

# PATENT SPECIFICATION



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## COMPLETE SPECIFICATION.

### Interlocking Mechanism for Calculating Machines of the Pin-wheel and Cam-disc Type.

We, LOUIS ROSENTHAL, of Prinzregenten Ufer 5, Nurnberg, Germany, and Dr. OTTO MESSLANG, of Bauerngasse, 35, Nurnberg, Germany, both German subjects, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

10 Locking devices on calculating machines of the cam-disc and pin-wheel type in which the driving or crank shaft and the zeroizing shaft are coupled with one another by means of a locking lever  
15 (zeroizing locking lever) acting alternately or reciprocally, so that the one shaft is locked as soon as the other is rotated are known. The object of these devices is to avoid the breaking of the  
20 zeroizing projections or noses provided on the tooth wheels of the counting mechanism and shaped out of the zeroizing shaft, when the calculating machine is not properly managed. This invention  
25 consists in a locking device on a calculating machine of the cam disc and pin-wheel type in which not only the driving shaft and a zeroizing shaft, but the driving shaft and two zeroizing  
30 shafts *viz.*, the shaft for the totalizing counter and that for the revolutions-counting mechanism are locked or released simultaneously by one and the same locking lever. A further feature  
35 of the invention is that the adjoining ends of the two zeroizing shafts have recesses or the like in which the head of a resilient locking pin enters when the latter is raised by means of a rail or bar  
40 fixed on the locking lever.

With the known locking devices the controlling of the locking lever is effected by rotating a controlling disc that is carried on the zeroizing shaft or the

crank shaft and provided with a wedge 45 incision or has a part cut out. The cut out part or some other cam incision directly effects the rotation of the locking lever. With this kind of controlling of the locking lever it has been found that, 50 in consequence of the wedge action, when there is a powerful strain the locking organs may be bent. In order to obviate these injurious effects on the locking apparatus the locking lever is not placed 55 under the control of a controlling disc, but its control is effected by rotating the setting-mechanism engaging shaft that raises the known lifting mechanism of the toothed setting rods of the adjusting 60 mechanism. Thereby the locking pin for the two zeroizing shafts as well as the locking tooth for the driving shaft and the corresponding recesses in the shafts or discs can have a more favourable form 65 *viz.*, rectangular, which excludes the forces acting with bending effect on the locking lever. The controlling of the locking lever can for example be effected 70 by the rotating of a fork shape arm carried on the setting-mechanism engaging shaft, which embraces a pin of the locking lever.

One example of carrying this invention into effect is shown on the annexed 75 drawings in which

Figure 1 is a longitudinal section of the locking device of the calculating machine.

Figure 2 a transverse section on the 80 line A, A of Figure 1, the zeroizing shafts being released.

Figure 3 a similar section on the line 85 B, B with the adjusting mechanism raised and the adjusting slides adjusted.

Figure 4 a transverse section of a tooth wheel carried on a zeroizing shaft with the zeroizing projections or noses seated on both parts.

[Price 1/-]

Figure 5 a transverse section of the locking pin for the zeroizing shafts.

The apparatus consists of a two armed lever 2, 3 (referred to as the locking lever), pivoted on the machine frame 1 at 1<sup>a</sup>, the one arm 2 of which lever has a rectangular shaped nose or projection 4, which, when the machine crank 5 is in the position of rest is out of engagement with a recess 6 in a grooved disc formed as a locking disc 7. (See the position of the locking lever shown in dot and dash lines in Figure 2). The cam discs are carried in the known manner on a driving shaft *a*, which is driven by means of the crank 5 and form as a whole the so-called barrel or drum. The arm 3 of the locking lever has a bent or bow form and consists of two arms 3<sup>a</sup> and 3<sup>b</sup> (Figure 1), which are connected with one another by means of a bridge piece 8 on which a bar or rail 9 is fixed. A resilient locking pin 10 which can be raised and lowered serves for locking and releasing the two zeroizing shafts 16 and 17.

The locking pin 10 is guided in an intermediate bearing 11 of the laterally movable totalizing counter carriage 12 and therefore participates in the movement of the carriage, the raising of the locking pin 10 is possible in any position assumed by the carriage. Therefore when the carriage moves it can slide laterally along on the rail 9 fixed on the bent lever arm 3, 8. In Figure 1 the right end position of the locking pin is shown in dot and dash lines.

The locking pin 10 is pressed downwards by a spring 13 that bears against a collar 14. The collar 14 of the locking pin 10 serves as a guide for it and as a stop in the downward direction by bearing against a disc 15 fixed in the carriage 12. The bore for the locking pin 10 in the intermediate bearing 11 is situated exactly in line vertically with the axis of the two zeroizing shafts 16 and 17. If the crank 18 of the zeroizing shaft 16 and the crank 19 for the zeroizing shaft 17 are in their positions of rest, that is to say, if the two wedge projections 20, 21 are snapped in the closing covers 22, 23 the inner ends of the two zeroizing shafts stand in the intermediate bearing at a slight distance apart. These inner ends of the zeroizing shaft 16 of the totalizing-counter mechanism and the zeroizing shaft 17 of the revolutions-counting mechanism are provided with narrow recesses 24, 25 into which a head 26 of the locking pin 10 can enter, when these recesses are opposite the head 26 and the locking pin 10 is raised. The head 26 has the form of a wide but flat extension piece that moves in lateral

grooves 27 of the cylindrical boring 28 for the locking pin 10 and is thereby secured against turning (Figure 5).

The present locking device is constructed in a cam disc calculating machine in which for the rotating of the cam discs 29 in the known manner rack bars 30 are provided, which by means of a differential setting mechanism 31 are put in engagement with the driving pins 32 of the cam discs 29. The raising of the differential setting mechanism 31 that is rotatable about a pivot 33 is effected as is known by means of two arms 36 fixed on the so-called setting mechanism engaging shaft 35 which raise the arms of the mechanism when the engaging shaft 35 is rotated through the pressing down of a key 37 fixed on it. On the free end of the mechanism 31 a helical spring 40 engages which has a constant tendency to draw same down. In the position of rest of the machine therefore the rack bars 30 are out of engagement with the cam discs 29. Between the two arms 36 a fork shape arm 38 is carried according to the invention on the setting mechanism engaging shaft. This arm embraces the one pin 39 of the locking lever 2, 3 and raises it, if pressure be applied to the key 37. There by a dependency of the locking device for the zeroizing shaft on the key is created, thus a figure in the totalizing counter or in the revolutions-counting mechanism can only be cancelled if firstly the machine crank 5 is in its position of rest and secondly the key 37 has been pressed down.

In Figure 4 a piece of the zeroizing shaft 17 with a zeroizing nose or projection 41 and a part of the counting wheel 42 carried on the zeroizing shaft are shown, the tooth wheel 43 of which is likewise furnished with a zeroizing projection 44. If during the rotation of the zeroizing shaft the projections 41 and 44 lie in one plane the counting wheels will be found returned to their zero position.

The action of the machine is as follows.

Supposing that a beginning is made with any calculation. In the position of rest of the machine the differential setting mechanism 31 is lowered and the locking lever 2, 3 is in the position shown in dot and dash lines in Figure 2. By pressing down the key 37 the differential setting mechanism 31 and the rack bars 30 are raised so that the transmission of the desired counting value to the cam discs 29 is possible by moving the rack bars 30. Through the arm 38 and by means of the pin 39 the locking lever 2, 3 is brought into the position

shown in full lines in Figure 2. The nose 4 of the locking lever 2, 3 engages in the recess 6 of the locking disc 7 and thereby locks the driving shaft *a*. If now the driving crank 5 be released the mechanism drops back into its original position in which the barrel or the driving shaft *a* is released, so that by turning the driving crank 5, calculation can be effected. During the turning of the crank 5 the locking lever 2, 3 is in its position as shown in dotted lines, in which the bar 9 presses up the resilient locking pin 10 and the head 26 projects into the recesses 24 and 25 in the zeroizing shafts 16 and 17 which are in their position of rest. Thus the zeroizing shafts are locked. When the calculation is ended, the result is to be seen on the counting wheels. Now a fresh calculation is to be made. During the crank action the calculator becomes aware that he has forgotten to cancel the previously calculated result. He wishes to effect the zeroizing notwithstanding that the driving crank 5 is not yet in its position of rest. A rotation of the zeroizing cranks 18 and 19 is however not possible, as the head 26 of the pressed up locking pin 10 locks the two ends of the zeroizing shafts 16 and 17. Only when the calculator has brought the driving crank 5 into the position of rest is it possible by pressing down the key 37 to allow the head 26 of the locking pin 10 to move out of the two recesses 24 and 25 in the zeroizing shafts 16 and 17 so that the result can be cancelled by rotating the zeroizing cranks 18 and 19.

It may further happen that in zeroizing the result of the counting the calculator has not completely turned the zeroizing cranks 18, 19 but for example, only 180° and now wishes to calculate by turning the machine crank 5. In order that it may be possible to effect zeroizing the locking lever 2, 3 must be in the position shown in unbroken lines (Figure 2) in which the locking pin 10 is out of engagement with the zeroizing shafts 16, 17. If the zeroizing shafts have only been rotated to the extent of a half rotation (see the position of one of the zeroizing cranks as shown in dotted lines in Figure 1) the two recesses 24 and 25 are directed not downwards but upwards. The ends of the zeroizing shafts are pushed laterally apart to right and left in consequence of the wedge projections 20 and 21 on the locking covers 22 and 23. As the head 26 is wider than the greatest occurring distance between the ends of the two shafts, it cannot go between these, but still comes on to the circumference of the shaft ends. Should

the calculator wish to turn the driving crank 5 he has to see that the locking nose 4 is out of engagement with the locking disc 7. The locking nose 4 however can only come out of its recess 6 if the head 26 can enter the recesses 24 and 25. So long as the zeroizing shafts are not turned into those positions in which the recesses lie exactly opposite the head 26 so that this can enter them a rotation of the driving crank 5 cannot be effected. The further calculation can only be effected when the zeroizing has been fully completed with both shafts. It is of course possible not to zeroize at all, but to leave the zeroizing shafts in their position of rest, for that always prevents quite independently of the counting value of the result, the entry of the locking pin 10 into the recesses and at the same time the releasing of the barrel.

The locking of the driving shaft *a* naturally occurs if only one of the two zeroizing shafts has not been completely rotated, that is 360°, as the wide head 26 of the locking pin 10 serves as locking device for both zeroizing shafts.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A locking device for the driving shaft and the zeroizing shafts of the totalizing-counter and of the revolutions-counting mechanism in calculating machines, of the cam disc and pin-wheel type the distinguishing feature being that between a locking disc carried on the driving shaft and the adjacent ends of the zeroizing shafts a locking lever is introduced, the two ends of which alternately lock and release either the locking disc and thereby the driving shaft or the zeroizing shafts in which latter case a resilient locking pin is introduced intermediate of the locking lever and the zeroizing shafts.

2. A locking device according to Claim 1, the distinguishing feature being that the adjoining ends of the two zeroizing shafts have recesses or the like, into which one and the same head of the resilient locking pin enters, when this is raised by means of a rail fixed on the locking lever.

3. A locking device according to Claim 1, the distinguishing feature being that the controlling of the locking lever is dependent on the rotation of the setting-mechanism engaging shaft which also raises the differential setting rack bars of the adjusting mechanism.

4. A locking device according to Claims

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1 and 3, the distinguishing feature being that the putting of the locking lever into position in which it locks the driving shaft is effected by rotating a fork shape arm carried on the setting-mechanism engaging shaft and embracing a pin on the locking lever.

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5. A locking device according to Claims 1, 3 and 4 the distinguishing feature being that the end of the locking lever which acts on the driving shaft has a rectangular nose or projection that can

enter a corresponding recess of a locking disc carried on the driving shaft.

6. The locking device for calculating machines of the cam disc and pin-wheel type constructed substantially as described with reference to the annexed drawings.

Dated this 17th day of October, 1924. 20  
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Agents for the said Applicants.

Fig.1.

[This Drawing is a full-size reproduction of the Original.]

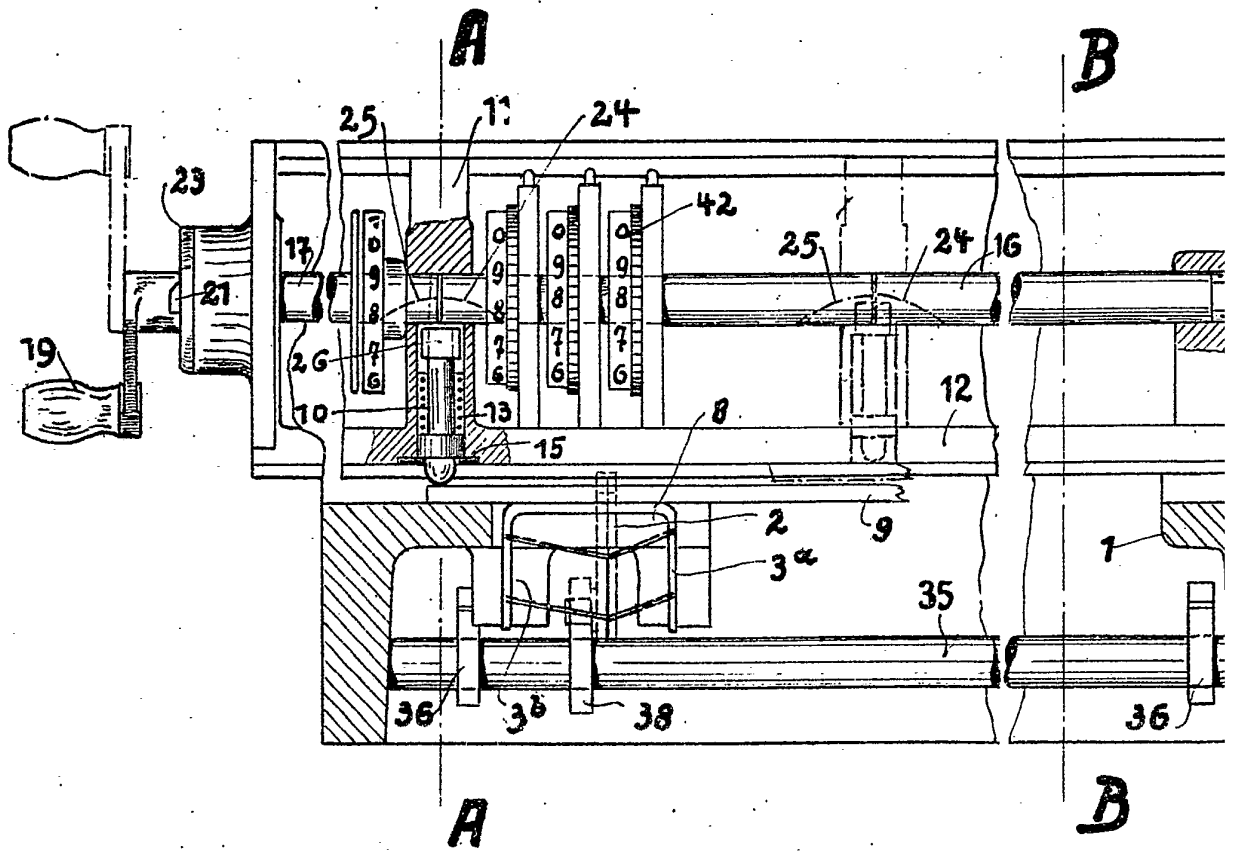


Fig. 1.

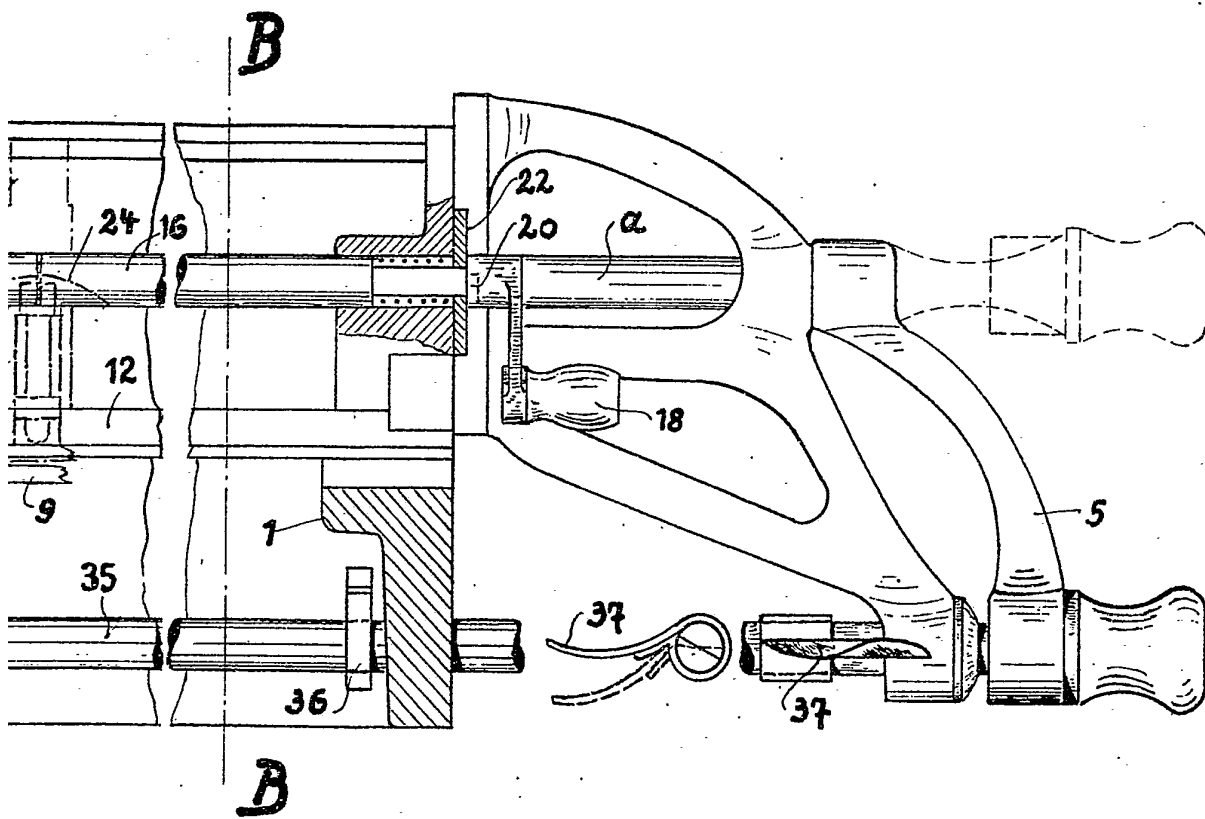
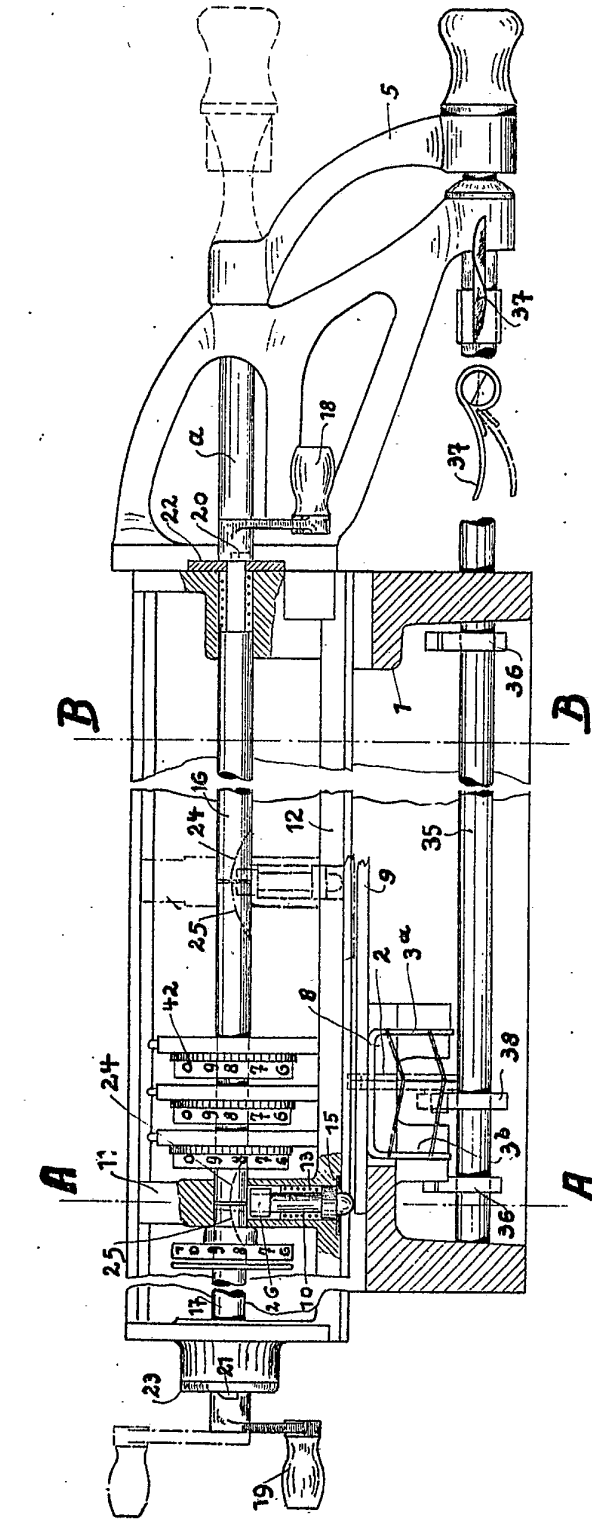


Fig. 1.



[This Drawing is a full-size reproduction of the Original.]

[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 2.

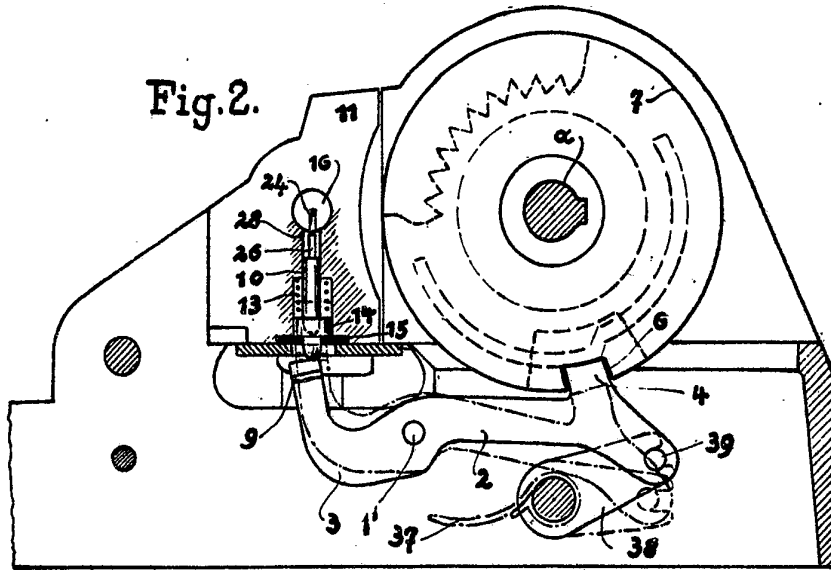


Fig. 3.

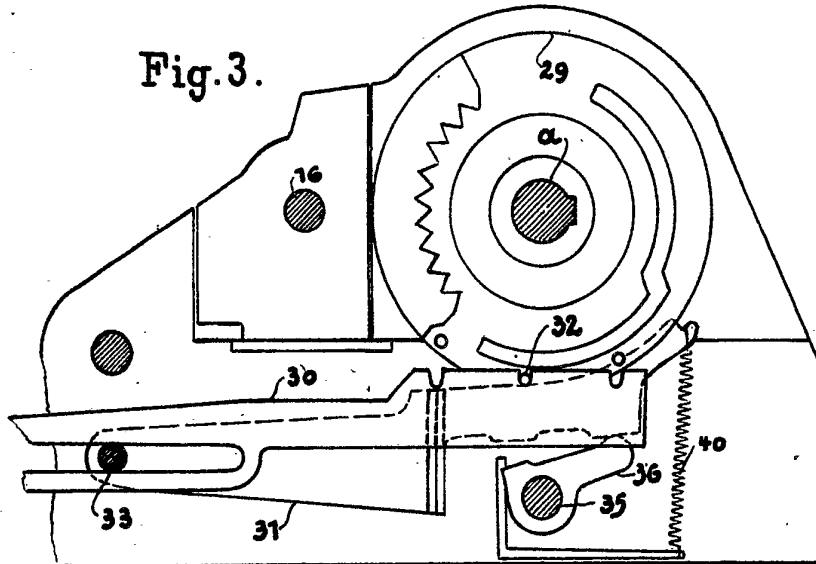


Fig. 4.

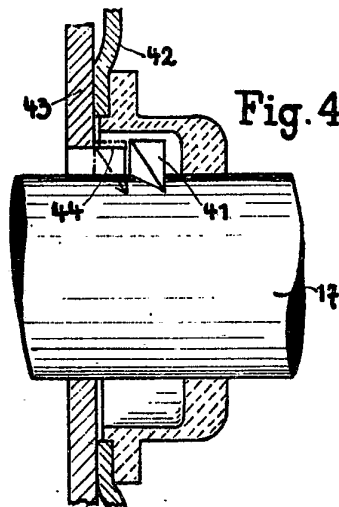


Fig. 5.

