

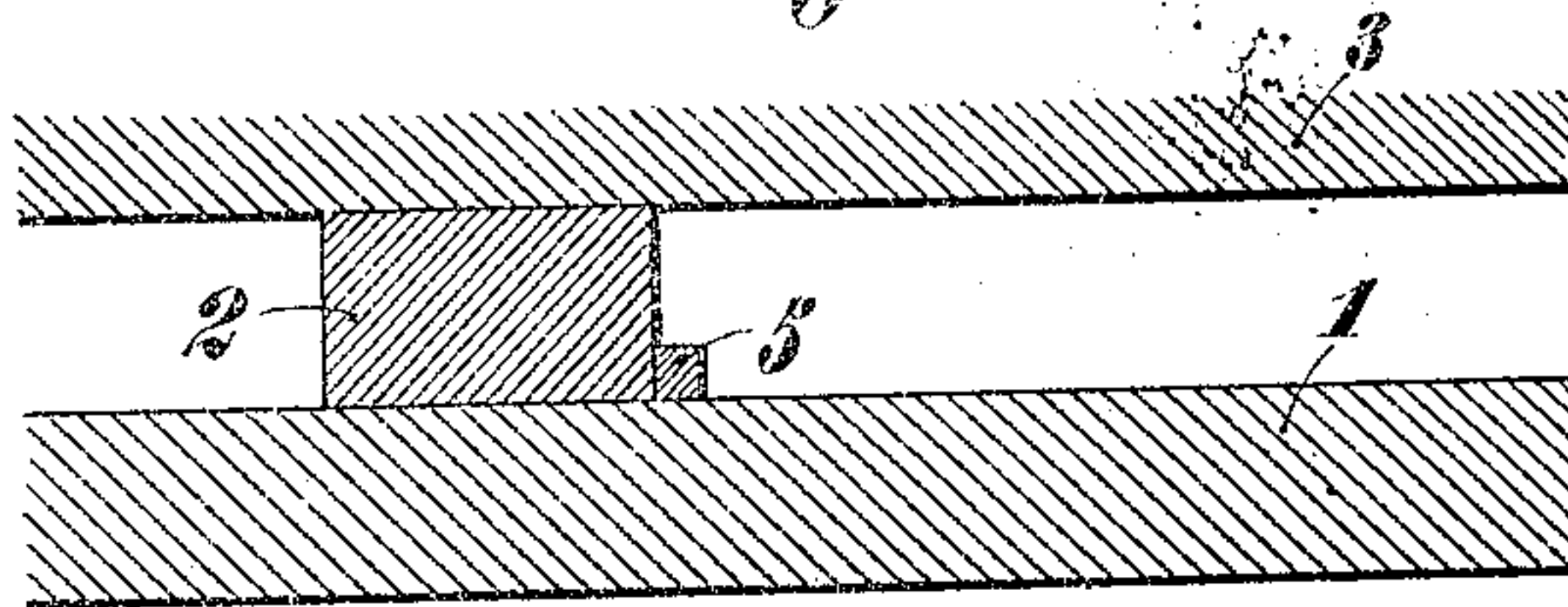
No. 822,057.

PATENTED MAY 29, 1906.

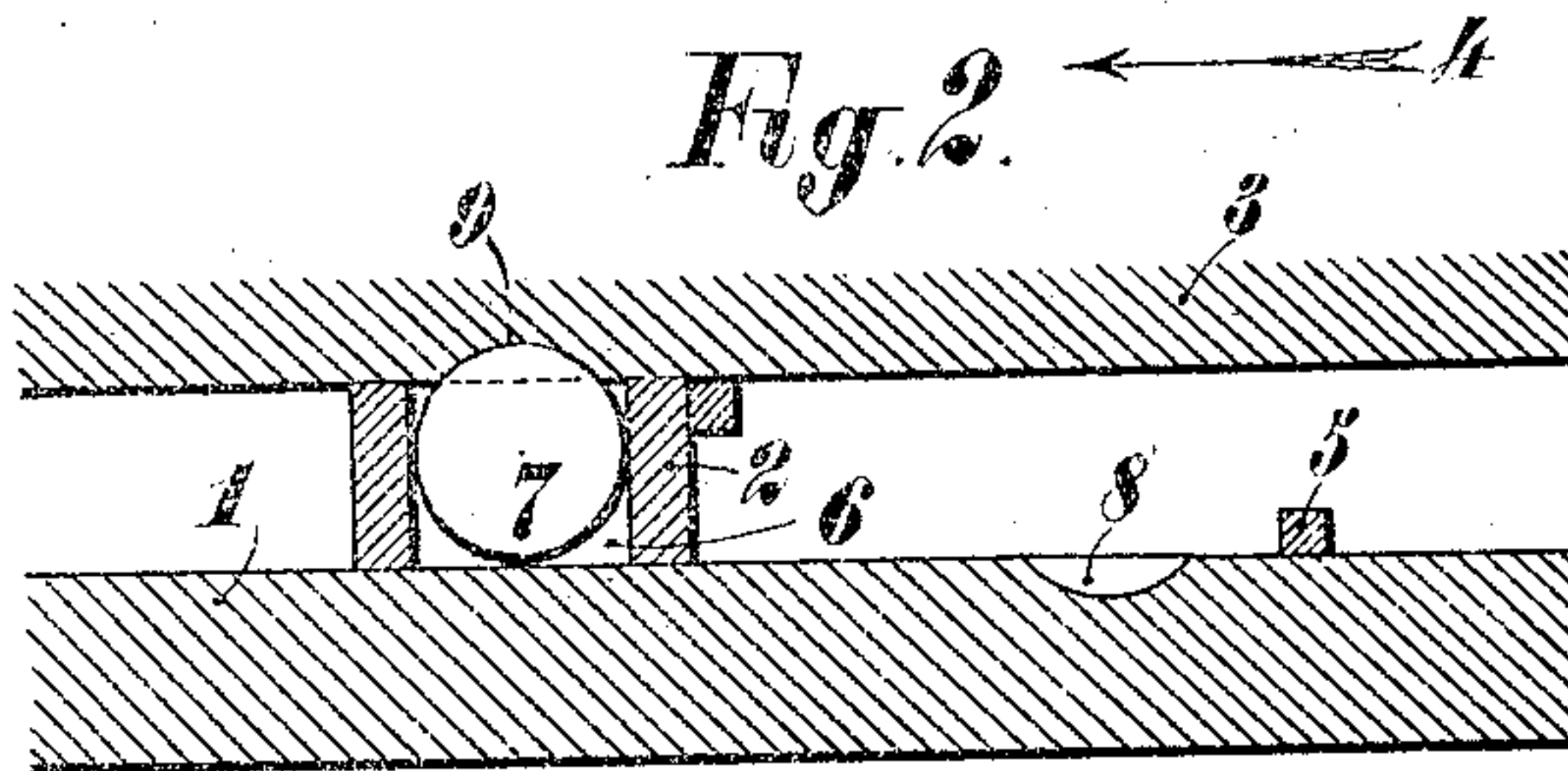
A. KREBS.  
SYSTEM OF LOCKING.  
APPLICATION FILED OCT. 9, 1905.

2 SHEETS—SHEET 1.

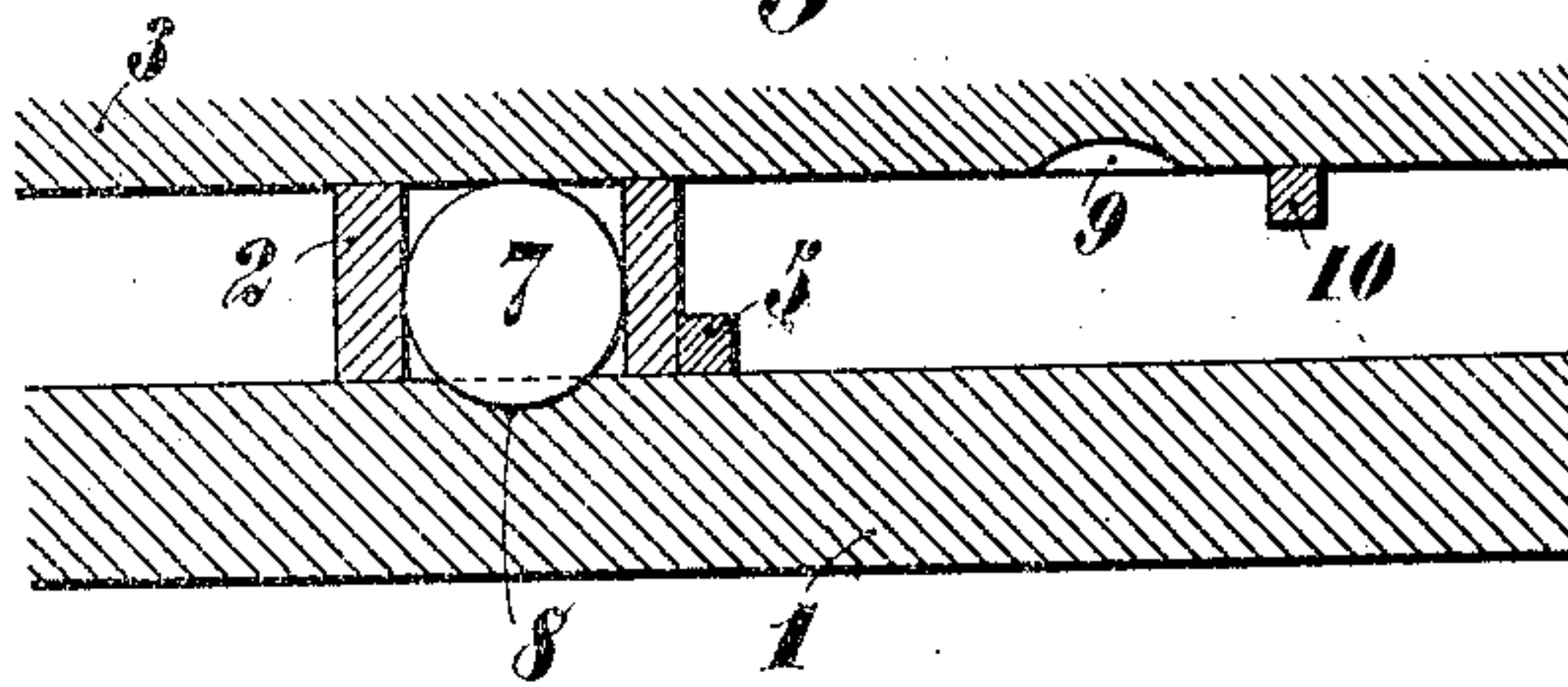
*Fig 1.*



*Fig 2.*



*Fig 3.*



Witnesses:

*E. E. Weaver*

*C. P. Kessler*

*Inventor*

*Arthur Krebs*

*By James W. Noyes*

*Att'y*

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2 SHEETS—SHEET 2.

Fig. 5.

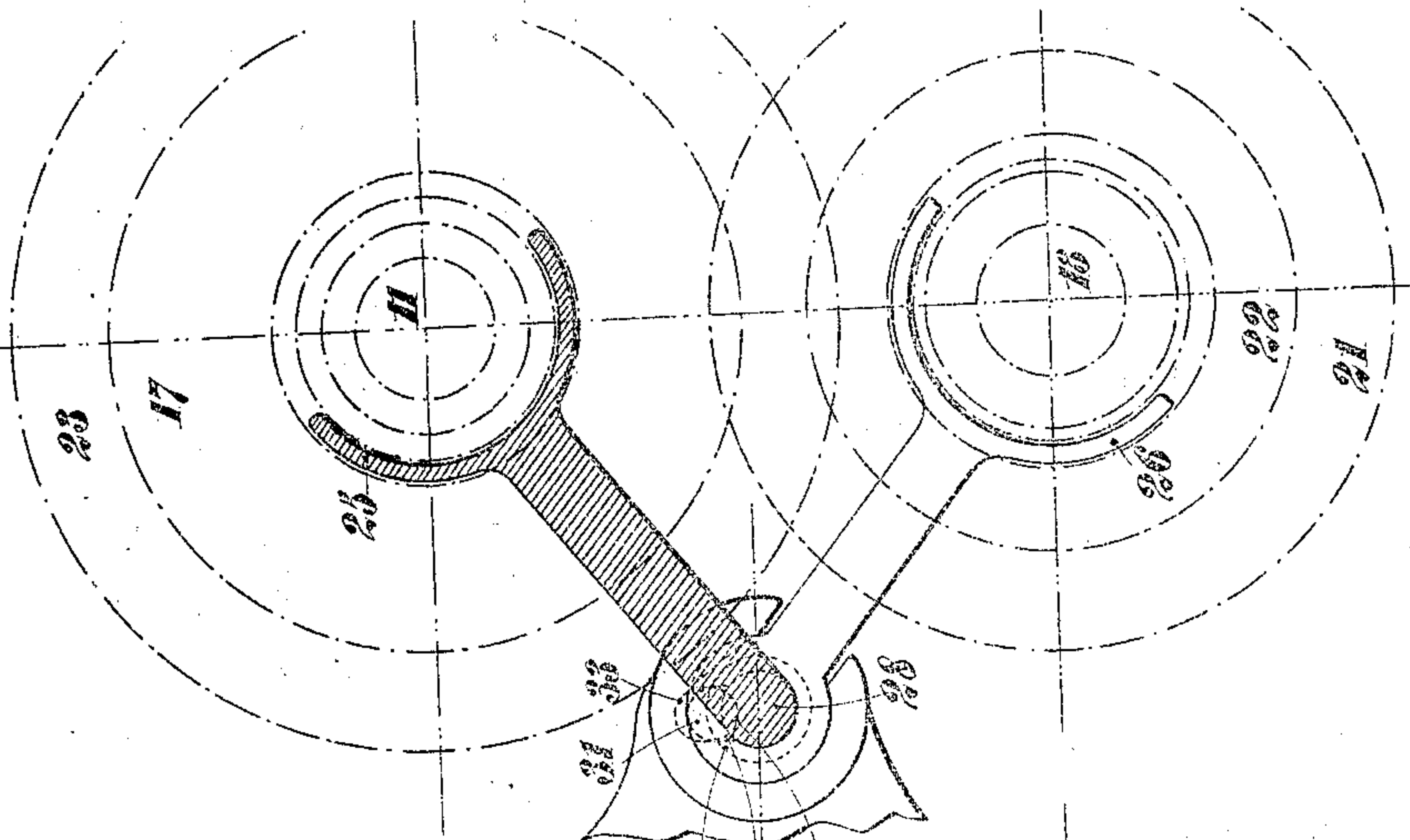
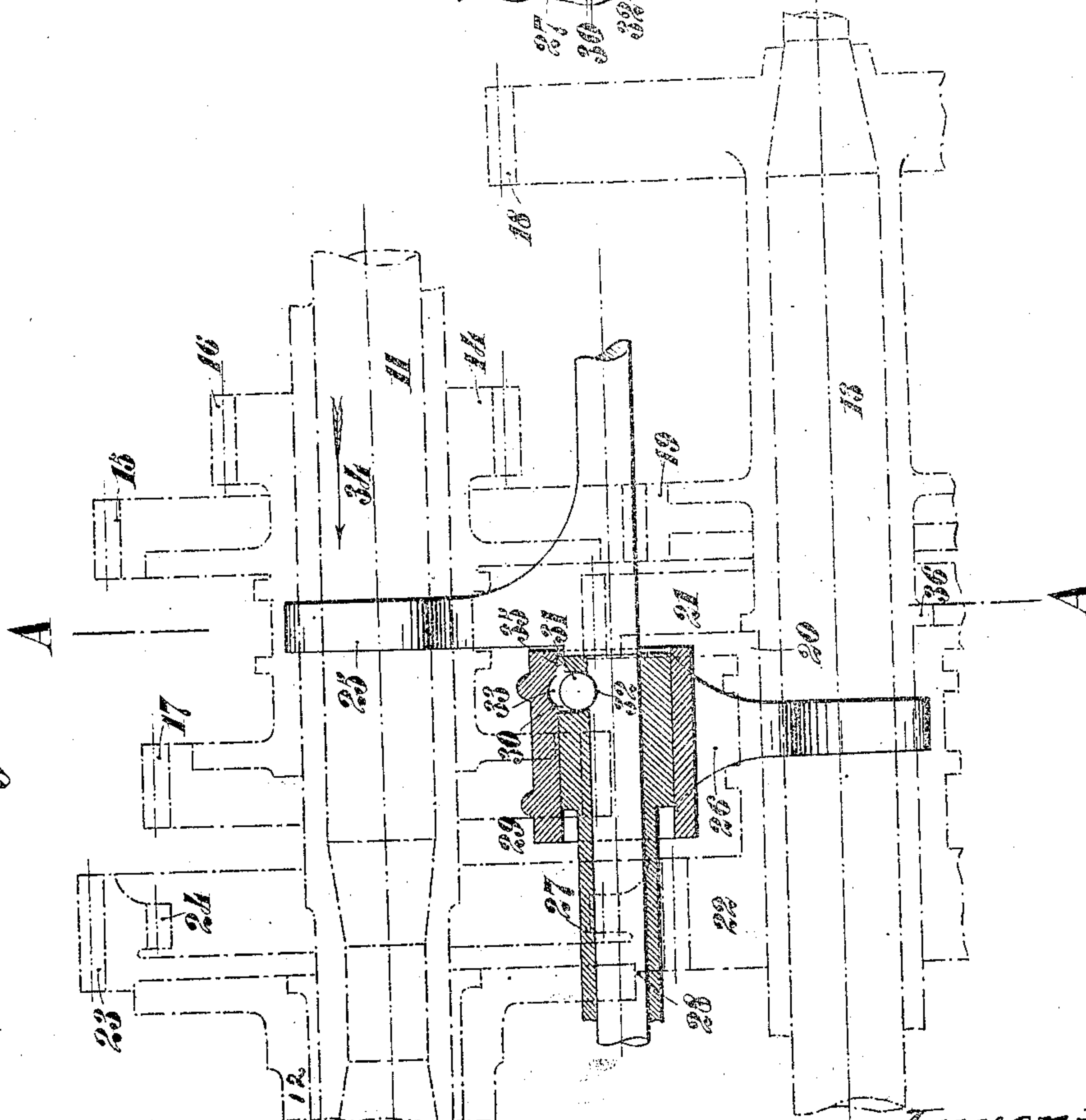


Fig. 4.



Witnesses  
E. E. Weaver  
C. D. Hester

Inventor  
Arthur Krebs  
By James L. Norris  
Attorney



# UNITED STATES PATENT OFFICE.

ARTHUR KREBS, OF PARIS, FRANCE, ASSIGNOR TO SOCIÉTÉ ANONYME  
DES ANCIENS ÉTABLISSEMENTS PANHARD ET LEVASSOR, OF PARIS,  
FRANCE.

## SYSTEM OF LOCKING.

No. 822,057.

Specification of Letters Patent.

Patented May 29, 1906.

Application filed October 9, 1905. Serial No. 282,068.

*To all whom it may concern:*

Be it known that I, ARTHUR KREBS, engineer, a citizen of the French Republic, residing at Paris, France, (Department of the Seine,) and having post-office address 19 Avenue d'Ivry, in the said city, have invented certain new and useful Improvements in Systems of Locking, of which the following is a specification.

This invention has for its object a system of locking which allows of carrying along by means of a part making mechanically-controlled shifts during a certain part of its course another piece shifting parallel to the first. The invention likewise deals with the application of this system of interlocking to the action of the speed-changing shifting spur-wheels for motor-cars.

On the annexed drawings, Figures 1, 2, and 3 are fragmentary sectional views of the locking elements in different positions. Fig. 4 is a sectional side elevation of the locking elements in connection with a speed-changing mechanism in dotted lines. Fig. 5 is a sectional view on the line A A of Fig. 4.

Let there be two parts 1 2 which can slide upon each other or one inside the other, the part 2 being moreover capable of shifting along a fixed wall 3. The part 1 moves in the direction of the arrow 4 and carries with it the part 2 in its movement by means of an abutment-piece 5. When 1 moves in the direction opposite to the arrow, if it is desired to carry along the piece 2 during a part of the course of 1 and afterward keep it motionless while the part 1 continues its movement, a system of interlocking must be adopted. For instance, the piece 2 may have a hollow 6 inside, Figs. 2 and 3, in which is placed a part 7 of a suitable form—as, for instance, a ball or cylinder of a diameter exceeding the width of the part 2 and forming a locking device.

Recesses 8 and 9 of a suitable shape for receiving the ball 7 or other suitable form are provided in the parts 1 and 3. In the position represented on Fig. 2 the ball 7 is constantly inserted and maintained in the hollow 9 of the part 3 by the plane face of the part 1. The parts 2 and 3 are thus locked together. If the piece 1 is shifted in the direction shown by the arrow, it only slides on 2 freely until the abutment-piece 5 pushes this latter forward. At this moment the hollow 8 is presented in front of the ball 7. The

latter can leave its receiver 9, and the parts 1 and 2 are connected together (position in Fig. 3) as soon as the plane face of 3 presses upon the ball.

If now 1 be shifted in the direction opposite the arrow 4, the part 2 is carried along, as it is made solid with 1 by the ball 7. The part 2 will be carried on until it strikes against the abutment 10 of the part 3. Then the ball once more enters into the recess 9, leaving the recess 8. The parts 1 and 2 are no longer fixedly connected, and the part 1 continues its movement alone. This method of locking finds application in the action of shifting spur-wheels for speed change. Fig. 4 shows an example of this application. Fig. 5 shows the motor-shaft; 12, the control-shaft arranged in the extension of the motor-shaft. 13 is an intermediate shaft for low and medium speeds. The motor-shaft 11 carries a sleeve 14, partaking of the rotation of this shaft, but which can be displaced along the length of the shaft. On this sleeve are fixed three toothed pinions 15 16 17. On the intermediate shaft 13 are directly fitted two toothed pinions 18 and 19, intended to mesh with the pinions 16 and 15, respectively. On the shaft 13 there is further fitted a sleeve 20, sharing in the rotation of the shaft, but capable of displacement along its length. This sleeve carries a toothed pinion 21, which may engage with a pinion 17, and it also carries a pinion 22, engaging normally with a gear 23, fitted on the control-shaft 12. This pinion 23 further has inside gear-teeth 24, which for running at a high speed mesh with the pinion 17. A fork 25 serves to operate the shifts of the sleeve 14. For running at slow and medium speeds it is sufficient to shift the spur-wheels 15, 16, and 17 by means of the fork in order to mesh either the gears 16 and 18 or the gears 15 and 19 or the gears 17 and 21, the gears 22 and 23 being presumed to be engaged.

For running at high speed, on the contrary, the gears 17 and 24 are meshed direct. When this meshing takes place, it is expedient to unmesh automatically the gears 22 and 23, so that the shaft 13 should not be needlessly carried with them. The shift of the sleeve 20, carrying the pinions 21 and 22, is operated by means of a fork 26. The rod 27 of this fork 26 is hollow, and in the inside of this rod a prolongation 28 of the rod of the



fork 25 slides. Further, the rod 27 shifts in a fixed block 29. A groove or hollow 30 is provided in the rod 27 to receive a ball 31 of a diameter slightly exceeding the thickness of the full part of the rod, and in the prolongation 28 of the rod of the fork 25, as well as in the block 29, recesses or dents 32 and 33 are provided in suitable places. It will be understood that when the fork 25 is shifted in the direction of the arrow 34 the fork 26 is carried along by the abutment 35. The sleeve 20 is therefore shifted in the direction of the arrow, and the unmeshing of the gears 22 and 23 takes place at the same time as the meshing of the gears 17 and 24 is effected. When it is desired to run at a slower speed and the fork 25 is shifted in the direction opposite to the arrow, the ball 31, engaged in the recess or dent 32, insures the interlocking of the rods 27 and 28, and the fork 26 is carried along in the direction opposite to the arrow until the moment when the gears 22 and 23 being once more meshed the ball 31 is once more facing the dent or recess 33 in the block 29. At that moment the sleeve 20 comes into contact with an abutment 36 of the shaft 13. The shift of the fork 25 from that time continues independently of the fork 26.

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

1. A mechanism of the class described including a movable recessed member, a shiftable member surrounding the movable member and having a recess therein for receiving a displaceable element, a displaceable element in said recess for locking the respective members together, and a fixed member having a recess for receiving the displaceable element when one of the members is actuated.

2. In an interlocking device, a plurality of members movable with respect to one another, a fixed member, each of the said members provided with recesses, and a displace-

able element mounted to move with said movable members for locking the same together when one of said members is shifted.

3. In mechanism of the class described, a plurality of shiftable members arranged one within the other, each provided with recesses adapted to be brought in register with one another, a displaceable element of a greater diameter than the depth of the recesses for locking the movable members together, and a fixed member having a recess for receiving the displaceable element when one of the members is moved in one direction.

4. In mechanism of the class described, a shiftable recessed member, a recessed member surrounding the said movable member and adapted for movement on the same, a displaceable element mounted in the recess of the last-mentioned member for locking the respective members together when either of the same are actuated in one direction, and a fixed member having a recess for receiving the displaceable element when one of the members is moved in an opposite direction.

5. In a gear-changing mechanism, a recessed shiftable rod, a movable member surrounding the same and having a recess adapted to be brought into register with the recess in the rod, a ball of greater diameter than the thickness of the member mounted in the recess of the latter for locking the rod to the said member when the recesses are in register with one another, and a fixed member having a recess adapted to register with the recesses in the respective rod and said member for receiving the ball and for locking said member against movement when the rod is moved in one direction.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ARTHUR KREBS.

Witnesses:

PIERRE LEINÉ,  
MAS. DE RIRAND.