

No. 702,197.

Patented June 10, 1902.

J. J. GARRITY.  
TUBE MACHINE.

(Application filed June 17, 1901.)

(No Model.)

4 Sheets—Sheet 1.

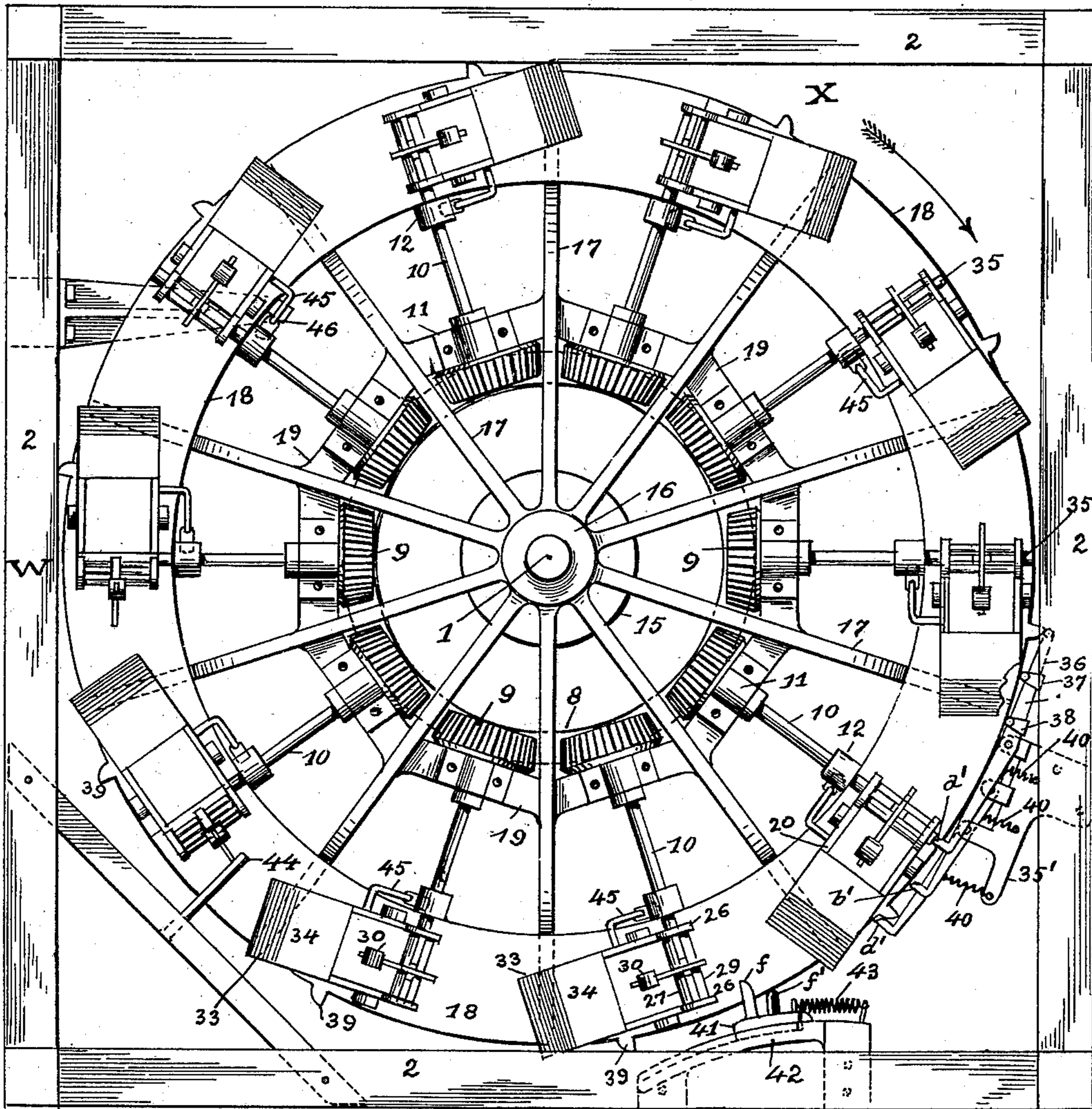


Fig. 1.

Witnesses.

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by *W. A. C. C.*  
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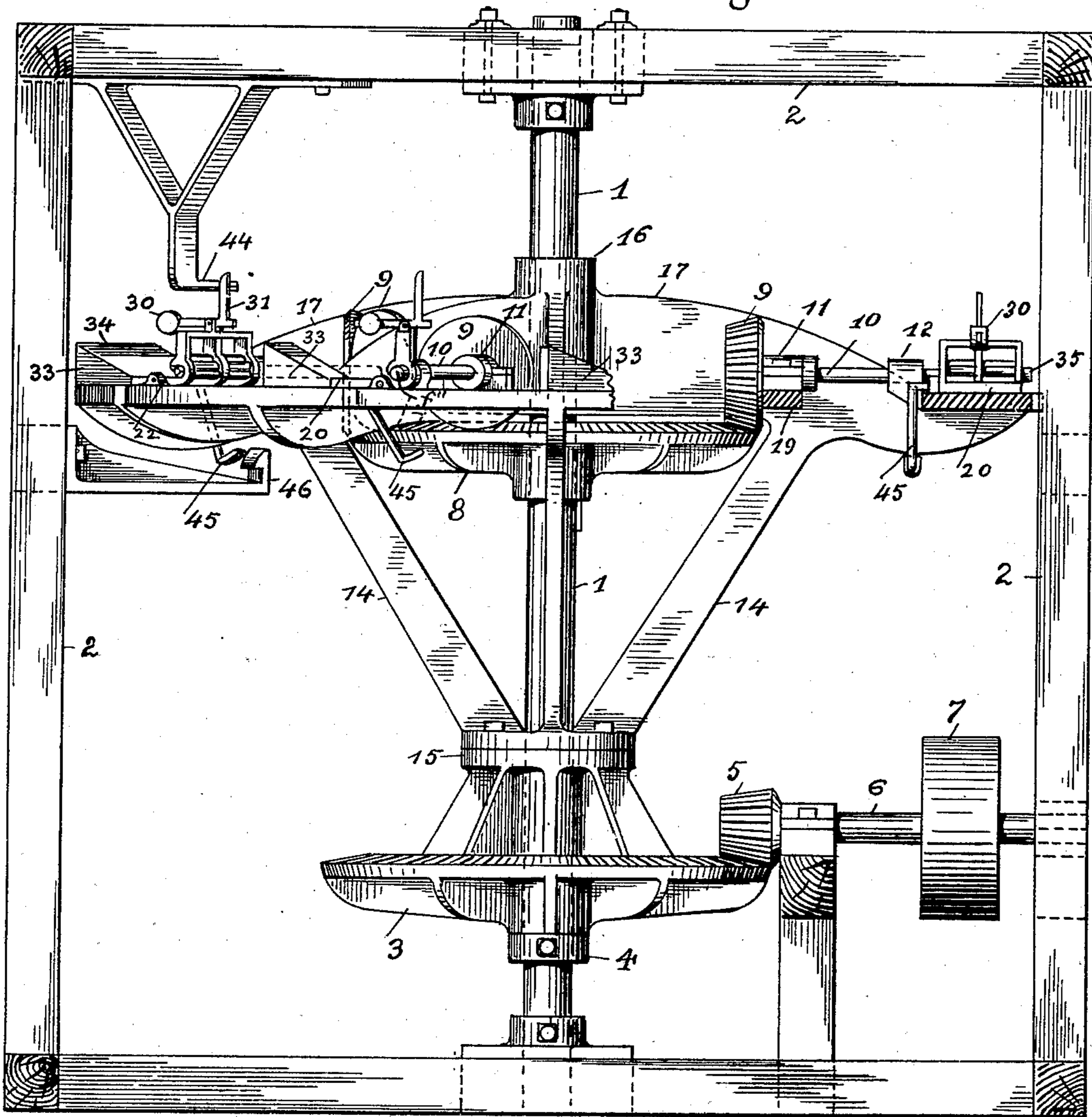
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(No Model.)

4 Sheets—Sheet 2.

Fig. 2.



Witnesses.

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4 Sheets—Sheet 3.

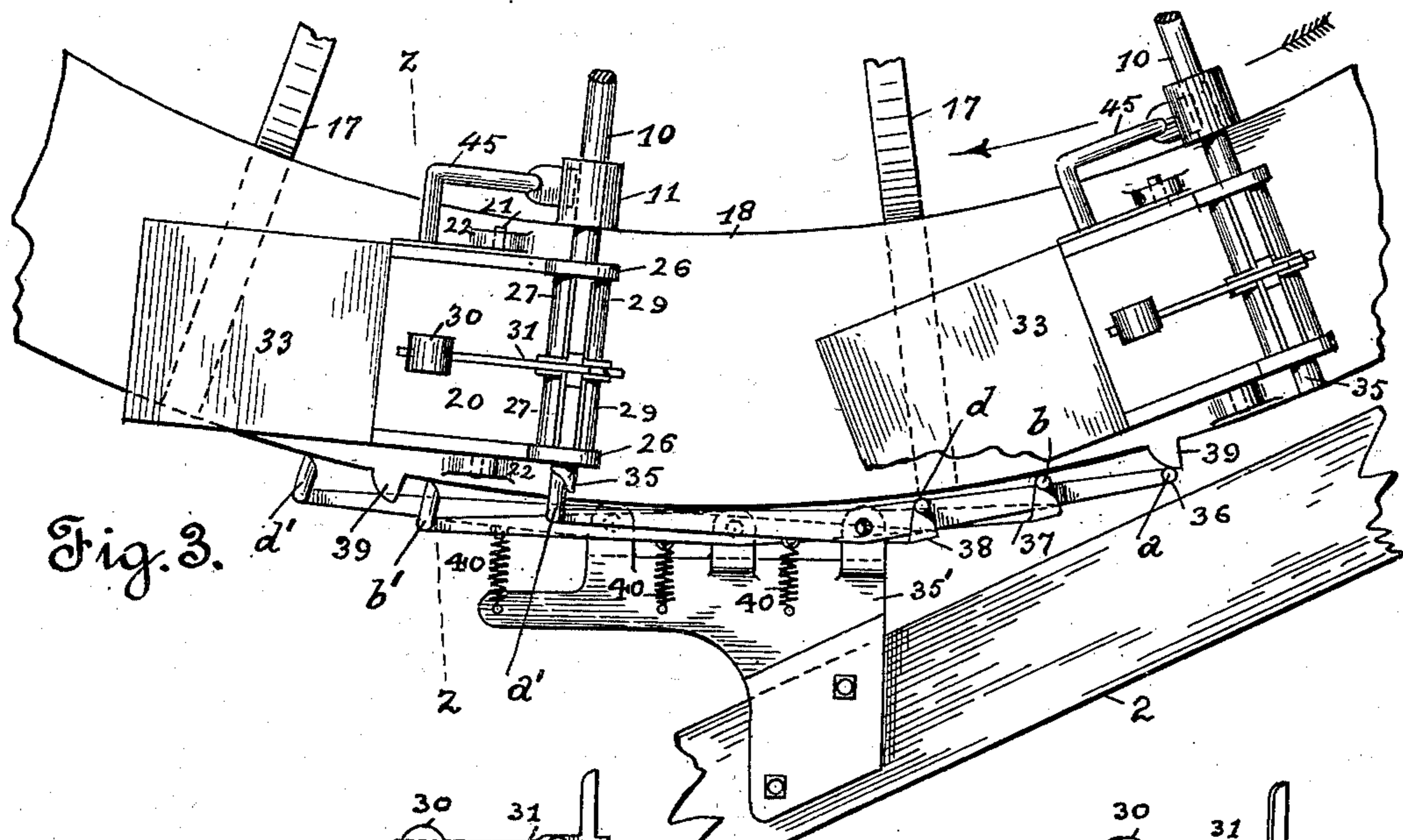


Fig. 3.

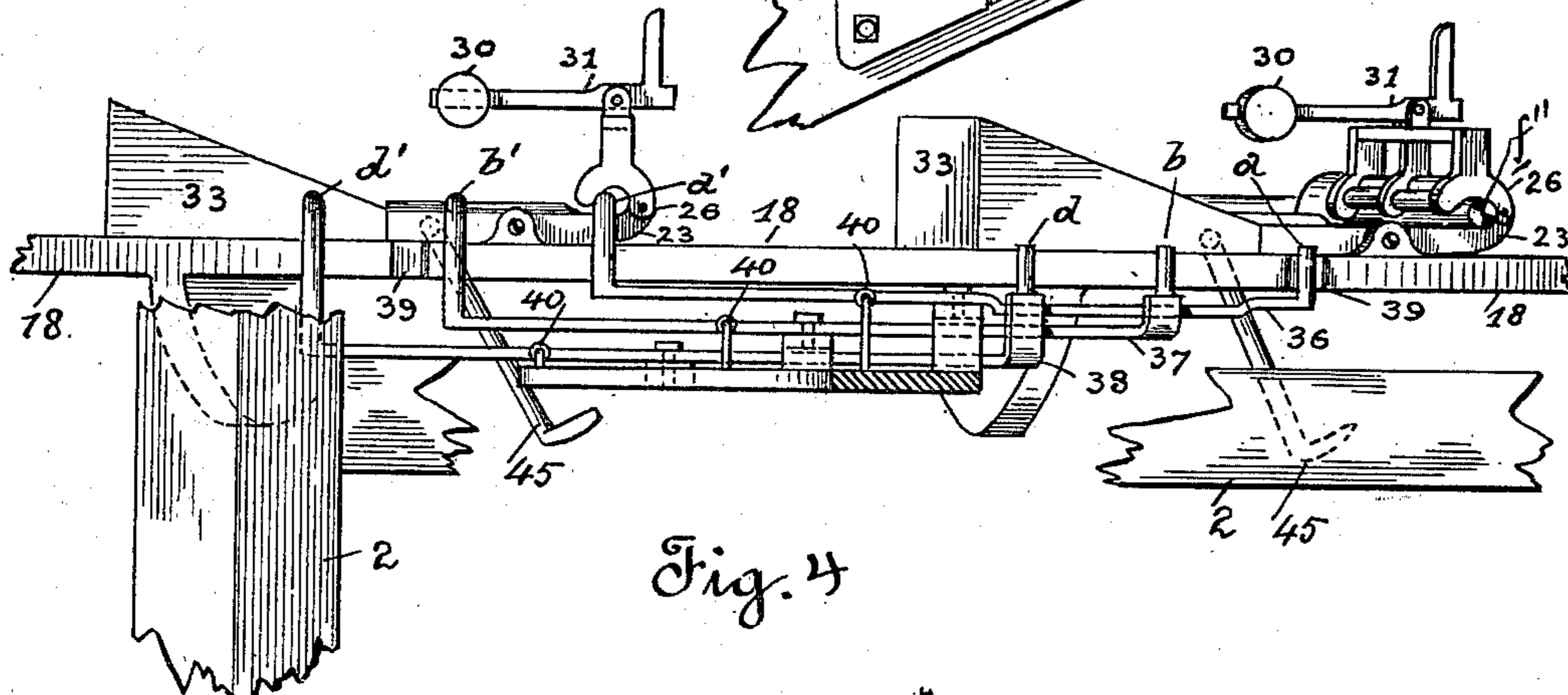


Fig. 4.

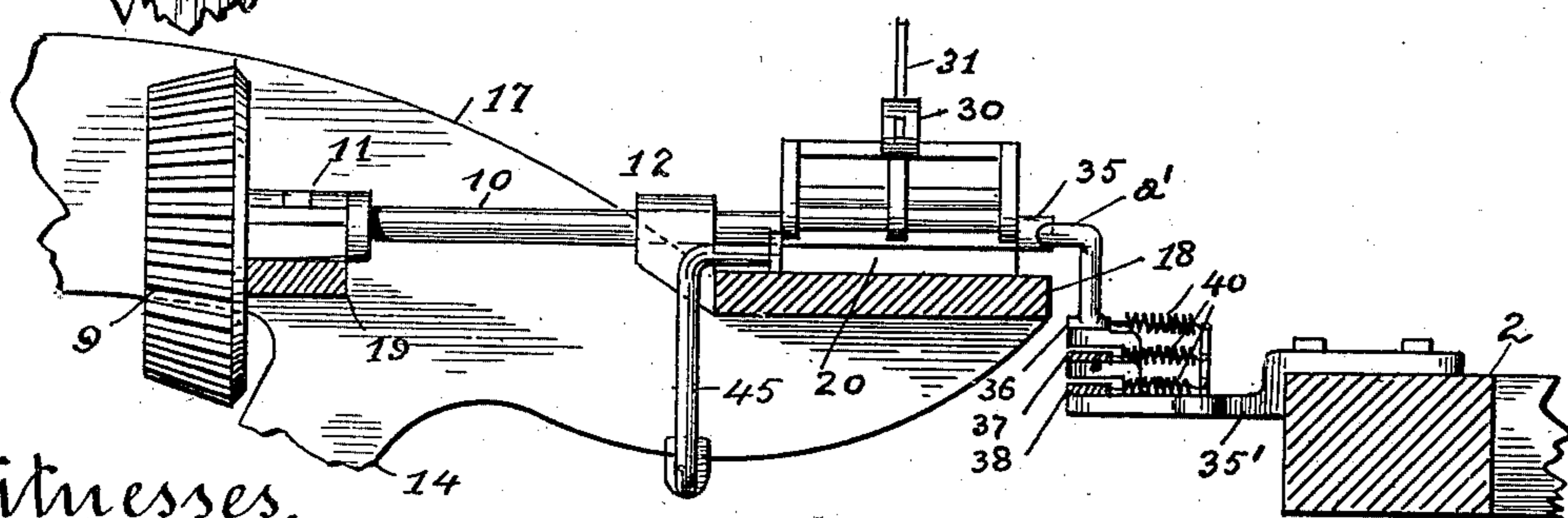


Fig. 5.

Witnesses.

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4 Sheets—Sheet 4.

Fig. 6.

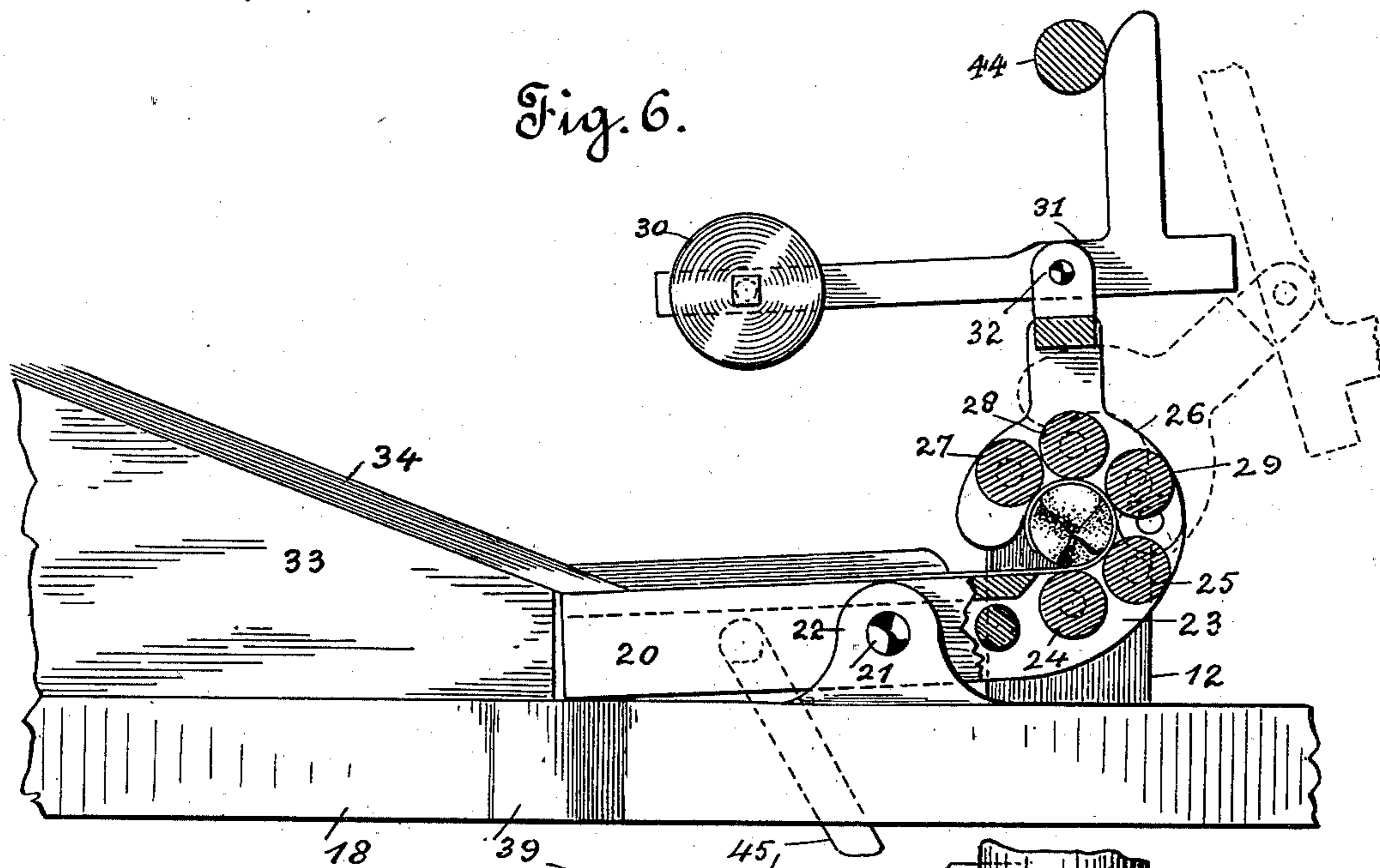
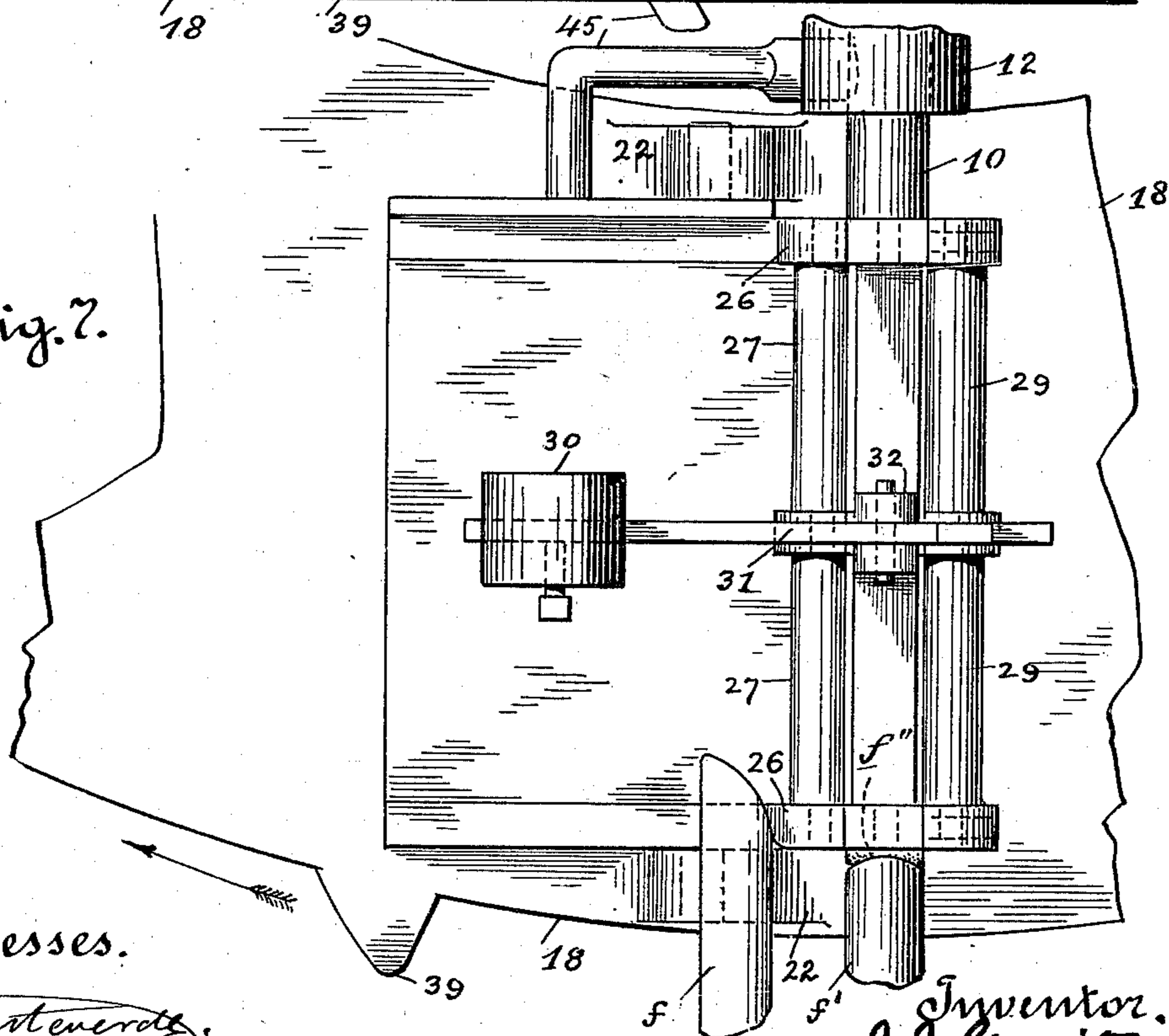


Fig. 7.



Witnesses.

*J. J. Garrity*  
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Inventor.  
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# UNITED STATES PATENT OFFICE.

JAMES J. GARRITY, OF PINOLE, CALIFORNIA.

## TUBE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 702,197, dated June 10, 1902.

Application filed June 17, 1901. Serial No. 64,847. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES J. GARRITY, a citizen of the United States, residing at Pinole, county of Contra Costa, State of California, have invented certain new and useful Improvements in Tube-Machines; and I do hereby declare the following to be a full, clear, and exact description of the same.

The present invention relates to a certain new and useful apparatus for manufacturing shells or tubes within which sticks of dynamite are placed or packed, the tube or shell acting as an envelop for the explosive material, the object of the invention being to facilitate the manufacture of such shells or tubes and reduce the cost incident thereto. Ordinarily these shells or tubes are made by hand, the paper being rolled around a stick of proper size and the overlapping edge glued or pasted down, after which one of the open ends of the tube or shell is closed. Care is required in order to properly roll and close the shell or tube and much time required in order to make one a proficient operator. By the hereinafter-described machine it is desired to provide means whereby the tubes or shells may be rolled, seamed, and the end closed mechanically, thereby making the tubes or shells mechanically perfect or of uniform size.

To comprehend the invention, reference should be had to the accompanying sheets of drawings, wherein—

Figure 1 is a top plan view of the machine; Fig. 2, a side view in elevation. Fig. 3 is a part broken enlarged plan view illustrating the means for crimping the projecting end of the tube or shell; Fig. 4, a side view of the mechanism set forth in Fig. 3 of the drawings. Fig. 5 is a cross-sectional end view in elevation on line *z z*, Fig. 3, one of the drive-pinions being attached to its shell or tube former; Fig. 6, an enlarged detail end view of one of the forming mechanisms, and Fig. 7 is a top plan view of the mechanism disclosed by Fig. 6.

Referring to the drawings, Fig. 2, the numeral 1 is used to indicate a central stationary shaft fitted within frame 2. To this shaft, near its bottom, is loosely fitted gear-wheel 3, being held in place by collar 4. This gear is driven by pinion 5, secured to

cross-shaft 6, which shaft is driven from any suitable source of power by a drive-belt (not shown) working over belt-wheel 7, fastened to the said shaft.

To the central shaft, a distance above the gear 3, is rigidly attached the gear 8, with which mesh the pinions 9, secured to the inner end of each former or mandrel 10. These formers or mandrels work in bearings 11 12 of a spider. This spider is arranged above the gear 8 and is connected to gear 3 by a series of downwardly-extending arms 14, which arms at their lower end are bolted to the hub 15 of gear 3. Being thus united, it is obvious that the spider is driven or rotated by gear 3.

The hub 16 of the spider is loosely mounted upon the central shaft 1, and between the arms 17 thereof work the pinions 9, Fig. 1 of the drawings. Bearings are attached to the connecting circular plates 18 and 19 of the spider.

The spider carries a series of forming mechanisms, ten in the present case, each comprising a base or platform 20, the trunnions 21 of which work in bearings 22, upwardly extending from the circular plate portion 18 of the spider. The rear end 23 of said plate is upwardly curved and has secured in bearings thereof the rolls 24 25. To this portion of the base or trunnioned platform is hinged the section 26, which also has secured in bearings thereof the rolls 27 28 29. These rolls when the hinged section is closed embrace the mandrel or former 10, which extends within the forming-rolls. If desired, the said rolls may be faced with rubber.

The hinged section 26 is held down or closed by the weight 30, which is adjustable upon the outwardly-extending arm of crank-lever 31, attached to upward extension 32 of said section.

In front of each platform or base 20, which are hung at a slight downward inclination, Fig. 6 of the drawings, is arranged an inclined table 33. This table rests upon the outer circular plate 18 of the spider and holds a layer or pile 34 of paper blanks. These blanks are so arranged or piled that the upper or top edge of each is exposed. By this arrangement an operator may apply paste to the edge of all sheets at one time.

The feed operator for the machine is stationed at point X, Fig. 1 of the drawings. As the forming mechanism approaches this point, due to rotation of the spider, with the hinged section 26 closed, the operator slips a sheet or paper blank from off its pile 34 and places the lower edge thereof between roll 24 and the former or mandrel 10. The former or mandrel 10 is driven or rotated by its pinion 9, which meshes with fixed gear-wheel 8. As the spider rotates the pinions 9 are carried therewith and meshing with gear 8 are rotated, and thus revolve or rotate the mandrels. The moment the lower edge of the paper is received between mandrel and roll 24 the blank is rapidly rolled around the mandrel until its pasted top edge overlaps and is rolled down firmly to seal same. Inasmuch as the paper blank is slightly wider than the platform or base 20, one end 35 of the rolled tube or shell, Fig. 3 of the drawings, will project beyond the forming-sections, which end is to be turned or crimped down in order to close same. This is accomplished in the following manner: From one of the side pieces of the frame is attached a bracket 35', to which are fulcrumed the levers 36, 37, and 38, each end of said levers being provided with an upwardly-extending finger. These levers are curved so that the fingers at the inner end thereof will be in the path of cams 39, attached to the outer edge of the plate 18 of the rotatable spider. The outer end of each fulcrumed lever is held outward by a spring 40, so that the finger at such end of the lever is normally held to one side of the line of travel of the forming mechanism. Presume the parts to stand in the position illustrated in Fig. 3 of the drawings—that is, each forming mechanism containing a rolled tube or shell. As carried by the travel of the spider, cam 39 in advance of the rear forming mechanism bears against finger *a* of fulcrum-lever 36 and forces same outward, thus throwing its forward end inward and placing its forward finger *a'* in line with projecting end 35 of the rolled tube or shell. The projecting end of the tube or shell bears against said finger and as moved thereagainst a third of its end is forced over or turned inward. By this time the cam 39 will have moved beyond finger *a*, when finger *a'* will be drawn outward by action of the spring. As cam 39 moves against finger *b* of lever 37 the same will be gradually forced outward and its forward finger *b'* moved inward. By this time the former or mandrel will have revolved, so that a fresh surface of the projecting end will be presented to finger *b'*. As carried against this finger, a second portion of the projecting end will be crimped or turned down, after which the finger is drawn outward beyond the line of travel, cam 39 having moved off of finger *b*. The said cam is then carried against finger *d* of fulcrumed lever 38 and forces same outward, causing finger *d'* of said lever to move inward, so as to engage the uncrimped portion of the

projecting tube or shell end as carried thereagainst by the travel of the spider. As carried past this finger, the remaining portion of the end is turned down or over, the end being thus crimped or closed. The projecting end, it will be observed, successively engages with the fingers *a'*, *b'*, and *d'*, each finger, so to speak, pressing down or crimping one-third of the exposed end. As the mandrel or former is continually rotating, a new surface will be presented to each finger. By the time the end of the forward tube or shell has been crimped that carried by the forming mechanism immediately behind will be in position to be acted upon by the first finger *a'*, which is thrown inward by cam 39 of the following forming mechanism bearing against finger *a* of lever 36 and forcing same outward, the operation thereafter being a repetition of that just described. The cam of the rear forming mechanism thus acts to operate the lever mechanism to crimp the end of the rolled tube or shell carried by the forming mechanism immediately in advance thereof. After the rolled tube or shell has been carried past the crimping-finger it is required or at least desirable that the crimped end be pressed firmly inward. For this purpose there is arranged a slight distance beyond the crimping devices the concaved slide-plate 41, which works against the convex face of plate 42. This slide-plate 41 is held back by spring 43. From the forward end of said plate projects the pins *f f'*. As the crimped tube or shell is moved past said slide-plate the forward pin *f* is engaged by outer forward edge of the closed hinged section 26 and the slide-plate drawn forward or outward by the travel of the spider. The second pin *f'* is such a distance from pin *f* that its end will press against the crimped end of the tube or shell. For a portion of its movement the slide-plate travels in the same arc as the spider. Consequently during this portion of its movement the pressure of pin *f'* increases upon the end of the rolled tube or shell and its crimped end is firmly pressed down or inward, the outer end of the former or mandrel being slightly cut, as at *f''*, out for this purpose. During the continued movement of the spider the slide-plate rides upon the outwardly-curved face of plate 41 and the pins are gradually forced away from the forming mechanism. The moment the pin *f* moves off the edge of the trunnioned base or platform spring 43 returns the slide-plate to its normal position. With the tube or shell thus rolled and crimped the forming mechanism is carried toward discharge-point W, where a workman is located to remove the rolled and crimped tubes or shells. During travel toward this point the upwardly-extending arm of the bell-crank lever 31 bears against projection or cam 44, causing same to move downward and throwing the hinged section 26 and the trunnioned base or platform upward. Thus opened the forming mechanism is carried toward operator located at point W, who grasps

the rolled tube or shell and slips same from off its mandrel. As each rolled tube or shell approaches point W it is in the same manner removed from the mandrel or former.

5 The only limit as to speed of the machine is the restriction placed thereon by the ability of the workman to feed the paper blanks to the forming-rolls and to extract the rolled tubes or shells from the mandrel or former.

10 As the empty mandrel or former is moved toward the feed-station X the crank-arm 45, depending from each base or platform 20, rides upon cam 46 and throws the tilted base or platform downward, when the weight 30 will cause the hinged section 26 to close. Thus closed the forming mechanism is moved or carried toward the feed-station for another blank to be fed thereto, after which the described operation is repeated.

20 By the hereinbefore-described apparatus a stronger, better, more durable, and more uniform tube or shell is produced than possible by hand and at a less cost.

I do not wish to be understood as confining myself to the employment of ten forming mechanisms, for the number may be increased or decreased as desired and a larger or smaller machine thus be provided. What has been illustrated is deemed the proper number of forming mechanisms for the manufacture of from forty to fifty thousand tubes or shells per day; but, as stated, the output may be increased or decreased by utilizing a greater or less number of forming mechanisms.

35 Having thus described the invention, what I claim as new, and desire to secure protection in by Letters Patent, is—

1. In an apparatus for forming paper shells for dynamite sticks, the combination with the horizontally-arranged rotatable spider, or table, of means for driving same, a series of forming mechanisms carried by the spider, a series of forming-rolls in each mechanism, a former or mandrel working between the forming-rolls of each mechanism, devices for rotating the former or mandrel during travel of the spider or table, of means whereby the projecting end of the rolled shell is crimped, and devices for opening and closing the forming mechanisms as carried toward the delivery and feeding stations.

2. The combination with the forming mechanism, of devices whereby the projecting end of the rolled shell is crimped during travel of the forming mechanism, the spring-held slide-plate carrying projecting pins, means for causing the pins to engage with the forming mechanism during a portion of its travel and firmly press down the crimped end of the shell.

3. In a machine of the character described, the combination with a rotary carrier, of mechanism mounted upon the surface thereof adapted to receive the blanks and roll the same around a mandrel or former, means for imparting rotation to the mandrel or former,

and devices arranged adjacent to the periphery of the carrier adapted to successively engage the end of the rolled shell to close the same.

4. The combination with the spider loosely mounted upon a fixed shaft, of means for imparting rotation thereto, a series of forming mechanisms carried by the spider, a mandrel or former working therein, a pinion attached to the inner end of each former or mandrel, a gear rigidly attached to the fixed shaft with which mesh the pinion of the former or mandrel, said pinion meshing with the fixed gear so as to impart rotation to the former or mandrel during travel of the spider, and means exterior to the carrier in the path of rotation thereof whereby the projecting end of the rolled shell is crimped or closed.

5. The combination with the forming mechanism comprising a fixed and a hinged section, of a series of rolls secured within each section, a mandrel or former working between said rolls, devices whereby said former or mandrel is rotated, means for crimping the projecting end of the rolled shell, and means for automatically throwing said hinged section out of operative position.

6. The combination with the rotary carrier or spider, of a series of trunnioned platforms, a series of forming-rolls secured therein, a section hinged thereto and carrying a series of rolls, a mandrel, or former working between said rolls, of devices whereby rotation is given to the former or mandrel during the travel of the rotary carrier, and means whereby the hinged section is opened and closed automatically.

7. The combination with a rotary carrier, of a series of trunnioned platforms carried thereby, and forming devices associated with said platforms, substantially as described.

8. In a machine of the character described, a former comprising a mandrel, hinged sections normally disposed around said mandrel, a plurality of rolls supported by each section and means for automatically throwing one of the sections out of operative position, substantially as described.

9. In a machine of the character described, tube-forming instrumentalities, means for conveying the same from point to point, and means supported independently of said conveying means adjacent to the edge thereof for crimping the end of the tube, substantially as described.

10. In a machine of the character described, a former comprising a mandrel, hinged sections disposed around said mandrel one above and the other beneath the same, rolls supported upon the surface of said sections, means for normally causing the hinged sections to approach, and means for throwing one of said sections up out of operative position, substantially as described.

11. In a machine of the character described, a rotary carrier, tube-forming instrumentalities

ties supported by said carrier, end-closing  
means including a pin and a shiftable sup-  
port therefor, and means brought into opera-  
tion by the movement of the carrier for en-  
5 gaging the pin-support to force the pin against  
the end of the tube, substantially as de-  
scribed.

In witness whereof I have hereunto set my  
hand.

JAMES J. GARRITY.

Witnesses:

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