.

3 SHEETS—SHEET 1.

927,599.

Fig. 1.

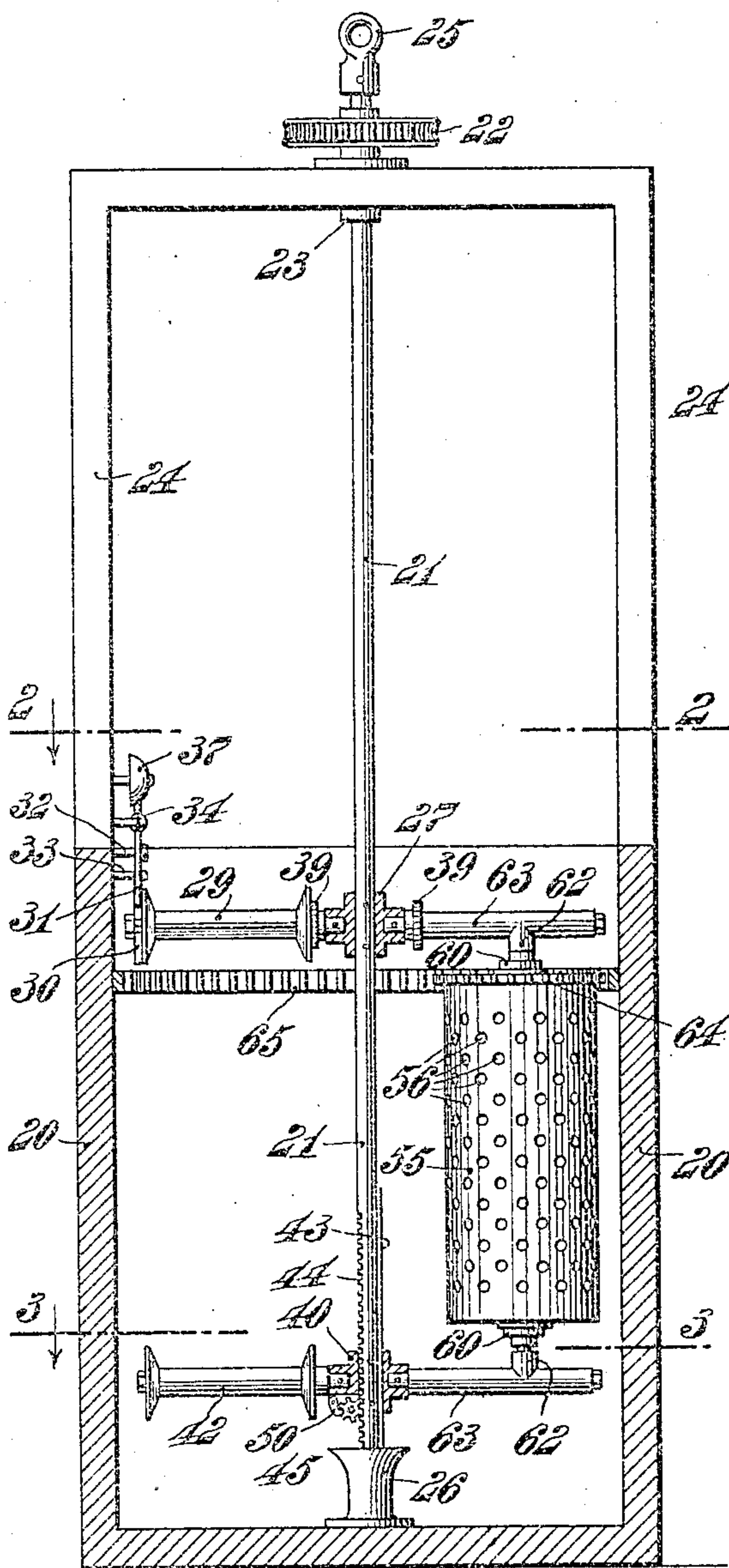


Fig. 2.

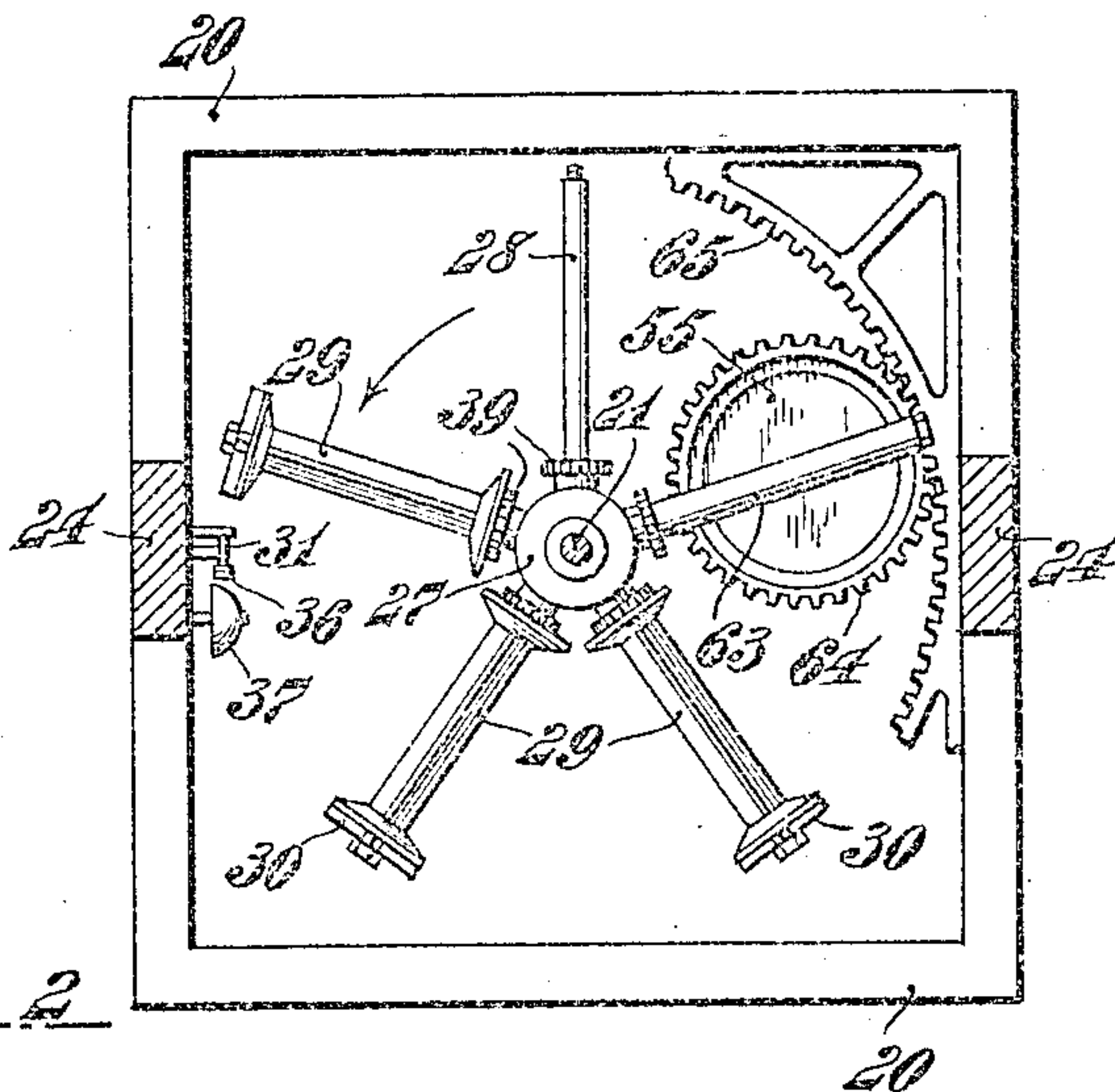
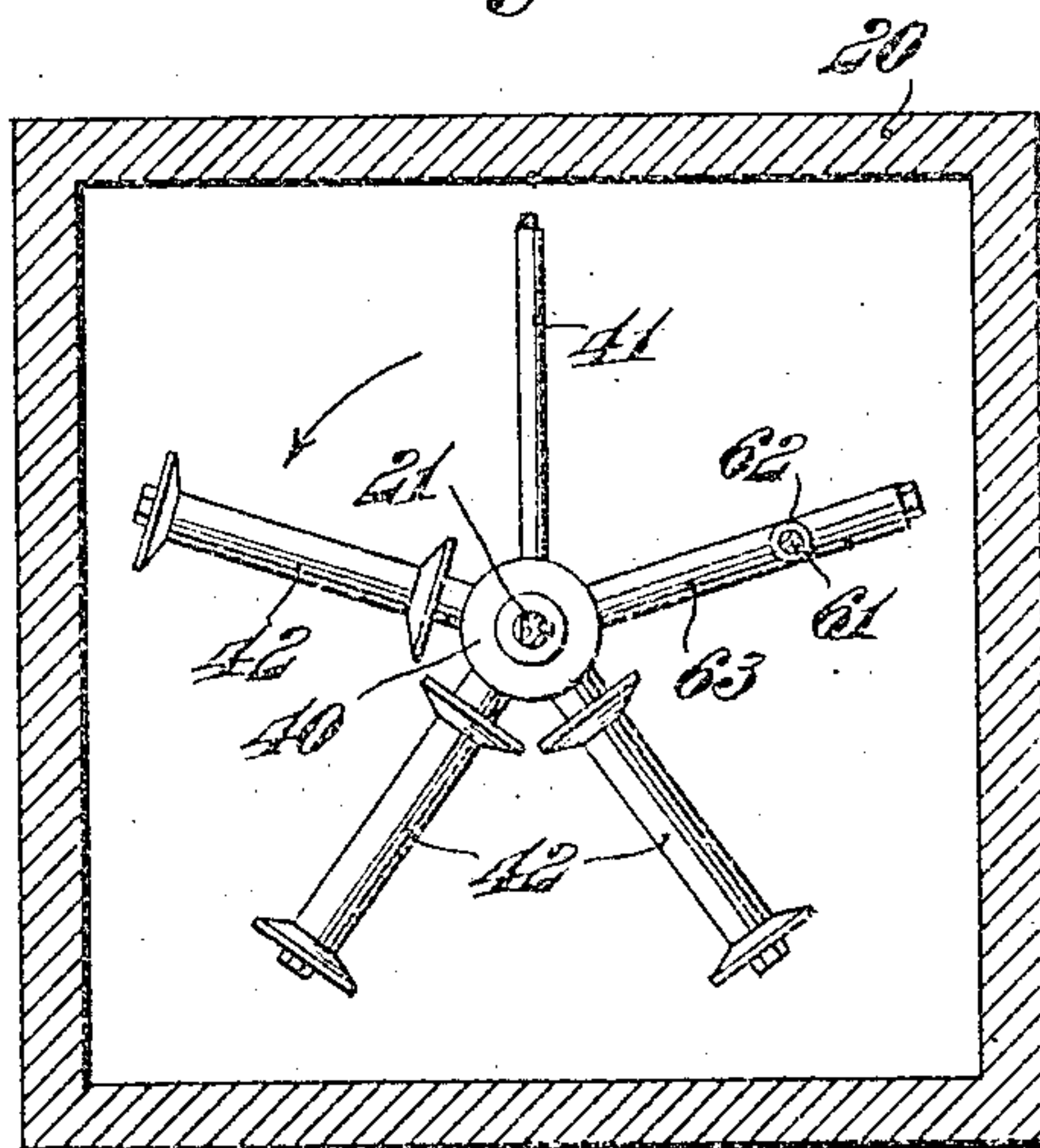


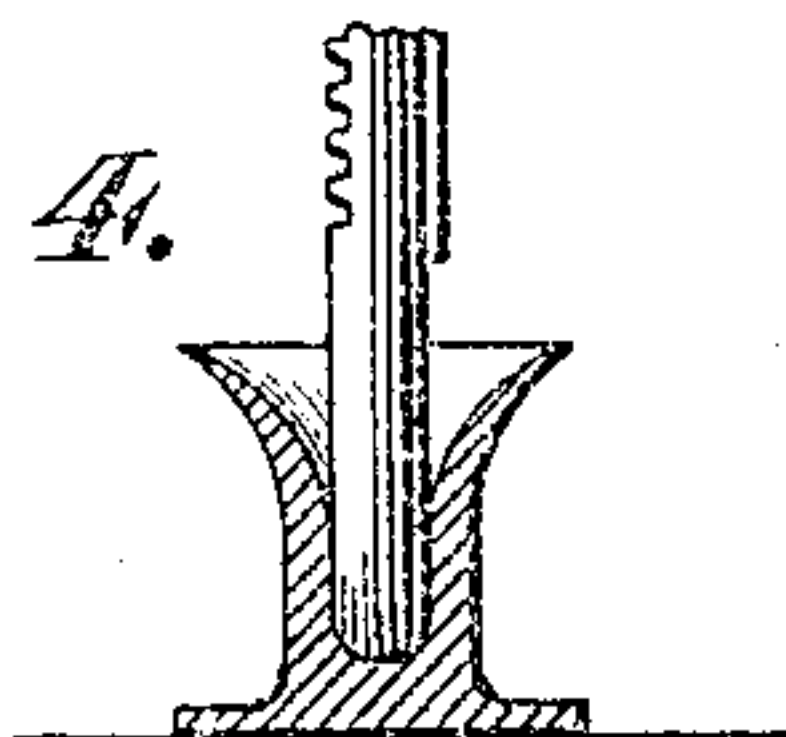
Fig. 3.



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Fig. 4.



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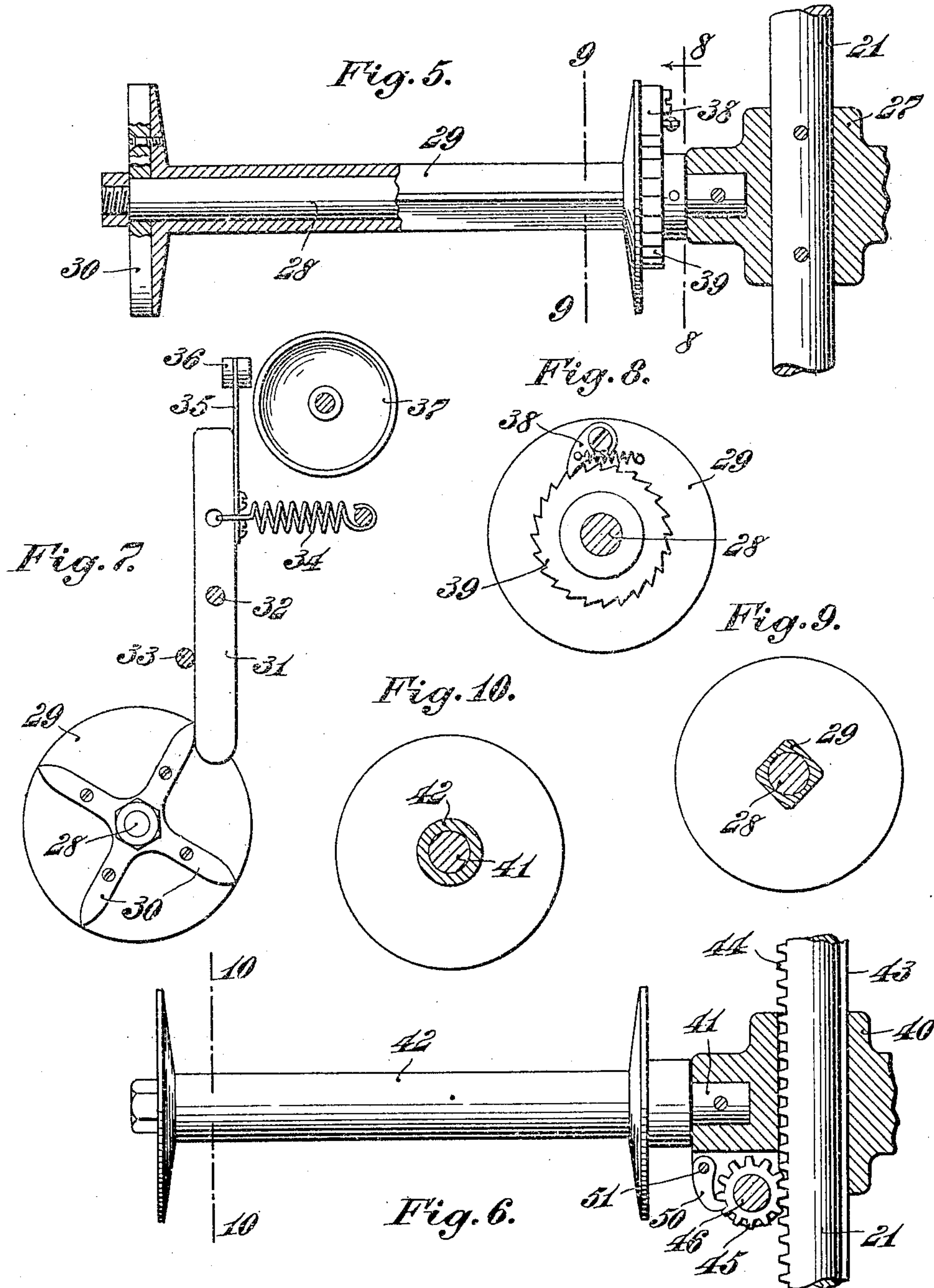
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3 SHEETS—SHEET 2.

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3 SHEETS—SHEET 3.

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Fig. 11.

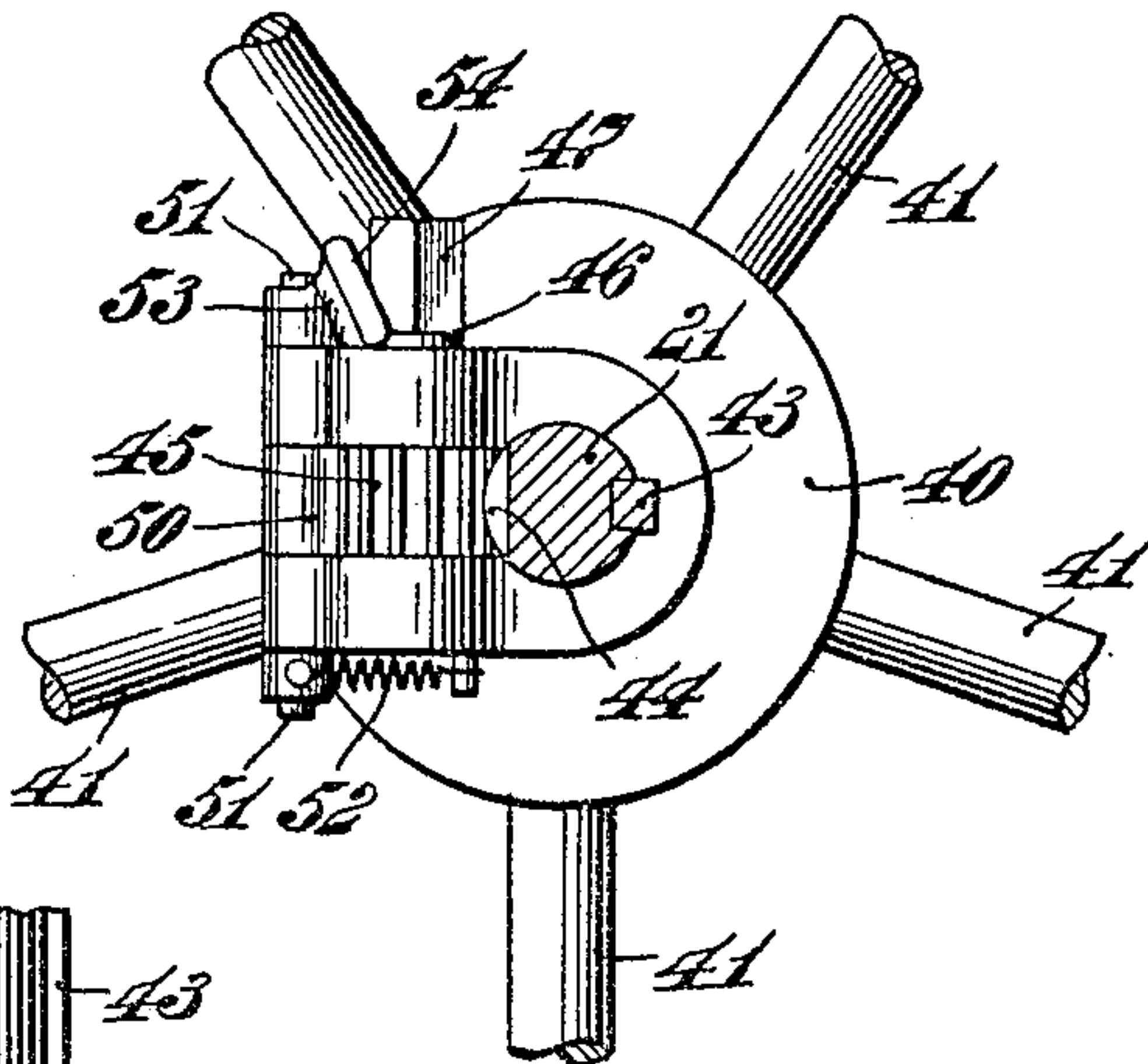


Fig. 12.

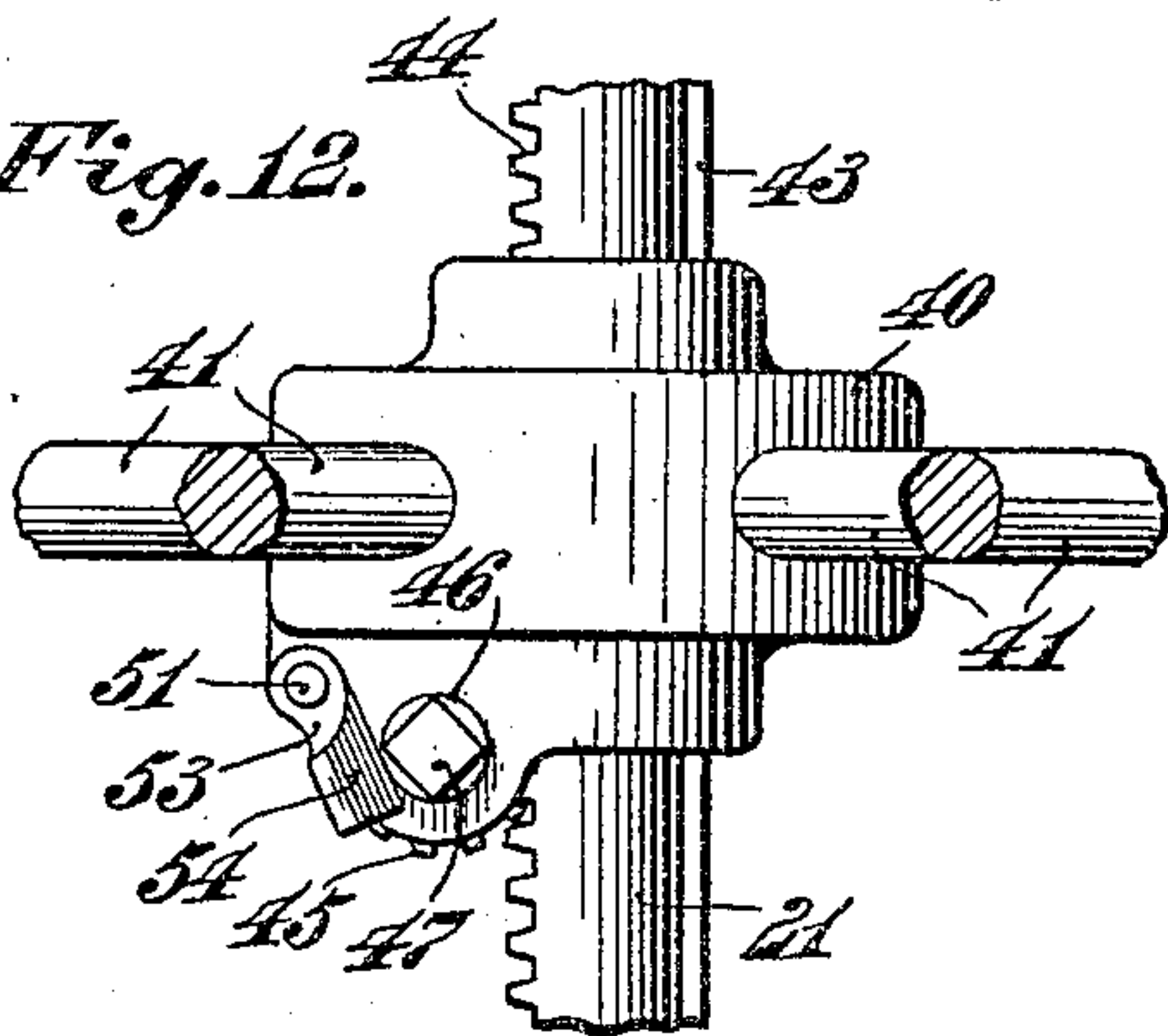


Fig. 13.

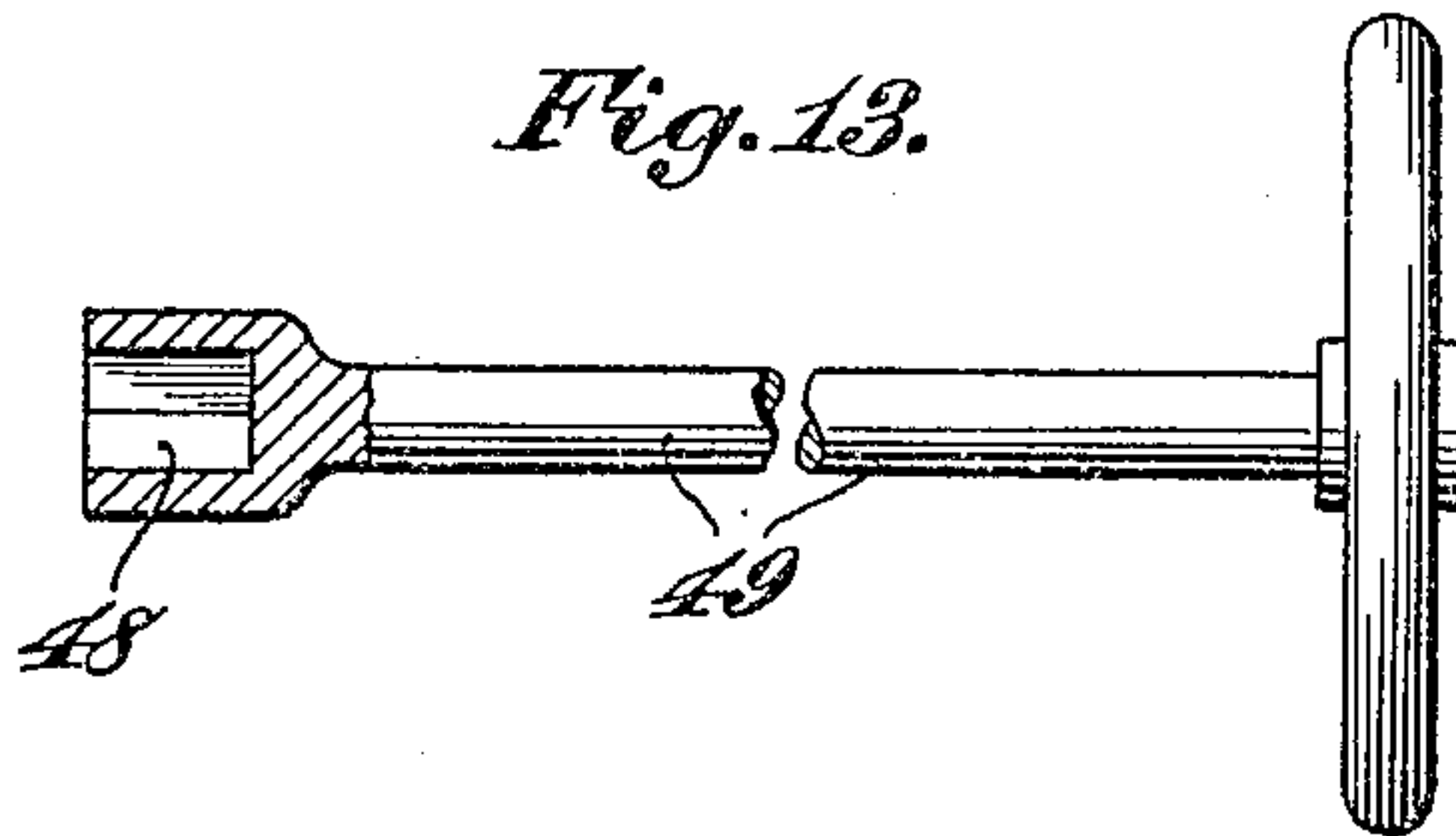


Fig. 14.

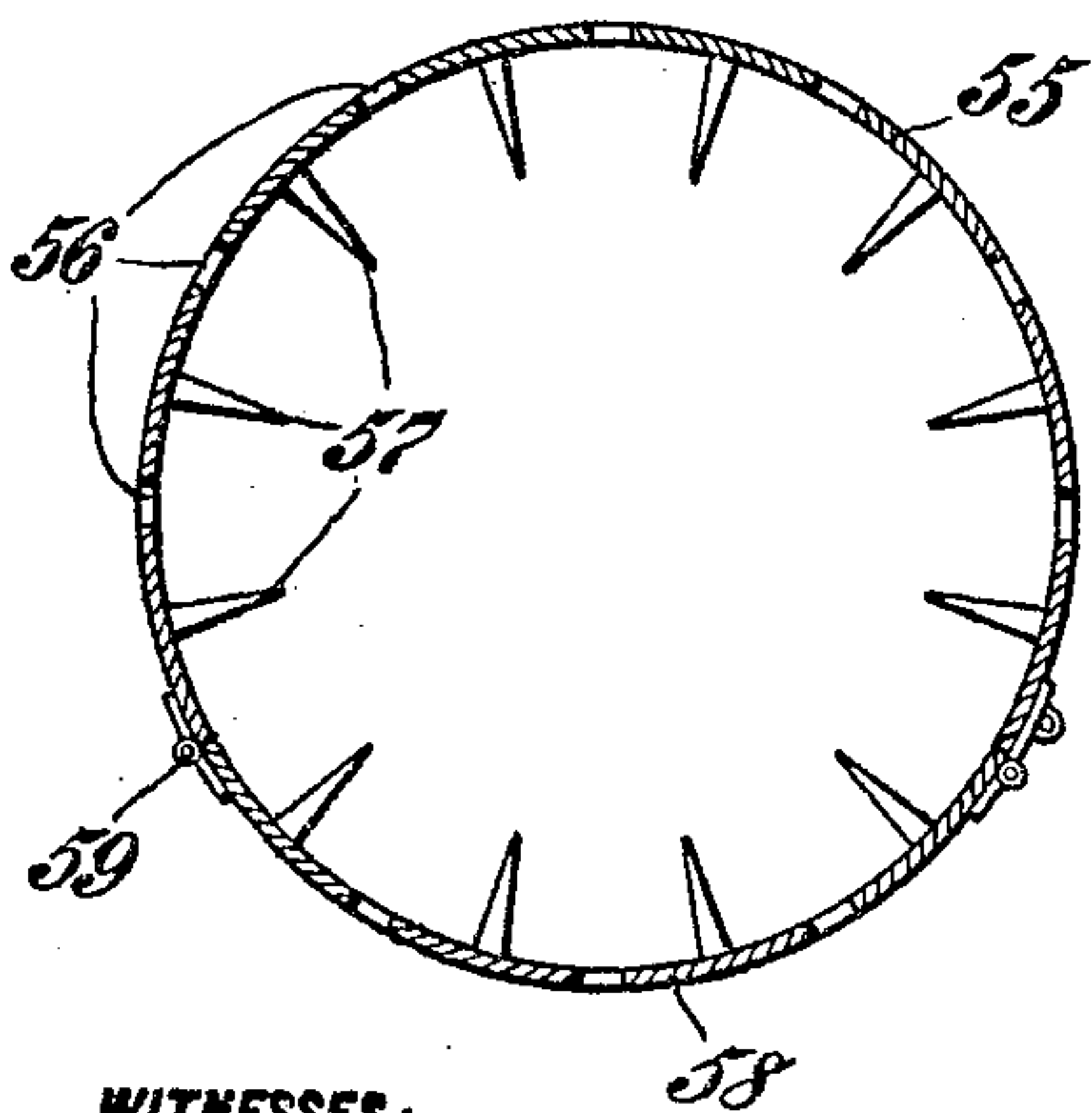
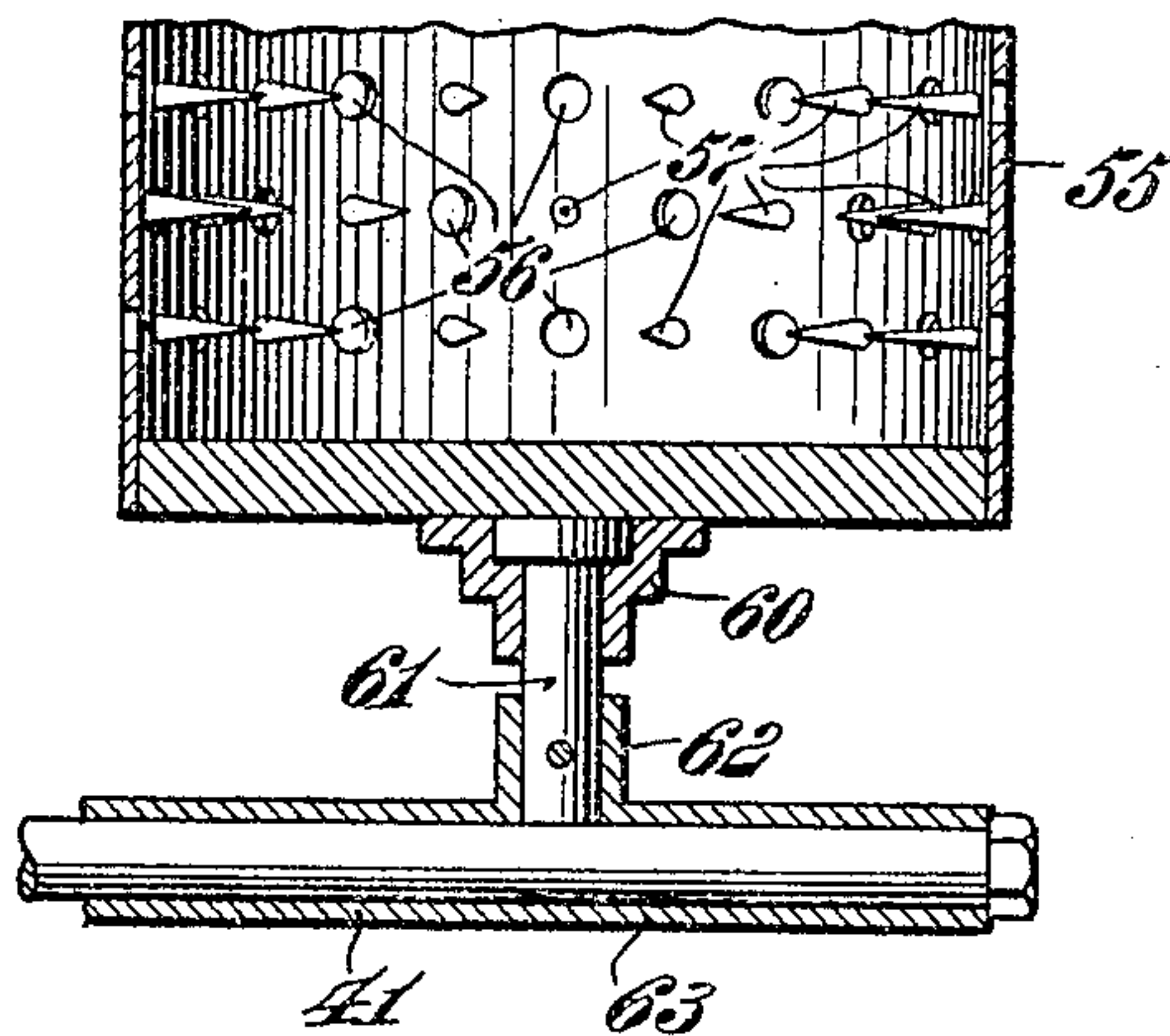


Fig. 15.



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UNITED STATES PATENT OFFICE.

JOSEPH RICHARDSON AND JACOB F. NEEF, OF PHILADELPHIA, PENNSYLVANIA.

DYEING-MACHINE.

No. 927,599.

Specification of Letters Patent.

Patented July 13, 1909.

Application filed November 13, 1908. Serial No. 462,467.

To all whom it may concern:

Be it known that we, JOSEPH RICHARDSON, a subject of the King of Great Britain, (who has declared his intention of becoming a citizen of the United States,) and JACOB F. NEEF, a citizen of the United States, both residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have jointly invented certain new and useful Improvements in Dyeing-Machines, of which the following is a specification.

Our invention relates to a dyeing machine and it has particular relation to a machine for dyeing yarn in skeins or for dyeing textile fibers in loose or unmanufactured condition.

The principal object of our invention is to provide a machine for dyeing textile materials in which all portions of the goods will be uniformly subjected to the action of the dye liquor.

Our invention finds a valuable application in connection with machines which are primarily designed for dyeing materials in small batches, although it may be embodied as well in machines of a larger type.

The nature and characteristic features of our invention will be more readily understood from the following description of one embodiment thereof, taken in connection with the accompanying drawings forming part hereof in which,

Figure 1 is a vertical central sectional view, partly in elevation, of a machine embodying the main features of our invention, Fig. 2 is a horizontal section, taken on the line 2—2 of Fig. 1, Fig. 3 is a horizontal section, taken on the line 3—3 of Fig. 1, Fig. 4 is a detail view in part section of a foot step bearing employed in the machine shown in Fig. 1, Fig. 5 is a detail view partly in section and partly in elevation of a spool upon which skein yarn is adapted to be supported in the machine for dyeing, this view also showing the manner in which the spool is mounted in the machine, Fig. 6 is a similar view of another spool and its manner of mounting, which spool forms in connection with the spool shown in Fig. 5, a pair over which the skein yarn is supported during the dyeing of the same, Fig. 7 is a detail view of the means for rotating the spools step by step during the operation of the machine, to the end that all portions of the skein will be uniformly subjected to the action of the dye liquor, Fig. 8 is a sectional detail view, taken

on the line 8—8 of Fig. 5, of means for preventing reverse rotation of the spools, Fig. 9 is a section of the spool shown in Fig. 5, taken on the line 9—9 of Fig. 5, Fig. 10 is a section of the spool shown in Fig. 6, taken on the line 10—10 of Fig. 6, Fig. 11 is an inverted plan view, partly in section, of the bracket in which the spindles for the spools shown in Fig. 6 are supported, Fig. 12 is a fragmentary side elevation of the same, Fig. 13 is an elevation, partly in section, of a socket wrench used to adjust the bracket shown in Fig. 11, vertically on the main vertical operating shaft of the machine, Fig. 14 is a horizontal section of a drum for containing loose or unmanufactured textile fibers during the dyeing of the same in the machine, and Fig. 15 is a vertical central section of the lower portion of the same, showing the manner of mounting the same on the spindles upon which the spools are mounted when skein yarn is being dyed.

Referring to the drawings, 20 is a tank or vessel adapted to contain the dye liquor. Vertically arranged in the vessel 20 is the main operating shaft 21, which may be driven in any suitable manner, but is shown provided with a worm wheel 22 which may be actuated by a worm, not shown. Shaft 21 is journaled at its upper end in a bearing 23 mounted in a suitable frame work 24 extending upward from the vat or vessel 20. The shaft 21 is journaled in bearing 23 in such manner that it may be slid vertically therein to raise the carried parts out of the dye liquor contained in the vessel 20. For this purpose also the upper end of shaft 21 may be provided with an eye 25 for engagement with the lifting apparatus, (not shown). The lower end of shaft 21 is journaled in a foot step bearing 26, shown in section in Fig. 4, the upper portion of bearing 26 being preferably made flaring so as to guide the shaft 21 to its proper position as the same is lowered into place.

Fixedly secured to shaft 21 in such position as to be beneath the surface of the dye liquor when shaft 21 is in its normal operative position in the vessel 20, is a bracket 27 which carries a series of radial spindles 28, fixedly secured therein. Upon each spindle 28 a spool 29 is loosely mounted so as to be capable of rotation thereon. To the outer flange of each spool 29 is secured a star wheel 30, so arranged as to encounter, during the rotation of shaft 21, the lower end of a lever 31

which in the normal operation of the machine acts as a stop to cause the rotation of spools 29 step by step as each arm of a star wheel encounters said lever 31. In the event of
 5 any of the spools 29 being prevented from rotating on account of the yarn becoming entangled or from other causes, it is necessary, to prevent breakage, to permit the star wheels to pass without being operated.
 10 For this purpose, the lever 31 is pivoted at 32 and is held in its normal position against a stop pin 33 by means of a spring 34 of such power as to hold the lower end of lever 31 against displacement by the star wheels
 15 30 under normal conditions of operation. Should however any of the star wheels be prevented from rotating as before stated, then the lower end of the lever 31 will be displaced against the tension of spring 34 and
 20 the star wheel allowed to pass. When this occurs however it is desirable that some indication be had of the improper conditions existing and for this purpose the upper end of lever 31 is provided with a leaf spring 35
 25 carrying a hammer 36 at its free end which is adapted to strike a bell 37 arranged in the path of the hammer 36 in such manner as to cause an audible alarm to be sounded as the lever 31 returns to its normal position after
 30 it has been displaced under the conditions stated. To prevent reverse rotation of the spools 29 from causes which will hereinafter be more fully set forth, the inner flanges of the spool 29 are each provided with a pawl
 35 38 which engages with a ratchet wheel 39 mounted and secured against rotation on each spindle 28.

Slidably mounted on the lower portion of the vertical shaft 21 is a bracket 40 in which
 40 are carried a series of radial spindles 41, arranged one under each spindle 28 carried by the upper bracket 27. Loosely mounted on each of the spindles 41 is a spool 42 which is capable of free rotation on its spindle, each
 45 of the spools 42 forming in connection with the spools 29 arranged above it, a pair of spools over which skeins of yarn are adapted to be carried in the vessel 20 for dyeing. The lower bracket 40 is keyed against rota-
 50 tion on the shaft 21 by means of a key 43, but is capable of vertical adjustment thereon. For the purpose of this adjustment the shaft 21 has a rack 44 cut in it, which rack 44 is engaged by a gear wheel 45 mounted on a
 55 shaft 46 which is journaled in bracket 40, so that by turning the shaft 46 and its gear 45 the bracket 40 can be raised or lowered to any desired position on the vertical shaft 21. One end of gear shaft 46 is made square as at
 60 47 for engagement by the square socket 48 of a wrench 49 when it is desired to turn the same for the purpose stated. To lock the bracket 40 at any given position on the shaft 21 there is provided a pawl 50 carried on a
 65 shaft 51 also journaled in the bracket 40, the

arrangement being such that the pawl 50 normally engages the gear 45 and is held in such position by means of a spring 52 to lock the gear against rotation. The end of pawl shaft 51 adjacent the square end 47 of shaft
 70 46 is provided with a finger 53 having an inclined surface 54, the arrangement being such that when the socket wrench 49 is placed on the square end 47 of gear shaft 46 the finger 53 will be pushed aside and by thus
 75 slightly rotating pawl shaft 51 causing the pawl 50 to be lifted out of engagement with gear 45 to allow the same to be turned by the socket wrench 49 and thus allow the bracket 40 to be moved to the desired position on the
 80 vertical shaft 21.

The operation of the machine as thus far described is as follows:—The vertical shaft 21, with the parts carried thereby, is first
 85 raised and held in its raised position to hold the spools out of the dye liquor contained in the vessel 20. The skeins of yarn are now mounted on the spools by first placing them on the upper spools and then over the lower
 90 spools, the lower set of spools being then adjusted down on the vertical shaft 21, in the manner hereinbefore indicated to thereby slightly tension the skeins between the pairs of spools. The vertical shaft is now lowered
 95 into the vessel 20 to cause the yarn carried by the spools to be immersed in the dye liquor. Shaft 21 being now rotated, as the star wheel 30 of each spool 29 encounters the lower end of lever 31, the spool will be rotated step by
 100 step on its spindle to cause the portion of the yarn which was in proximity to the spool to be advanced so that all portions of the yarn will be evenly and uniformly subjected to the action of the dye liquor. It will therefore be
 105 understood that the upper set of spools may be considered as driving pulleys, the skeins of yarn constituting belts, and the lower set of spools constituting idle driven pulleys, over which the yarn passes as it is also rotated in
 110 the vessel about the main vertical shaft 21. For the purpose of securing a better hold on the yarn the upper set of spools 29 are preferably made square in cross section as shown in Fig. 10. In the event of the spools being
 115 prevented from rotating from any cause, the device shown in Fig. 7 will be brought into play as hereinbefore described. The yarn being somewhat elastic and the spools being loosely mounted on their respective spindles,
 120 it is possible that the ascending portion of the yarn over the spools might be stretched as the star wheels are actuated and to prevent a reverse rotation of the spools from this cause the pawls 38 and ratchets 39 are provided, the arrangement and construction and
 125 operation of which are hereinbefore described. The vertical adjustment of the lower set of spools in addition to permitting the skeins of yarn to be placed on the spools over the flanges thereof, also serves to allow
 130

various sizes or lengths of skeins to be dyed in the same machine.

When it is desired to dye loose or unmanufactured textile fibers such as cotton or wool in the machine, the spools are removed from their respective spindles and drums 55 placed thereon as indicated in Figs. 1, 2, 3, and 15 of the drawings. The walls of the drums 55 are perforated as at 56 and are provided on their interior with a series of prongs or spikes 57 to maintain the material in a suspended condition in the drums. One portion 58 of the cylindrical walls of the drums is hinged as at 59 to constitute a door for the insertion and removal of the material. To mount the drums 55 on the spindles, each end of each of the drums is provided with a bearing 60 having studs 61 journaled therein, the studs 61 forming an axis of rotation for the drums 55. The studs 61 are secured in side extensions 62 of sleeves 63 which are slid on the spindles 28 and 41 at the top and bottom respectively. It will thus be seen that the drums 55 are free to rotate on their axes and to insure this rotation they are provided at one end with a gear 64 which is arranged to mesh with an internal gear 65 which may be fixedly or removable mounted in the vessel 20. The drums 55 will therefore not only rotate about the vertical shaft 21 but will also have an additional rotation about their own axes to thereby insure a thorough permeation of the dye liquor through the material contained within them.

What we claim as new and desire to secure by Letters Patent is:

1. The combination of an open unitary dye containing vessel, a vertical shaft revolvably mounted therein, two series of spools carried by said shaft and extending radially therefrom within the dye containing vessel, one spool of one series constituting with a spool of the other series a pair over which skeins of yarn are adapted to be mounted, the upper series of spools being fixed to the revoluble shaft and the lower series of spools being simultaneously vertically adjustable thereon, and means located near the top of said vessel for rotating said spools on their individual axes during the rotation of the vertical shaft.

2. The combination of an open unitary dye containing vessel, a vertical shaft revolvably mounted therein, two series of spools carried by said shaft and extending radially therefrom within the dye containing vessel, one spool of one series constituting with a spool of the other series a pair over which skeins of yarn are adapted to be mounted, the upper series of spools being fixed to the

revoluble shaft and the lower series of spools being simultaneously vertically adjustable thereon, means for locking the lower series of spools in desired adjusted positions, and means located near the top of said vessel for rotating said spools on their individual axes during the rotation of the vertical shaft.

3. The combination of a dye containing vessel, a vertical shaft revolvably mounted therein, brackets carried by said shaft, radial spindles carried by said brackets, spools adapted to receive skein yarn and drums adapted to receive loose or unmanufactured textile fibers, said spools and said drums adapted to be interchangeably mounted on said spindles.

4. The combination of an open unitary dye containing vessel, a vertical shaft revolvably mounted therein, a series of spools carried by said shaft and extending radially therefrom within said dye containing vessel, means for rotating said spools about their individual axes during the rotation of the vertical shaft, and means for rendering said rotating means inoperative under abnormal conditions.

5. The combination of an open unitary dye containing vessel, a vertical shaft revolvably mounted therein, a series of spools carried by said shaft and extending radially therefrom within said dye containing vessel, means for rotating said spools about their individual axes during the rotation of the vertical shaft, means for rendering said rotating means inoperative under abnormal conditions, and means for indicating the non-rotation of the spools under such conditions.

6. The combination of an open unitary dye containing vessel, a vertical shaft revolvably mounted therein, two series of spools carried by said shaft and extending radially therefrom within said dye containing vessel, the upper series of spools carrying star wheels at their outer ends, and a lever adapted to be encountered by said star wheels during the rotation of the vertical shaft to thereby cause said spools to be rotated on their individual axes, said lever being pivoted intermediate its ends and maintained in its normal position by means of a spring, and carrying an alarm element at one end thereof.

In testimony whereof we have hereunto signed our names in the presence of two witnesses.

JOSEPH RICHARDSON.
JACOB F. NEEF.

Witnesses:

HENRY D. McCORD WEIR,
ALBERT BELEW.