

March 7, 1944.

E. CRAIG ET AL

2,343,445

MEANS FOR REMOVING DETACHABLE DRILL BITS FROM DRILL RODS

Filed Dec. 13, 1940

3 Sheets-Sheet 1

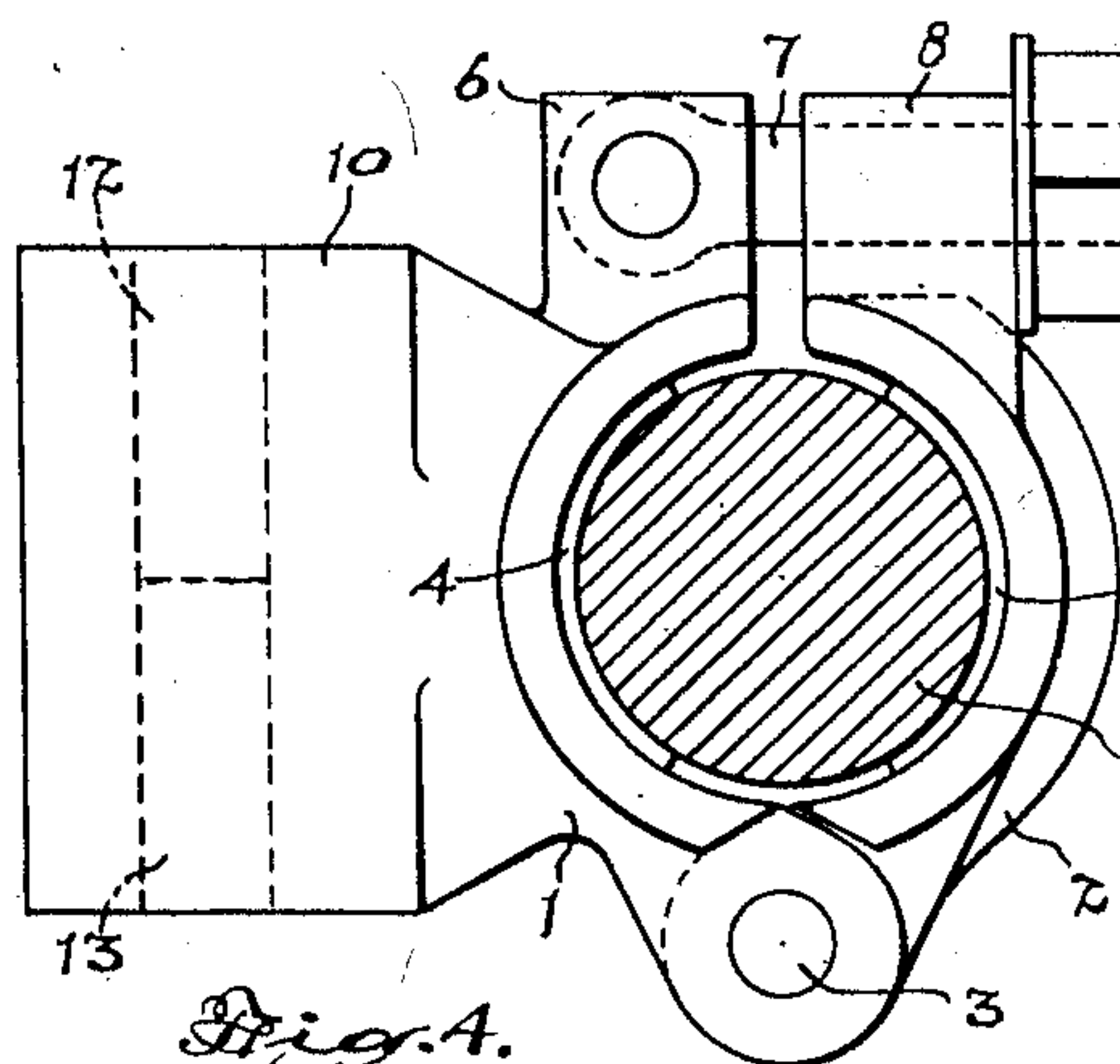


Fig. 4.

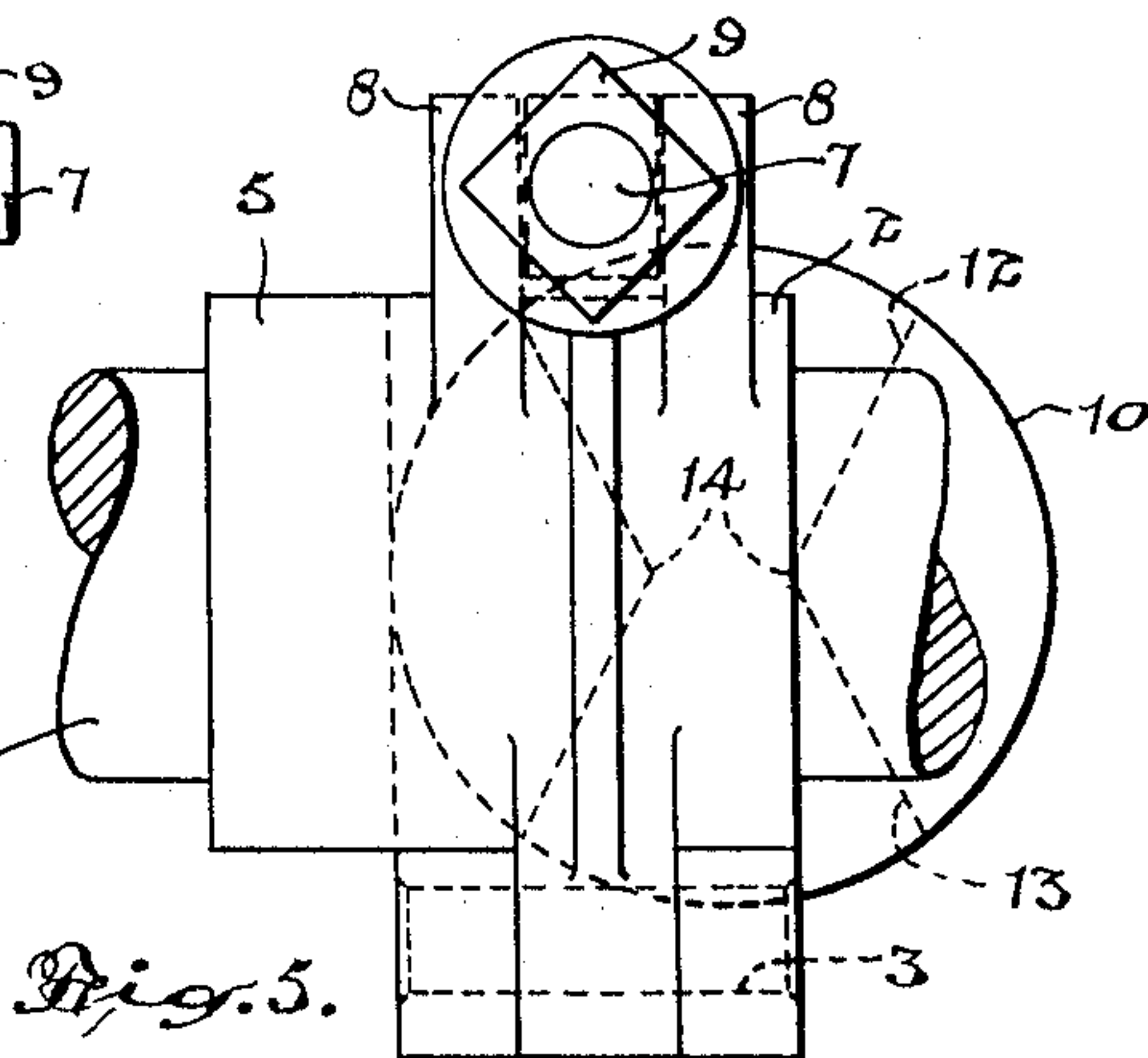


Fig. 5.

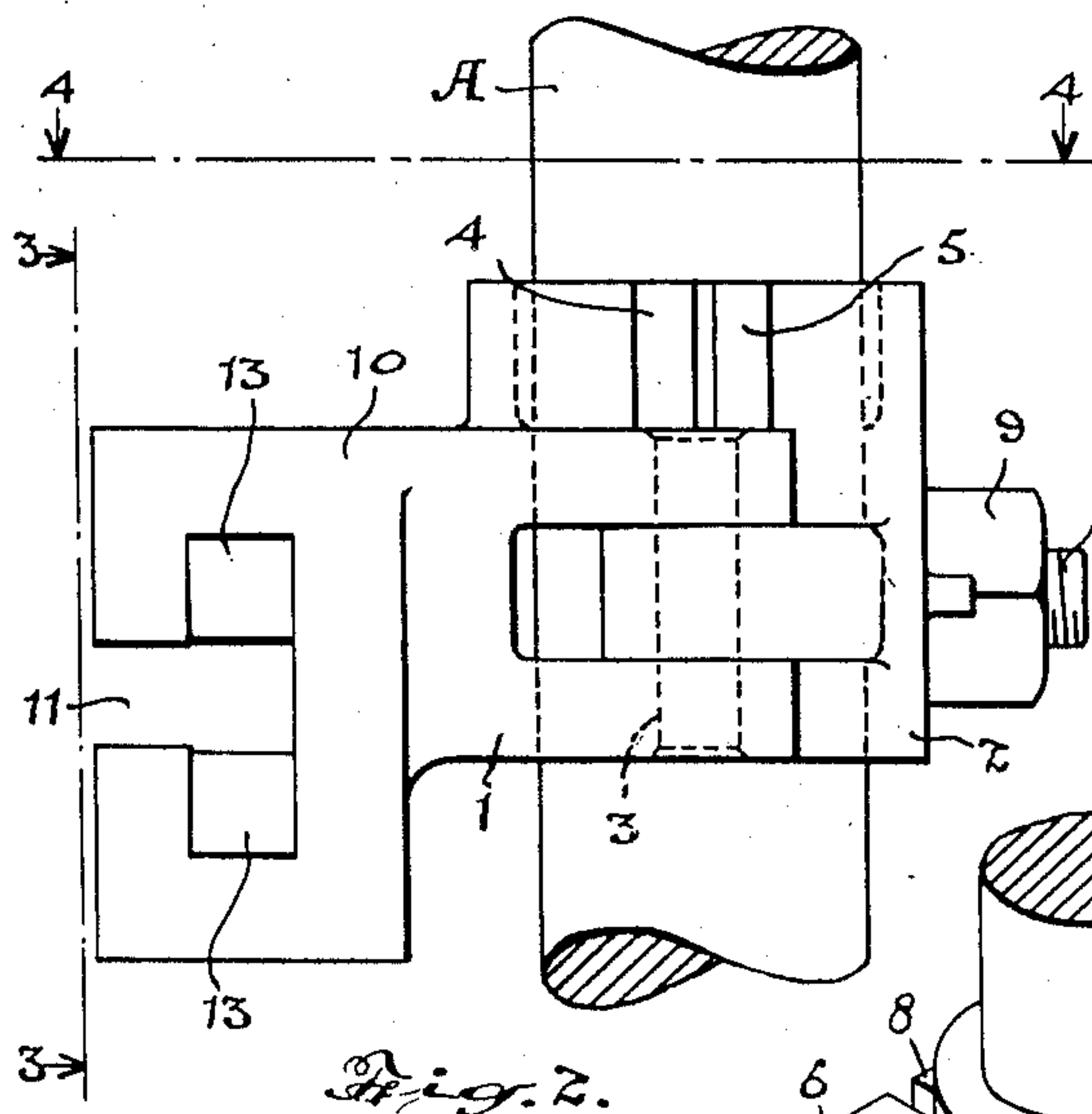


Fig. 2.

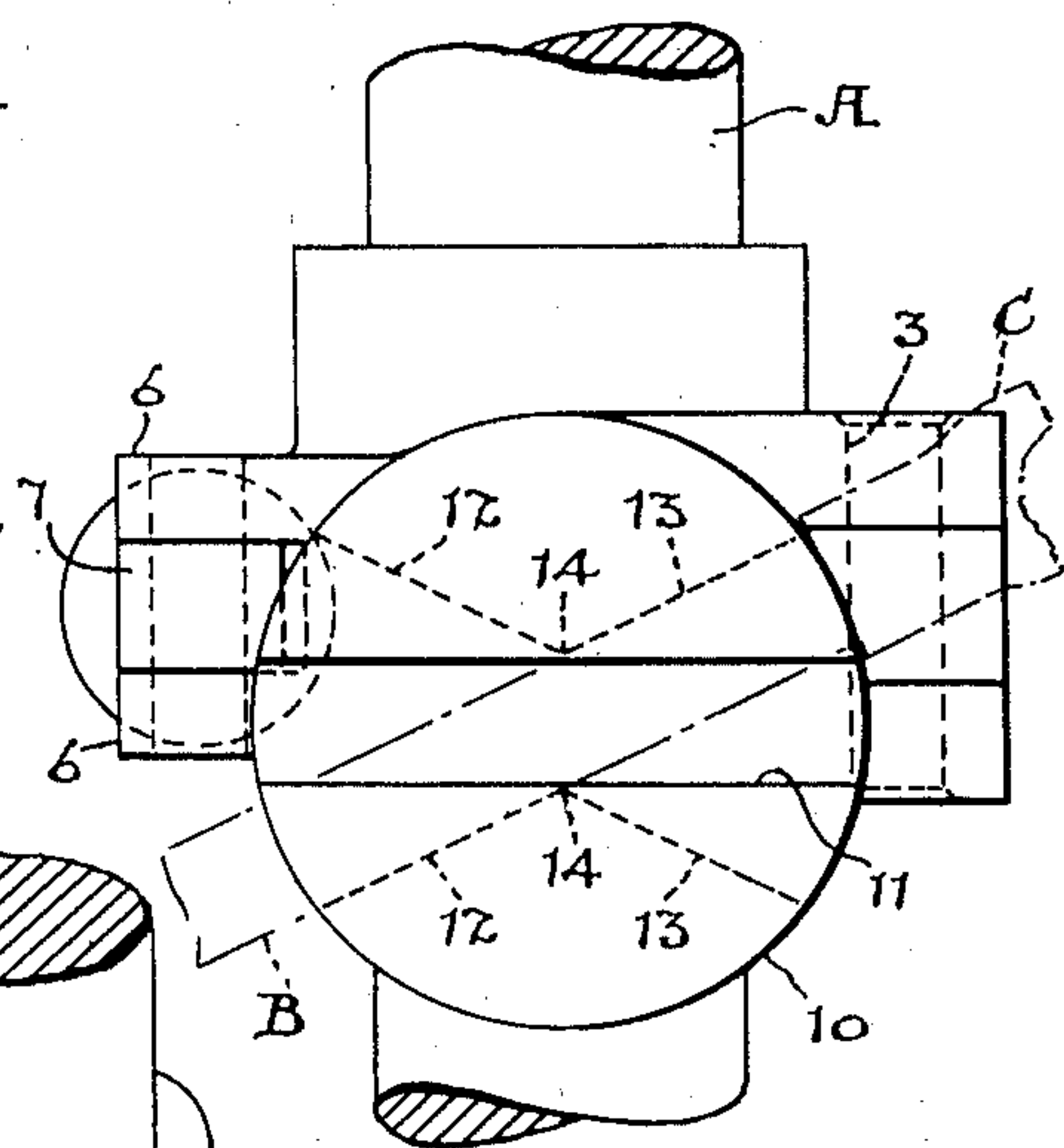


Fig. 3.

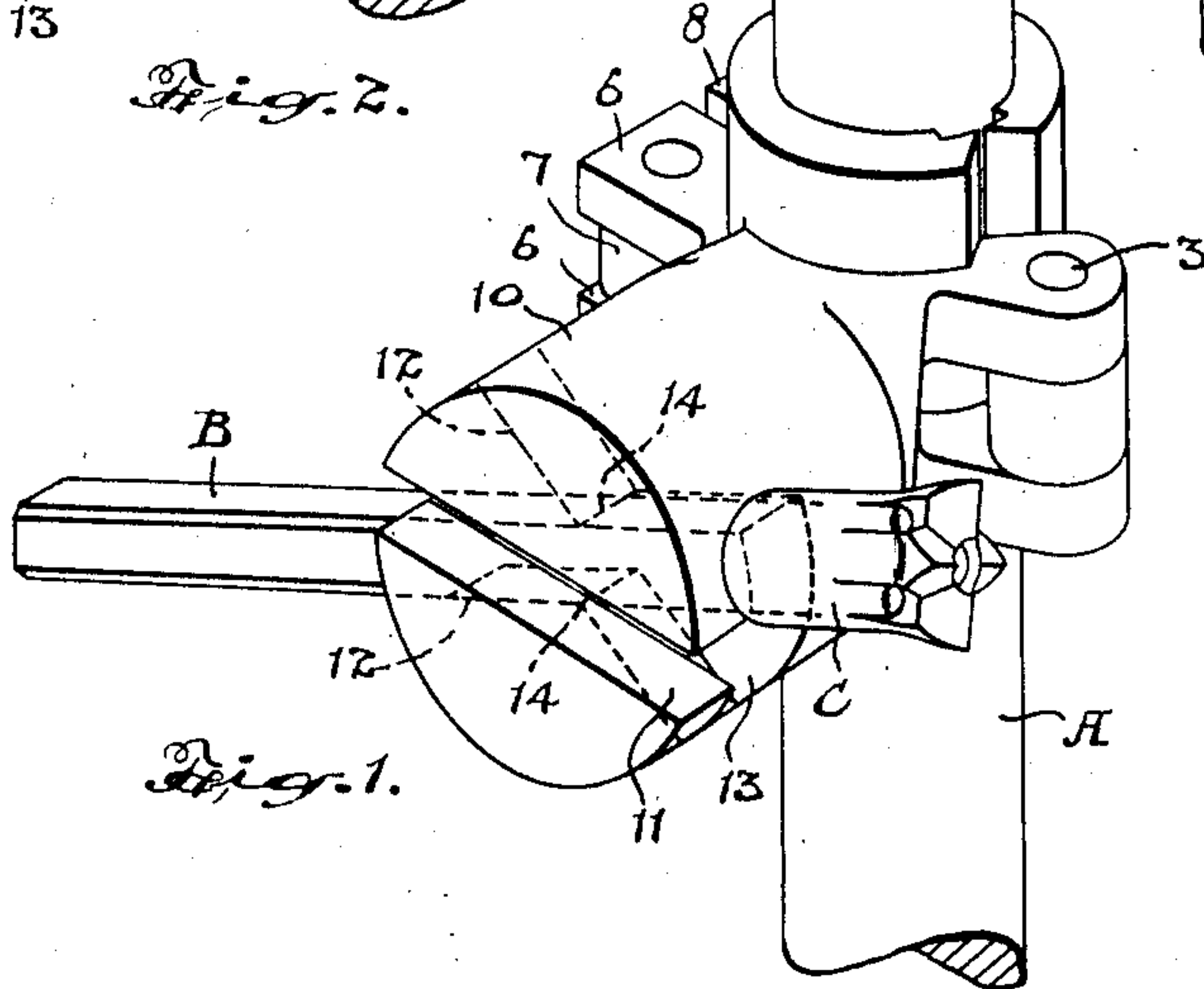


Fig. 1.

Inventors.  
Ernest Craig.  
Robert Craig.

by *H. S. Dunnington*  
att'y.

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3 Sheets-Sheet 2

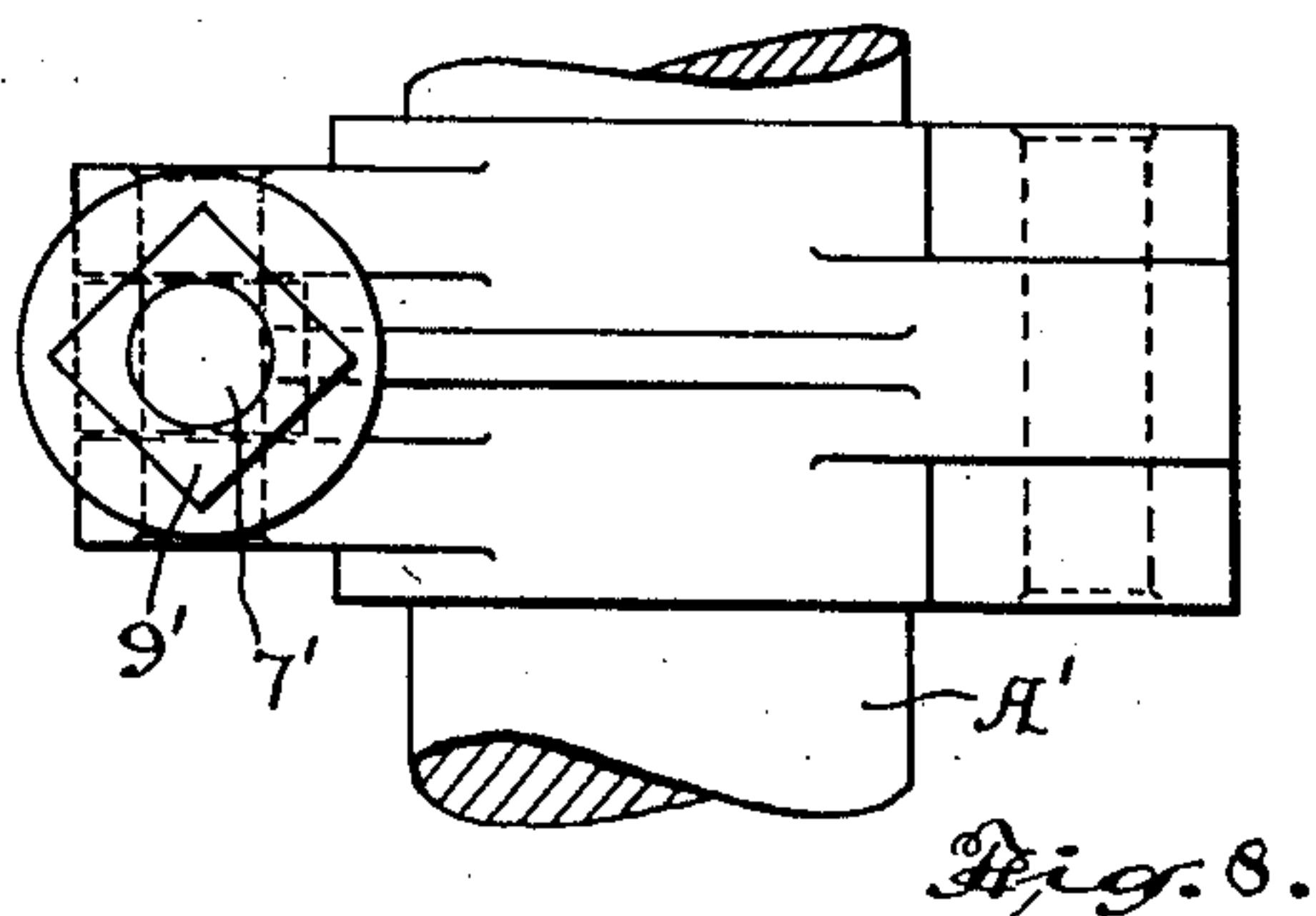


Fig. 8.

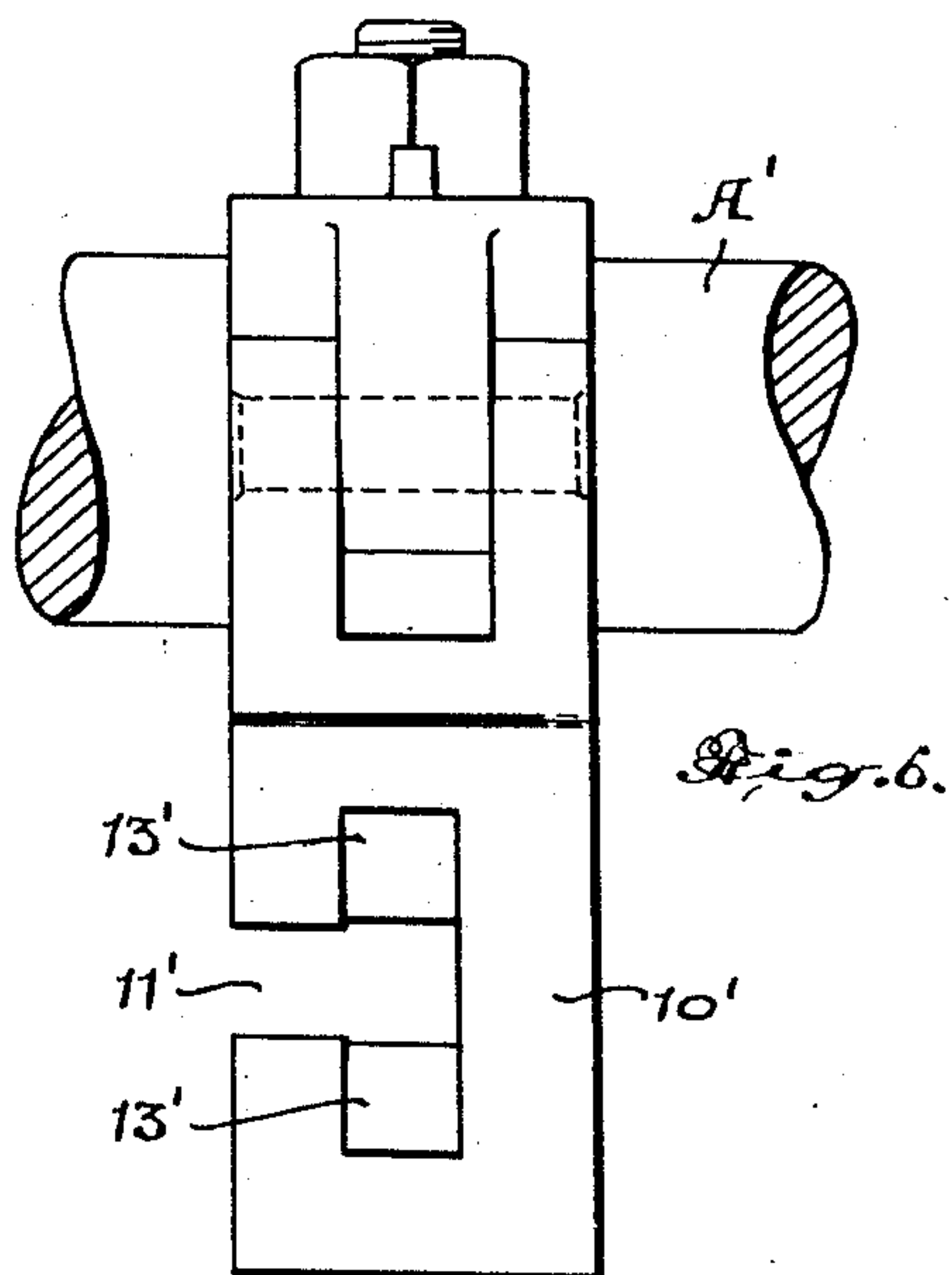


Fig. 6.

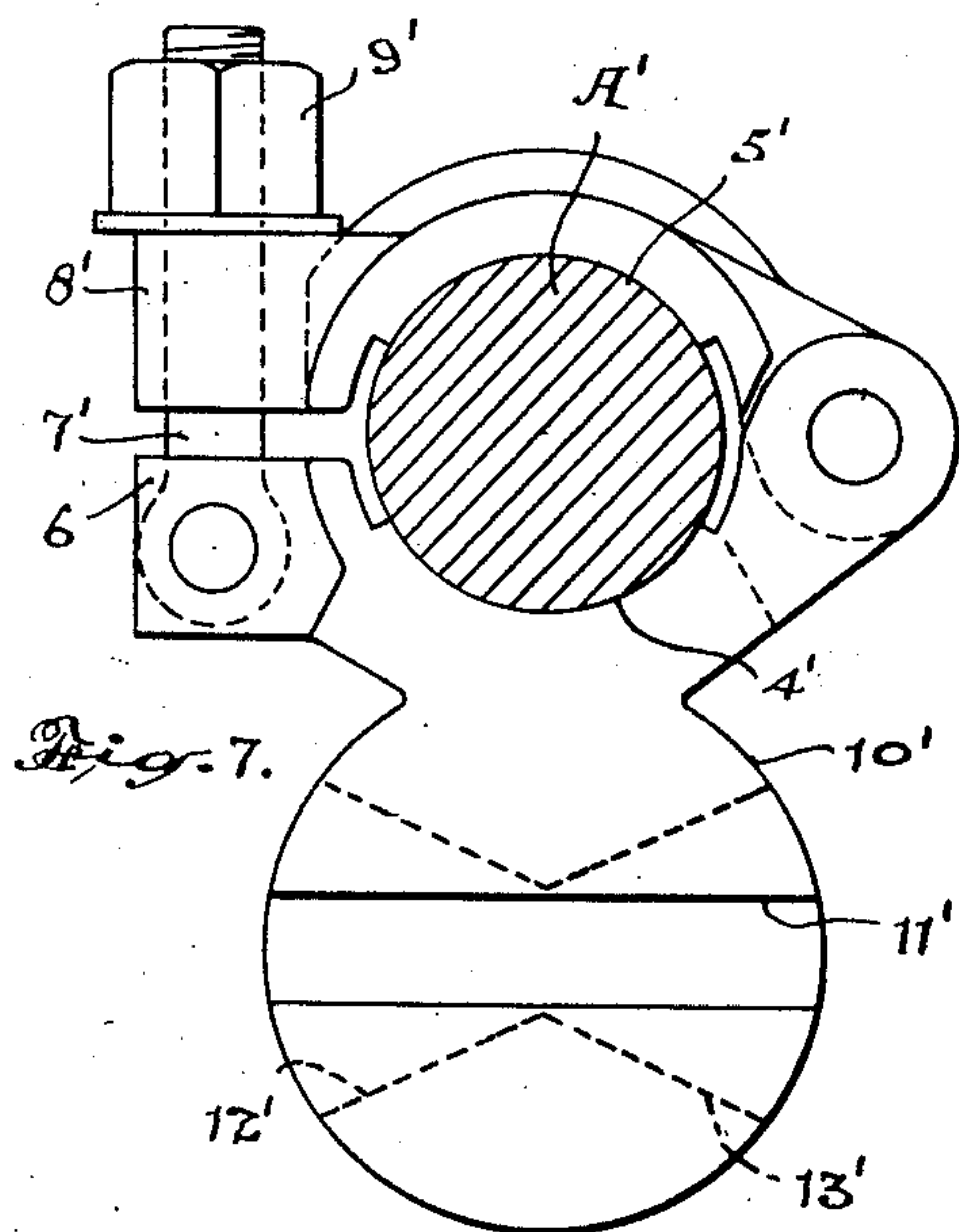


Fig. 7.

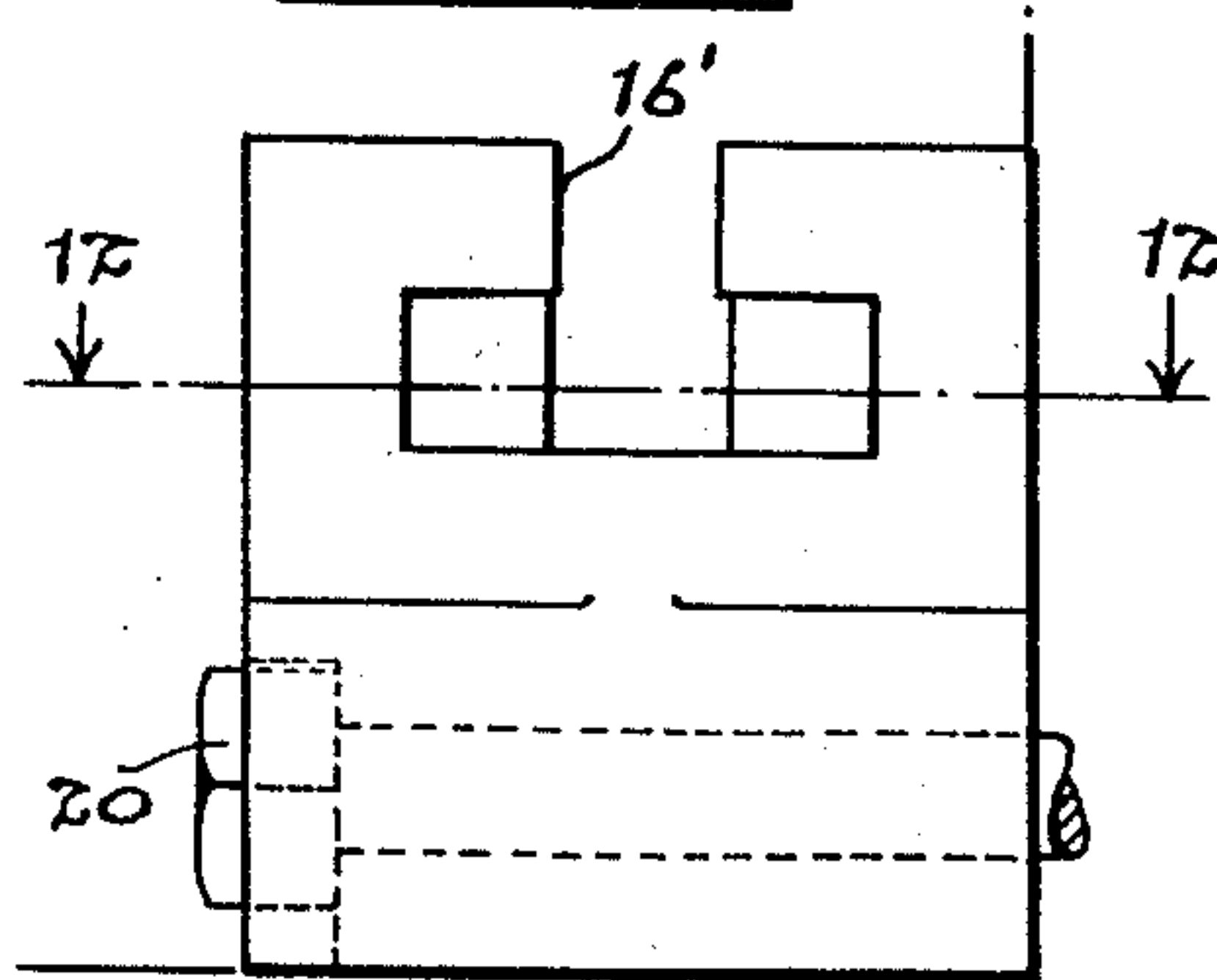


Fig. 11.

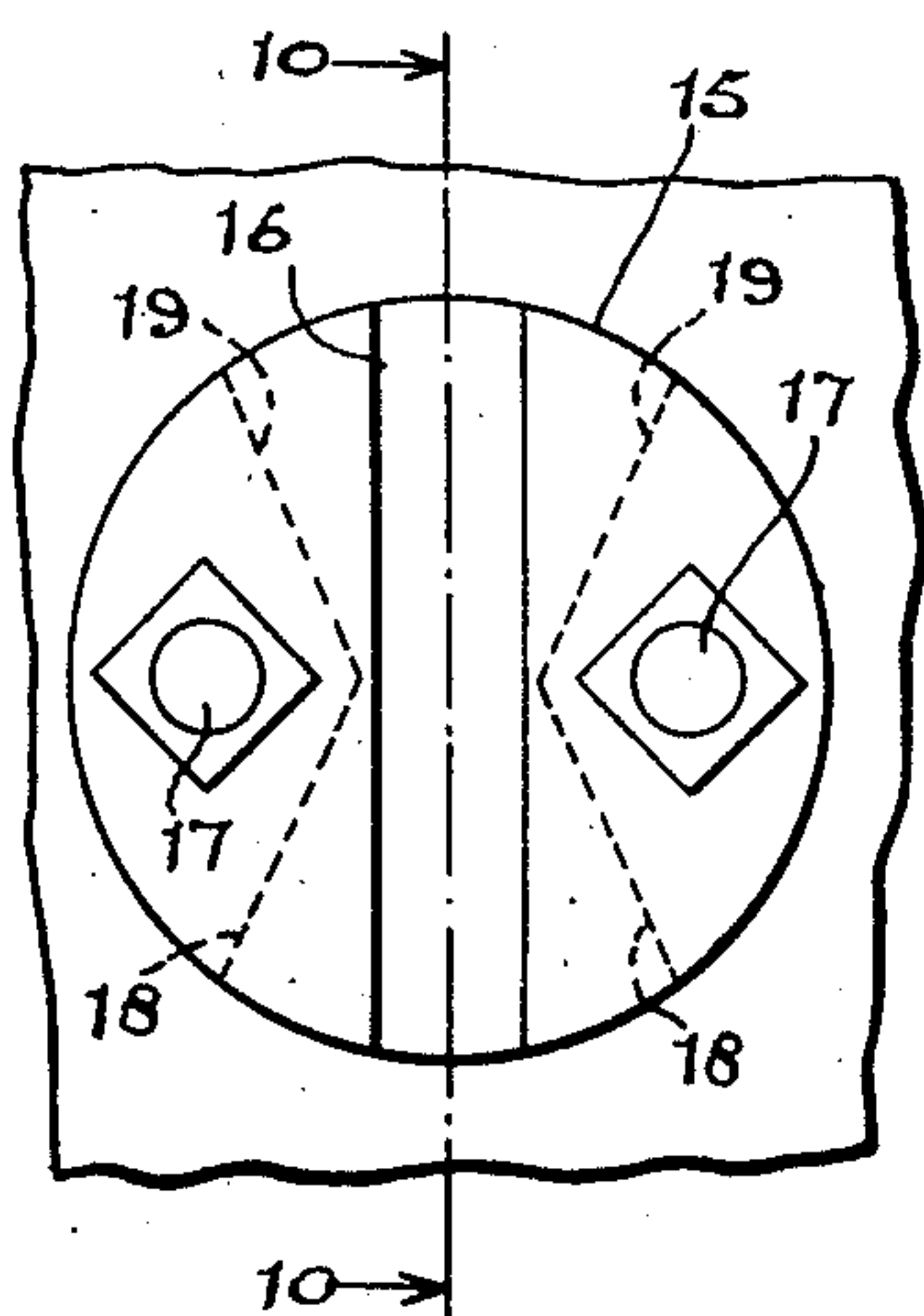


Fig. 9.

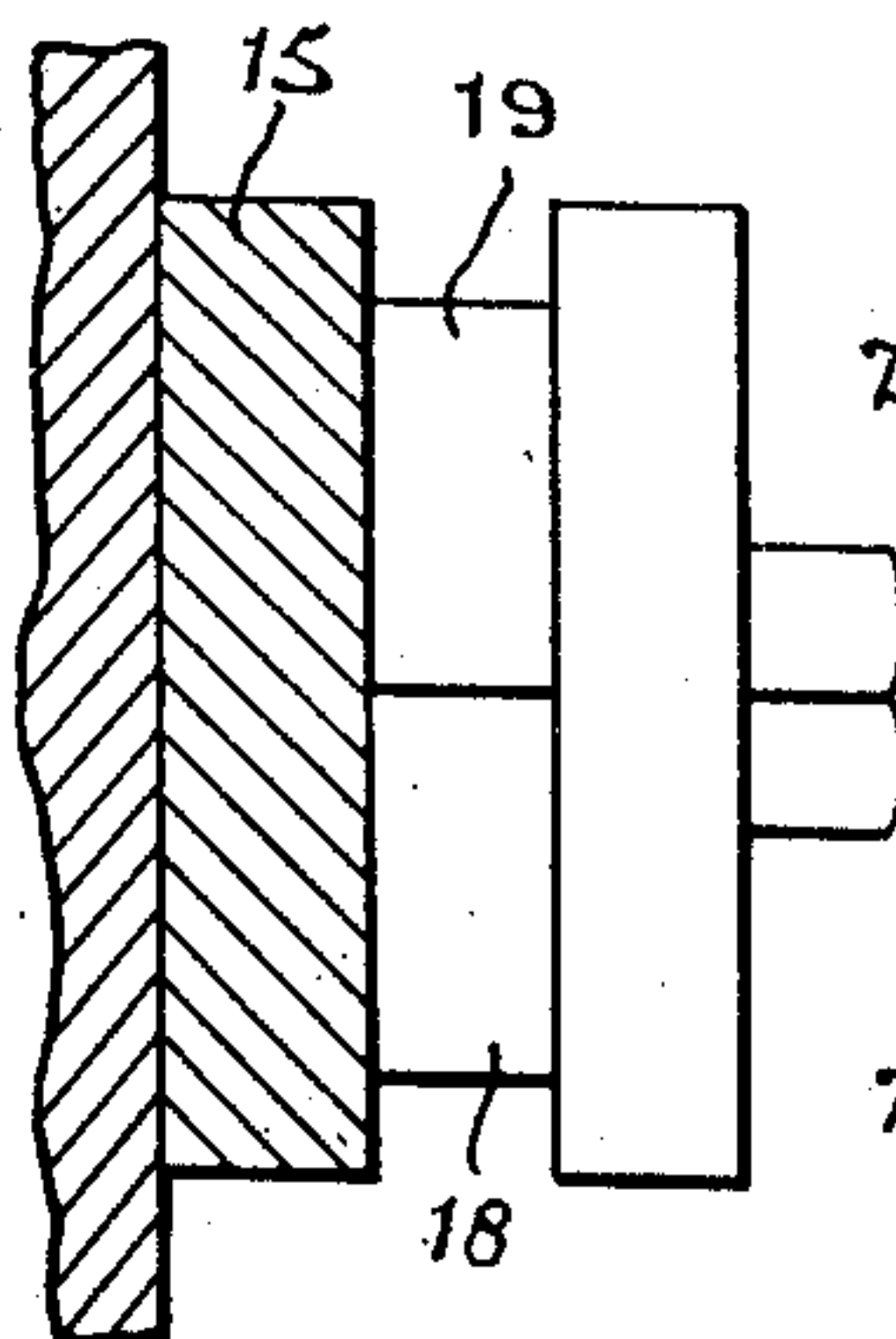


Fig. 10.

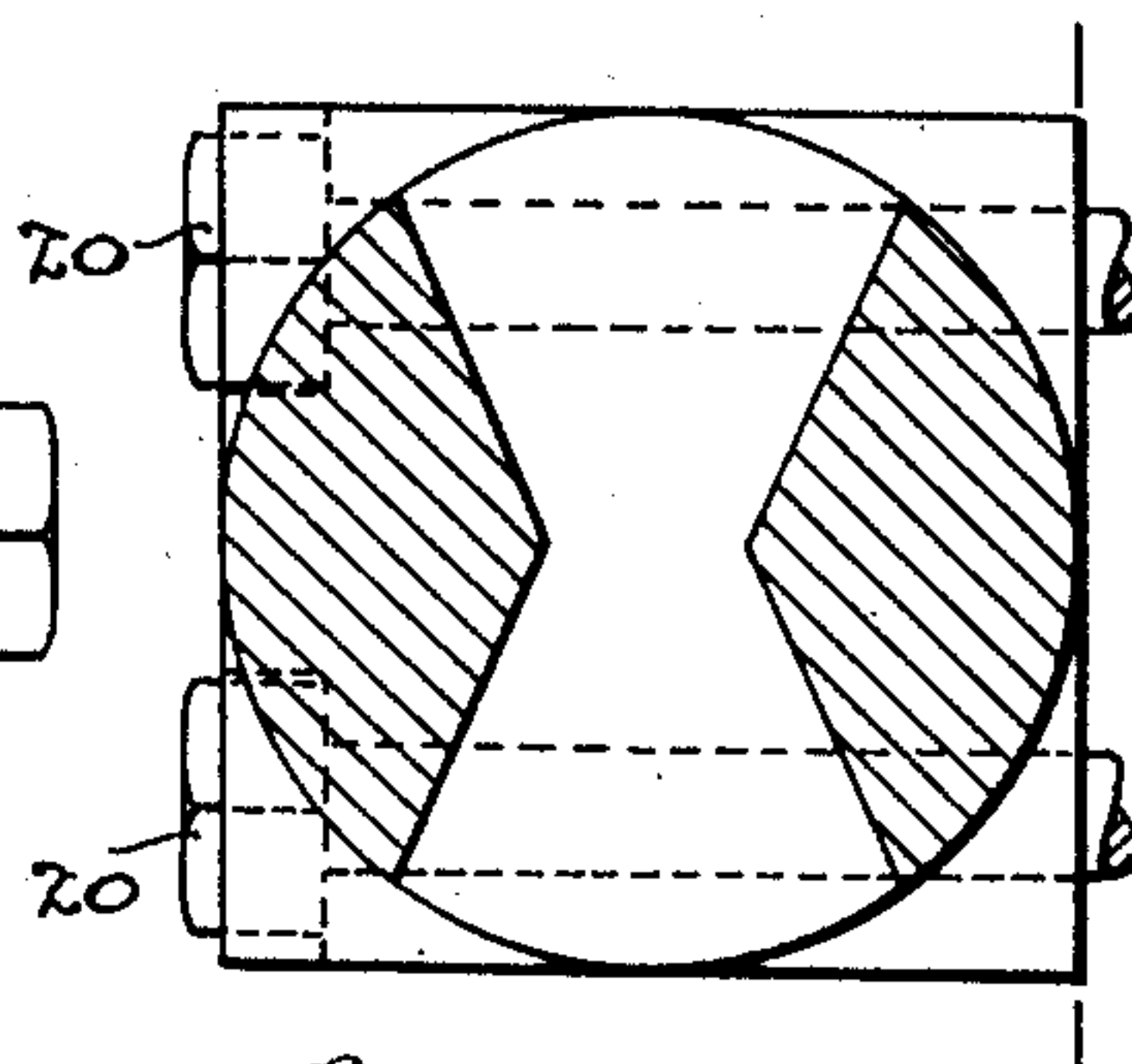


Fig. 12.

Inventors.  
Ernest Craig.  
Robert Craig.

by *W. D. Dimmick*  
att'y.



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E. CRAIG ET AL

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3 Sheets-Sheet 3

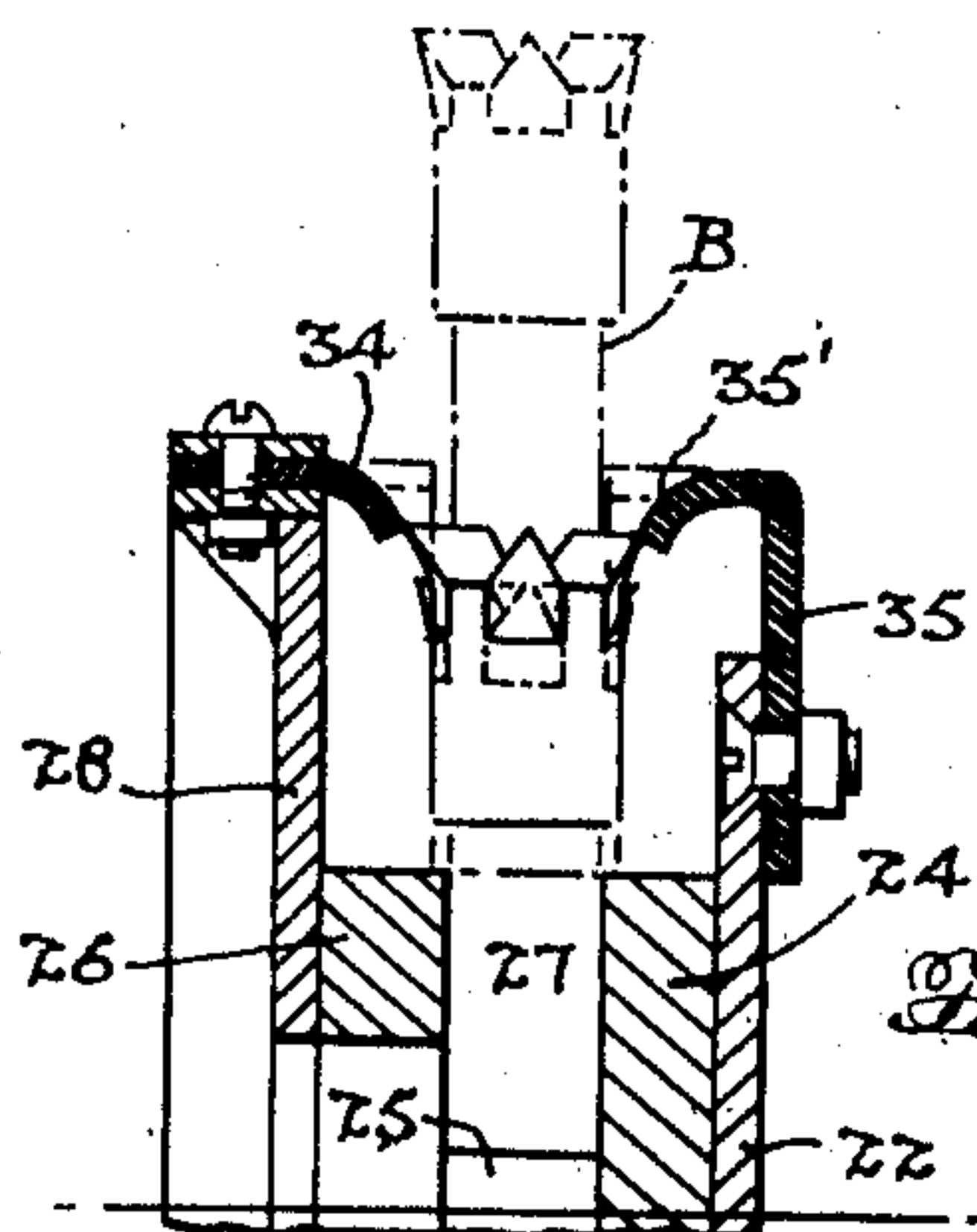
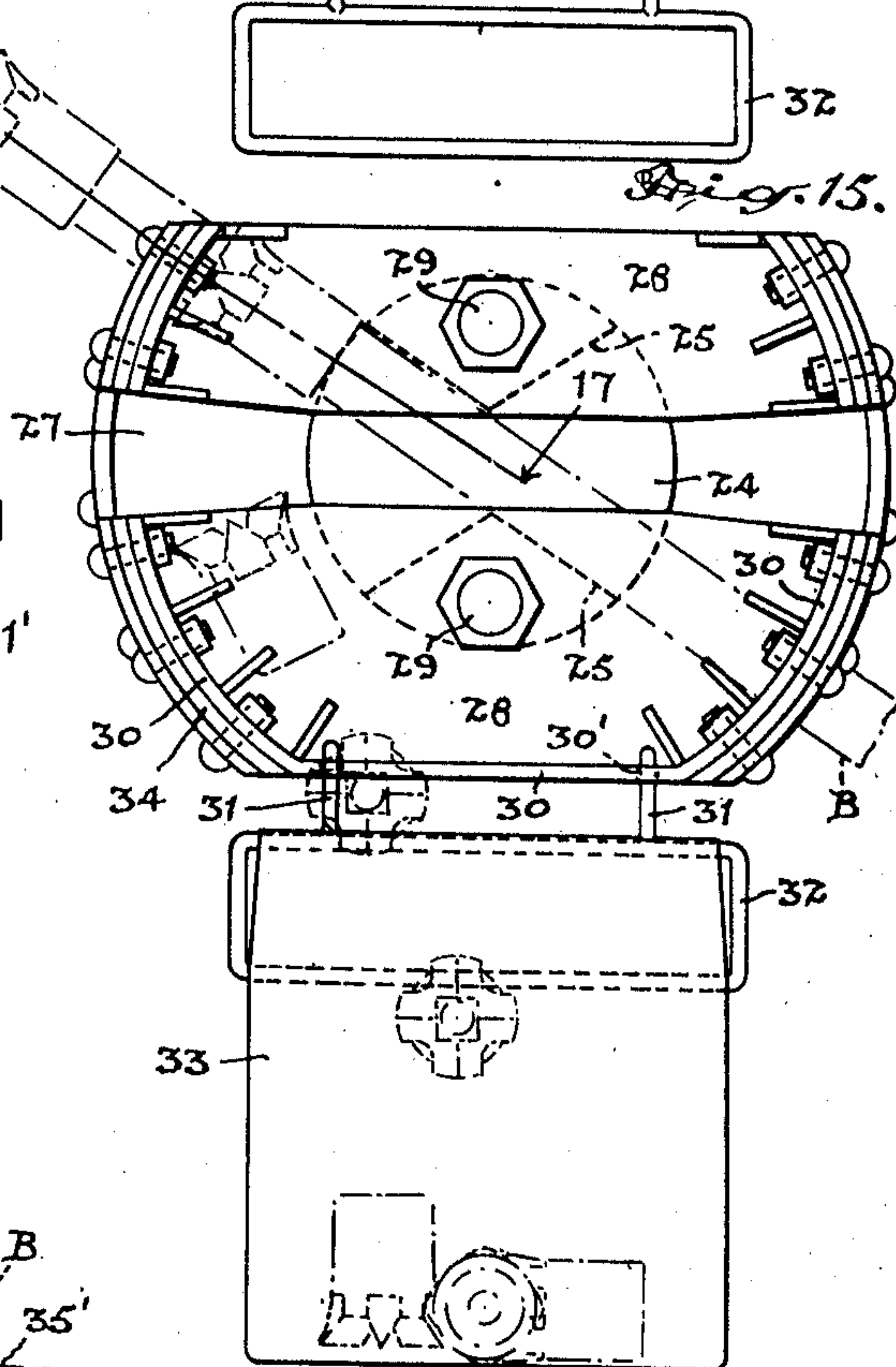
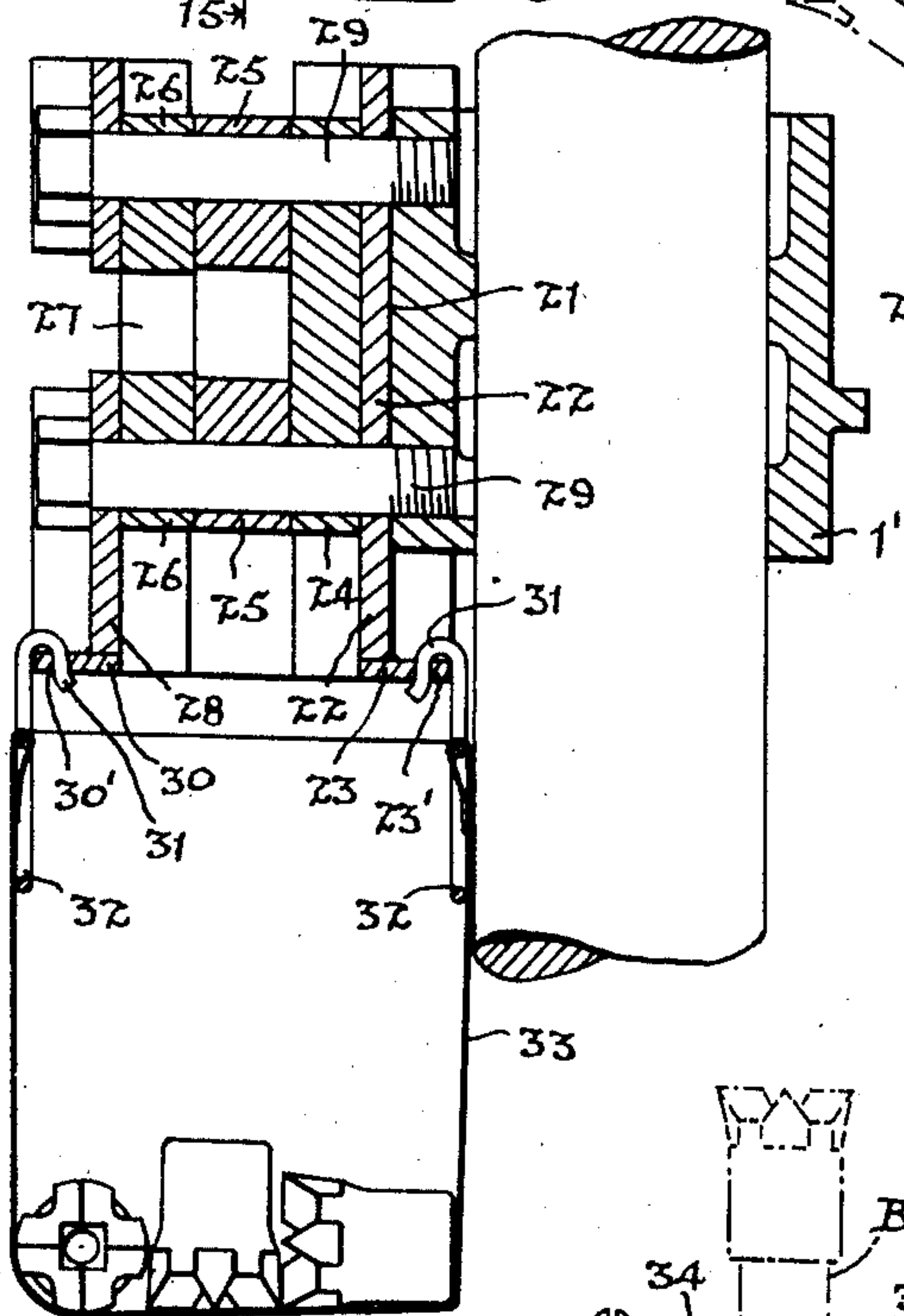
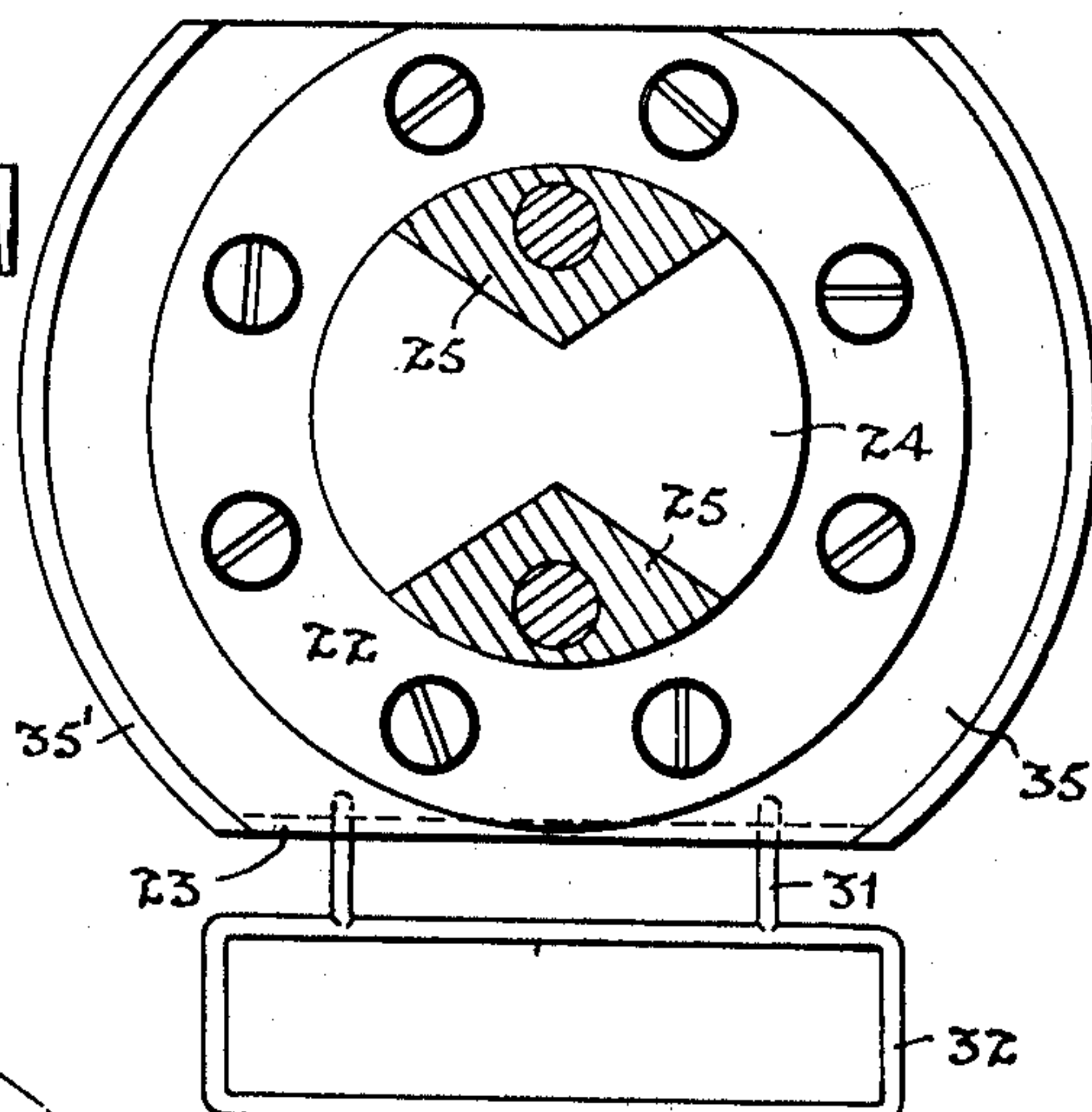
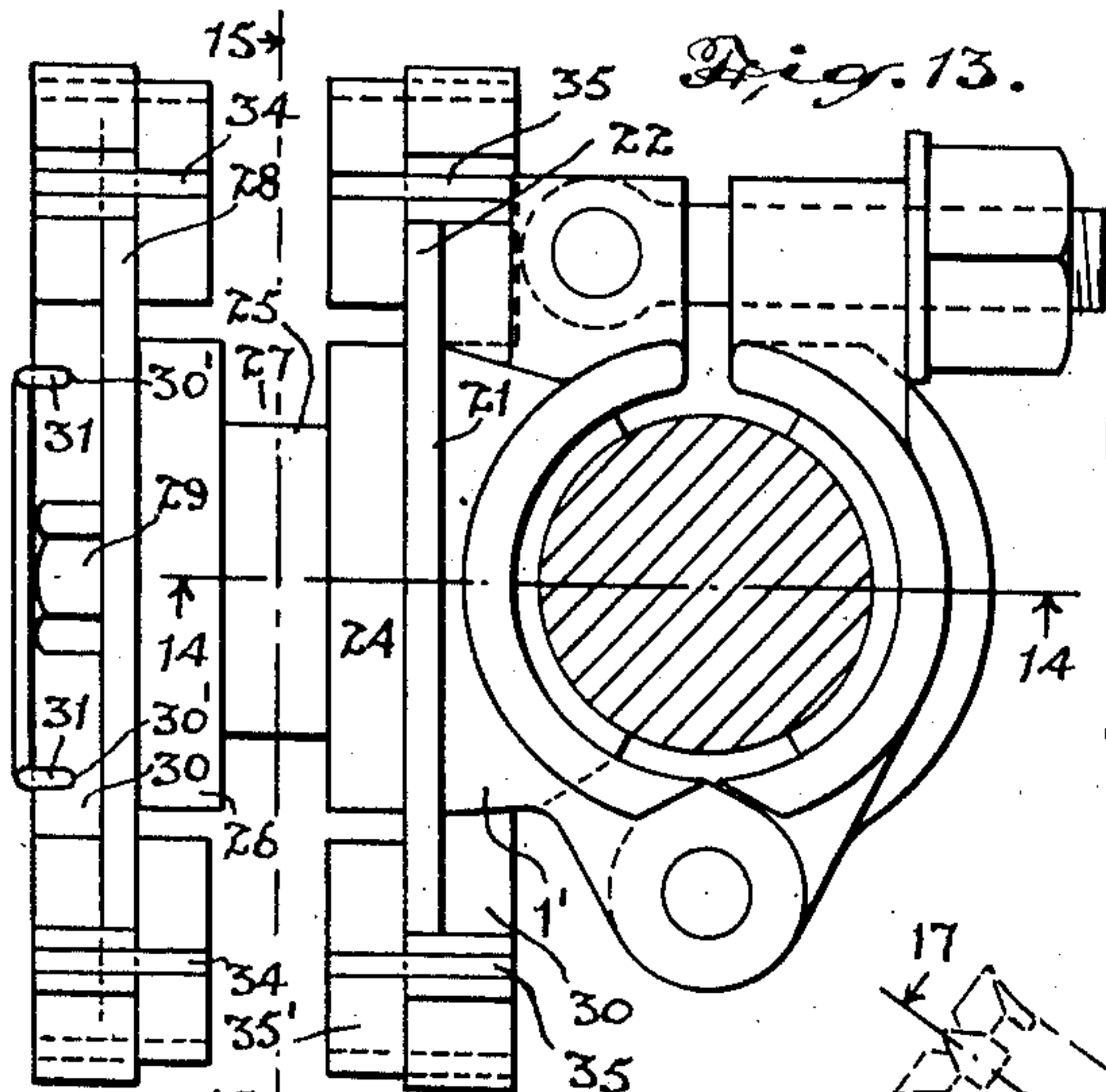


Fig. 16.

Inventors.  
Ernest Craig.  
Robert Craig.

by J. H. Dunnington  
att'y.



## UNITED STATES PATENT OFFICE

2,343,445

MEANS FOR REMOVING DETACHABLE DRILL  
BITS FROM DRILL RODSErnest Craig and Robert Craig, Falconbridge,  
Ontario, Canada

Application December 13, 1940, Serial No. 369,964

8 Claims. (Cl. 29—86.1)

The principal objects of this invention are to facilitate the removal of telescopically interfitting detachable bits, such as used in rock drilling, from the drill rods, and to provide a simple but efficient form of device for this purpose which may be mounted in a convenient location adjacent to the drilling operation and which will obviate the necessity of the operator having to carry and use special wrenches or removing tools, thereby simplifying the work of renewing the drill bits and effecting a material saving of time and labour.

A further and important object is to provide a device for the removal of detachable bits which will cooperate with the drill rod and bit in such a manner that mishaps through accidental misplacement of the rod during the removal of the bit will be avoided.

The principal feature of the invention resides in the novel construction of a bit-removing device which may be conveniently and rigidly mounted and which is slotted to slidably and interlockingly co-operate with the drill rod which is moved sharply through the slotted structure so that the inertia of the rod will withdraw the same from the bit on impact of the latter with contact portions of the slotted structure.

A further and important feature of the invention resides in the provision of the device with co-operative clamping portions adapted to be tightly clamped about the support or standard of the drilling machine.

In the drawings

Figure 1 is a perspective view of a preferred form of device constructed in accordance with the present invention showing same mounted on a vertical drill support or standard and illustrating the drill rod inserted therein for the removal of the bit.

Figure 2 is a side elevational view of the structure shown in Figure 1.

Figure 3 is a side elevational view of Figure 2 looking in the direction of the arrows 3—3 and illustrating the drill rod and bit in broken lines.

Figure 4 is a sectional plan view taken on the line 4—4 of Figure 2.

Figure 5 is a side elevational view of Figure 4 as viewed from the right.

Figure 6 is a side elevational view of a modified form of device particularly adapted for mounting on a horizontal drill support and showing same mounted in place thereon.

Figure 7 is a side elevational view of Figure 6 looking to the right.

Figure 8 is a plan view of Figure 7.

Figure 9 is a side elevational view of a modified form of structure adapted for floor or wall mounting.

Figure 10 is a transverse section taken on the line 10—10 of Figure 9.

Figure 11 is an end elevational view of a further modified form of device adapted for wall or floor mounting.

Figure 12 is a sectional plan view taken on the line 12—12 of Figure 11.

Figure 13 is a plan view of a modified form of bit remover with flexible apron or shield for preventing loss of bits removed from the drill rods.

Figure 14 is a sectional view taken on the line 14—14 of Figure 13 and showing the receptacle for receiving the removed bits.

Figure 15 is a section on the line 15—15, Figure 13.

Figure 16 is a front elevational view of the structure illustrated in Figures 13 and 14.

Figure 17 is a section on the line 17—17 Fig. 16.

In the use of rock drills of the detachable bit type considerable difficulty has been experienced and much valuable time has been lost in the removal of the bit from the shank due to the bit becoming jammed or impacted on the end of the drill rod and requiring considerable effort to remove the same before a fresh bit may be placed thereon.

Experience has shown that where it is necessary to exchange the drill bits in the cramped and dark space of a mine drift it is difficult for the workman to operate a separate wrench or other tool for removal of the bit and such tool frequently becomes lost or misplaced so that drilling operations are held up until the implement is retrieved or another one obtained.

It is the purpose of the present invention to eliminate these difficulties and to obviate the necessity of the operator handling special removal tools, while at the same time providing for the easy removal of even the most stubbornly impacted or jammed bit.

In the form of the invention illustrated in Figures 1 to 5, the bit-removing device is formed in two articulated sections 1 and 2 adapted to swing about the connecting pin 3 and formed with semi-circular jaw portions 4 and 5 which are adapted to snugly embrace a vertically positioned drill-supporting standard A.

The section 1 is formed with lug extensions 6 having a clamping bolt 7 pivotally connected therewith, and the section 2 is formed with spaced lugs 8 between which the bolt 7 is adapted to swing, and a clamping nut 9 is adapted to bear



against the lugs 3 to firmly clamp the device on the standard A so that the device may be adjusted to any desired height thereon and firmly clamped in any desired angular relation thereabout.

The section 1 is provided with an enlarged boss portion 10, here shown of cylindrical form, and this boss is formed with a horizontal diametrically arranged slot 11 leading inwardly from the end and of a size sufficient to permit lateral entry of the drill rod B having the bit C thereon.

The diametrically arranged slot 11 is enlarged at the inward end to form segment-shaped recesses 12 and 13 which diverge longitudinally of the slot 11 from the central portion thereof so that when the drill rod B has been inserted in the slot 11 a slight rocking movement of the drill rod about the apexes 14 will displace the drill rod into the recesses 12 and 13 out of register with the radial slot 11, thus preventing its slipping from the slot.

The operator when he has thus inserted and positioned the drill rod with the bit positioned a suitable distance from the boss 10, then applies sudden longitudinal force to the drill rod so that the projecting sleeve of the bit is brought suddenly into impact with the boss 10, and the bar or drill rod B, due to its inertia, will be effectively withdrawn from the bit. The one motion will usually suffice to detach the tightest fitting bit and leave the drill rod ready for the reception of a fresh bit, and a considerable saving in time over the present tedious and uncertain methods of removing bits is effected.

It is important to note that when the operator is manipulating the drill rod to remove the bit there is no possibility of the drill rod slipping out of the slot 11 to cause injury since the provision of the offset recesses provides for the locking of the drill shank against accidental exit from the slot while permitting the required axial manipulation, and it will be readily appreciated that the operator will quickly accustom himself to the particular angle on which the drill rod should be held during the manipulation in the removal of the bit.

In the modification shown in Figures 6 to 8 the device is adapted to co-operate with a horizontal drill standard A' about which the jaw members 4' and 5' are adapted to be tightly clamped by the clamping bolt 7' and nut 9' co-operating with the respective lugs 6' and 8'.

The device shown in Figures 6 to 8 differs from that shown in Figures 1 to 5 in that the boss member 10' is arranged so that its axis will be substantially parallel with the axis of the drill-mounting standard A' when the device is mounted thereon, and while it may be positioned in various angular positions about the standard, it is here shown mounted directly therebelow so that the diametrically arranged slot 11' extends substantially horizontally and with the segment-shaped recesses 12' and 13' arranged and adapted to co-operate with the drill rod in the manner defined in connection with Figures 1 to 5.

While the device defined in connection with Figures 1 to 8 is particularly adapted for mounting on a drill standard or other suitable part of a usually available drilling equipment in order to rigidly support the same, it is desirable to provide for alternative forms of support or mounting, and in Figures 9 and 10 a simple form of device is shown adapted for either wall or floor mounting, the device in this case comprising a simple boss-like member 15 apertured either side of the dia-

metrically arranged slot 16 for the reception of clamping bolts 17, which bolts may be anchored directly in the wall or floor of a drift or other mine working convenient to the zone of drilling operations.

The boss 15 is recessed in communication with the slot 16 similar to the recessing hereinbefore defined to provide the segment-shaped recesses 18 and 19.

The form of device illustrated in Figures 11 and 12 is adapted for mounting in a corner between a wall and floor surface and the base is apertured to receive the anchoring bolts 20, and the slot 16' may be located so that it faces either upwardly or laterally for the most convenient co-operation with the drill rod under the particular circumstances encountered.

In any of the above forms of the device any suitable metal may be employed and due to the comparatively simple structure involved the device lends itself readily to economical manufacture from cast steel so that only very minor finishing operations will be required and it is proposed to chill-cast the boss portion containing the slot and recess formations so that the contact area particularly which is engaged by the bit will withstand the continued impact of the bit thereagainst without objectionably wearing or breaking down, or, alternatively, the bit contacting area may be formed as an insert of extremely hard wear-resisting metal comparable to the metal from which the remaining portions of the device is made and this insert may either be cast in place or suitably fitted in position.

A device such as described, while of a comparatively simple nature nevertheless possesses considerable utility, and its use in connection with the removal of bits from drill rods will effect a considerable saving in the already heavy cost of drilling operations since it eliminates a definite source of delay and heretofore unavoidable annoyance in the use of telescopically interfitted bits.

In the modified structure of this invention shown in Figures 13 to 17 the slotted bit removing boss is of a composite form. The articulated clamp section 1' is formed with a flat outer face 21 and fitted thereagainst is a metal plate 22 which has a lateral flange 23 which extends horizontally across the bottom.

Next to the plate 22 is a heavy steel plate 24 on the outward face of which are arranged a pair of segmental blocks 25 having their apexes arranged diametrically opposed. A pair of elongated plates 26 are arranged outside the blocks 25 and form a horizontal slot 27 corresponding with the slot 11 as shown in Figures 1 and 2. The plate 24, blocks 25 and plates 26 may be formed in a single piece if desired.

Sectional plates 28 corresponding with the inner plate 22 are arranged outside the plates 26 and the whole assembly is clamped together by bolts 29 extending therethrough, the inner ends being threaded into the boss 1'.

The outer plates 28 are flanged similarly to the inner plate 22 with lateral flanges 30.

The lower flanges 23 and 30 are provided with holes 23' and 30' respectively in which are inserted the hook supports 31 of a pair of wire frames 32, to which is secured a sac 33 preferably of canvas or rubber. The sac 33 is open at the top to receive the bits as they fall from the removing tool.

Secured to the part cylindrical portions of the flanges 30, as shown in Figures 16 and 17, are



rubber strips 34 which extend inwardly from the plate 28. A rubber strip 35 of L-shaped cross section is shown secured to the inner plate 22, the outturned flange 35' thereof forming with the strip 34 an arc-shaped slot at each side of the tool, which slot is wide enough to accommodate the drill rod B but is smaller than the head of the bit.

It will be understood that the plates 22 and 28 may be of rubber and the strips 34 and 35 may be an integral part thereof.

The bit may be readily drawn between the rubber flanges, as particularly illustrated in Figure 17, but as the bit clears the rubber flanges they spring outwardly and prevent the escape of the bit when it is dislodged from the end of the drill rod by impact against the segmental blocks 25 corresponding with the boss 10.

These rubber flanges then guide the removed bit as it falls and directs it into the sac 33. The bits are thus collected as they are removed from the drill rods so that they will not be lost in the "muck" surrounding the "drill," and at the end of a "shift" in the drilling operations the miner removes the sac 33 by simply removing the hooks 31 from the supporting flanges of the removing tool and carries the sac out with him.

The recovered bits may then be re-dressed and sharpened for a second use.

It is found in practical mining operations that bits can be resharpened economically and with the use of the device described the bits are recovered automatically and without special effort on the part of the miners.

It will be readily understood that the construction herein described may be altered considerably without departing from the invention.

What we claim as our invention is:

1. In a device for removing drill bits slotted to receive the drill rod and remove the bit by impact, means for automatically retaining the removed bits, and means for directing the removed bits to said retaining means.
2. In a device as claimed in claim 1, a sac supported from the slotted remover adapted to receive and retain the removed bits.
3. In a device for removing drill bits slotted to receive the drill rod and remove the bit by impact, flexible flanges arranged at either side of said slotted member and spaced therefrom and extending toward each other to form a flexible slot to permit the inward passage of the bit to engage the slotted bit remover and prevent its escape after removal from the drill rod, and means for receiving said bits after their removal from the drill rod.

4. In a device for removing drill bits slotted to receive the drill rod and remove the bit by impact, a receptacle for the removed drill bits detachably secured to the remover and means for directing the removed bits from said slotted device to said receptacle.

5. A device for removing drill bits slotted to receive the drill rod and remove the bit by impact, rubber flanges of arc-shaped form arranged at either side of the slotted member and extending beyond the impact bit-engaging portions, said flanges being spaced apart a lesser distance than the maximum diameter of the bit to prevent the escape of the bit after removal from the drill rod, said flanges being adapted to guide the removed bits downwardly, and means for receiving the disengaged bits.

6. A device for removing detachable bits from drill rods, comprising a compact body of metal having a slot opening into one face and extending completely thereacross and adapted to slidably receive said drill rod and guide the same axially, the bottom of said slot being widened to permit the bodily rocking of the drill rod out of alignment with the entry end of the slot, the portions of the said metal body at the outward end of the widened transverse slot presenting impact shoulders adapted on the axial displacement of the drill rod relative thereto to engage the detachable bit to remove the same by impact.

7. A device for removing detachable bits from drill rods including a substantially cylindrical boss member diametrically slotted, said slot opening outwardly at one end of the boss to receive the drill rod by lateral displacement of the latter, said slot having segment-shaped enlargements forming recesses at the inward end of said slot into which the drill rod is adapted to enter on the rocking thereof about the axis of the boss to slidably but interlockingly accommodate the drill rod.

8. A device for detaching drill bits, comprising a block of metal provided with a slot extending from side-to-side thereof, said slot opening outwardly along its end-to-end extent to permit lateral entry of the drill rod, said slot at its inner side being widened to form recesses to slidably accommodate the drill rod in a plane offset from the plane of said outward opening to thereby prevent lateral movement of said drill rod, said recessing extending in segment-like form to opposite sides of each end of said slot forming apexes aligned centrally of the metal block to form sliding and fulcrum contacts with the drill rod.

ERNEST CRAIG.  
ROBERT CRAIG.