No. 608,611. Patented Aug. 9, 1898.

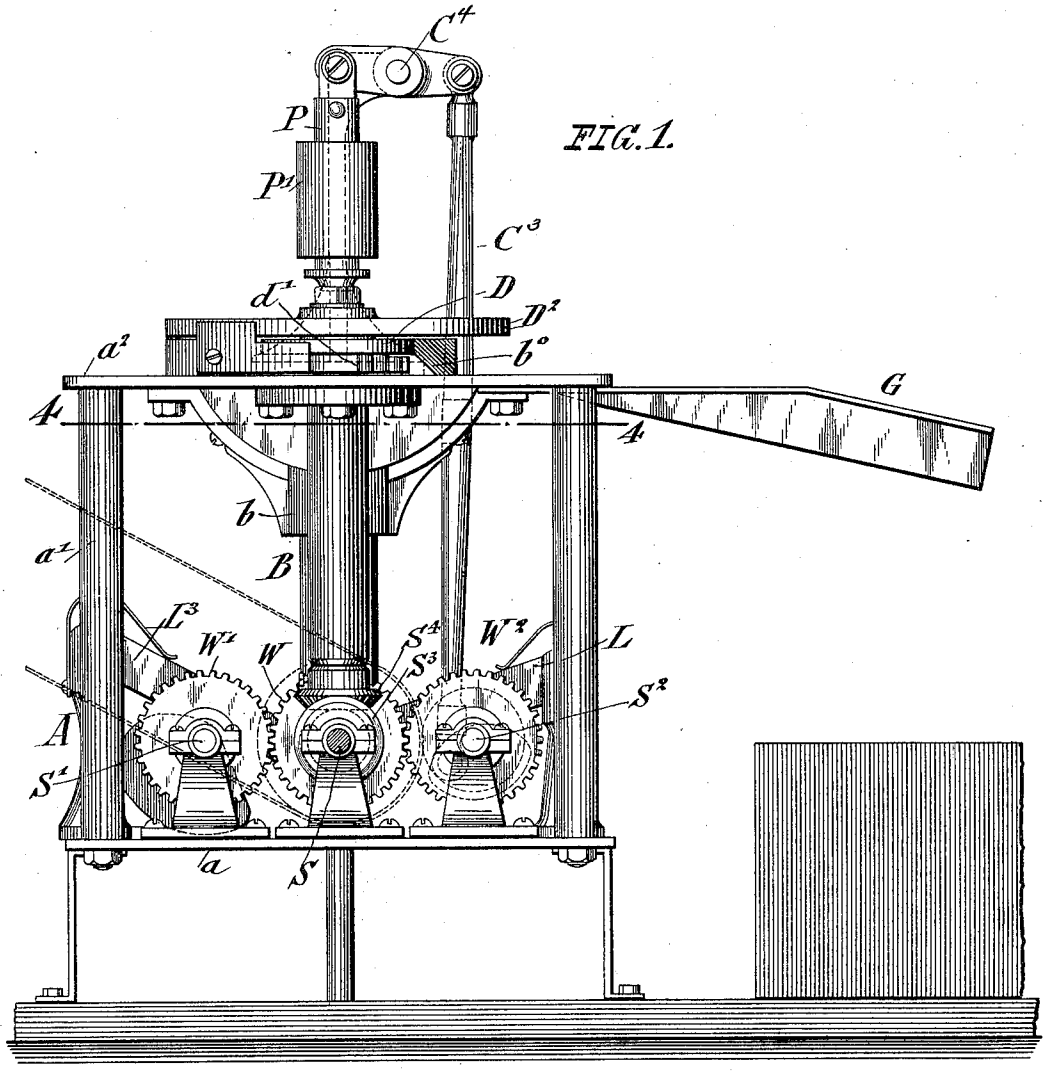
E. KLAHN.

MACHINE FOR ASSEMBLING BALL RETAINERS FOR BALL BEARINGS.

(Application filed Apr. 27, 1898.)

(No Model.) 7 Sheets—Sheet 1.

FIG. 1.




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No. 608,611. Patented Aug. 9, 1898.

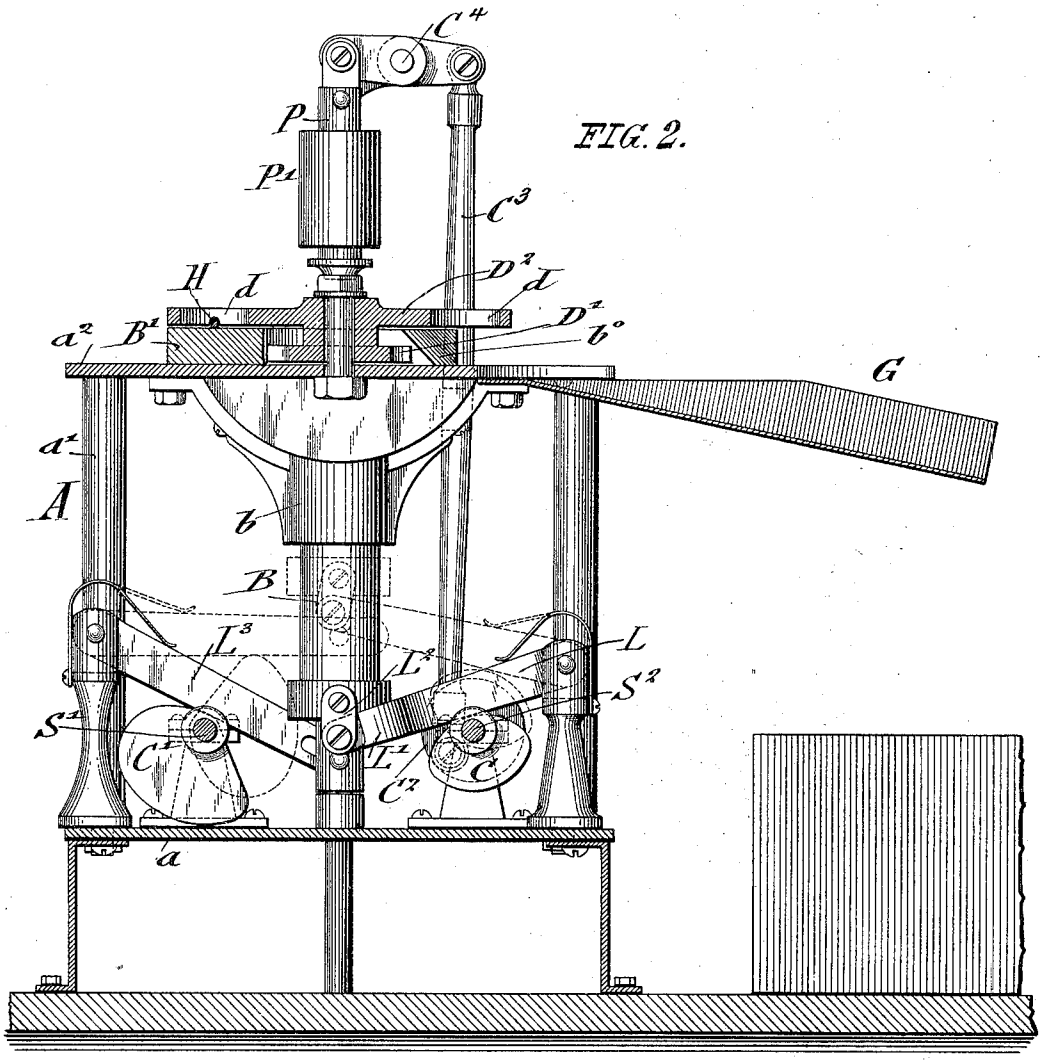
E. KLAHN.

MACHINE FOR ASSEMBLING BALL RETAINERS FOR BALL BEARINGS.

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(No Model.) 7 Sheets—Sheet 2.

FIG. 2.




WITNESSES:

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No. 608,611. Patented Aug. 9, 1898.

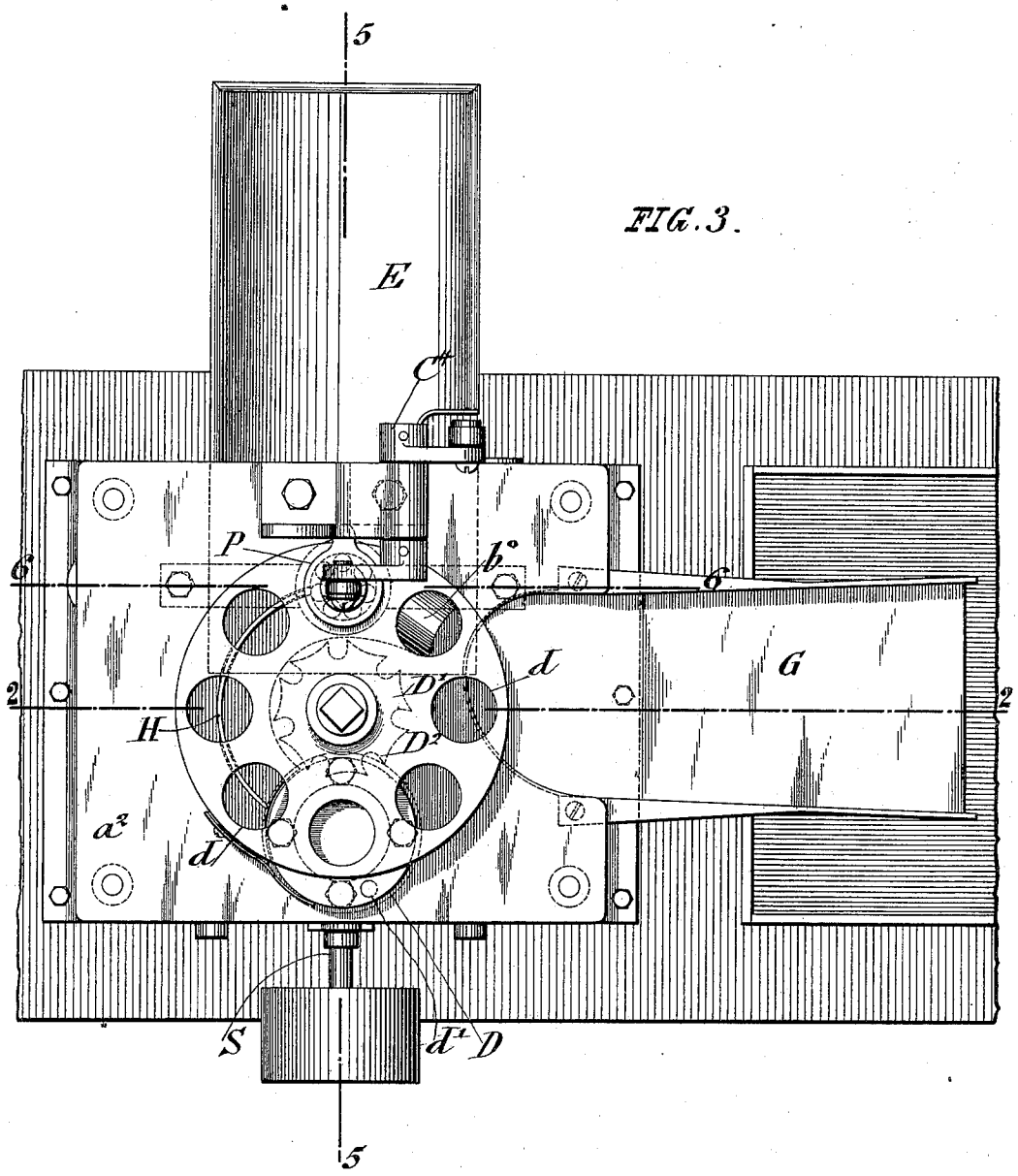
E. KLAHN.

MACHINE FOR ASSEMBLING BALL RETAINERS FOR BALL BEARINGS.

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(No Model.) 7 Sheets—Sheet 3.

FIG. 3.




WITNESSES:

Bruno von Hülsingklöwen

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INVENTOR

Emil Klahn

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No. 608,611. Patented Aug. 9, 1898.

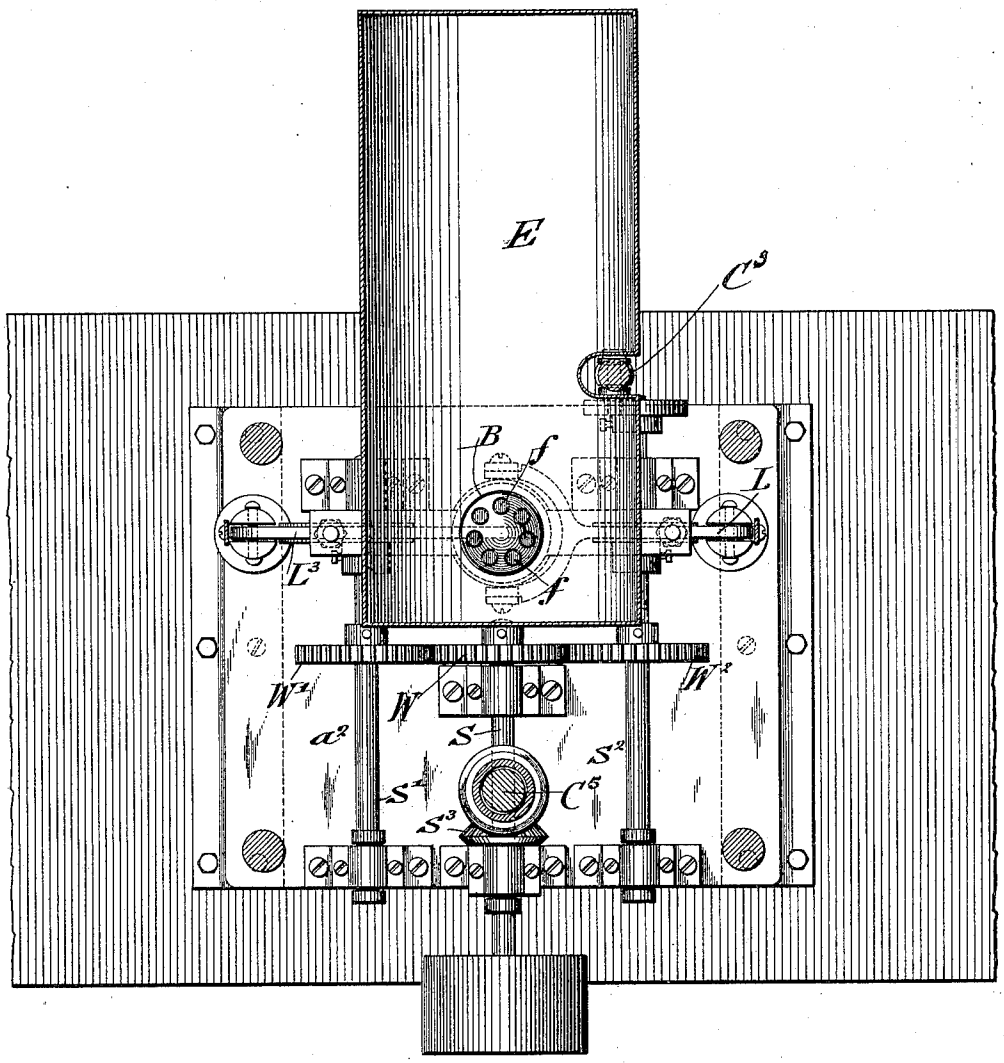
E. KLAHN.

MACHINE FOR ASSEMBLING BALL RETAINERS FOR BALL BEARINGS.

(Application filed Apr. 27, 1898.)

(No Model.) 7 Sheets—Sheet 4.

FIG. 4.




WITNESSES:

Bruno von Biltzingslöwen

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No. 608,611. Patented Aug. 9, 1898.

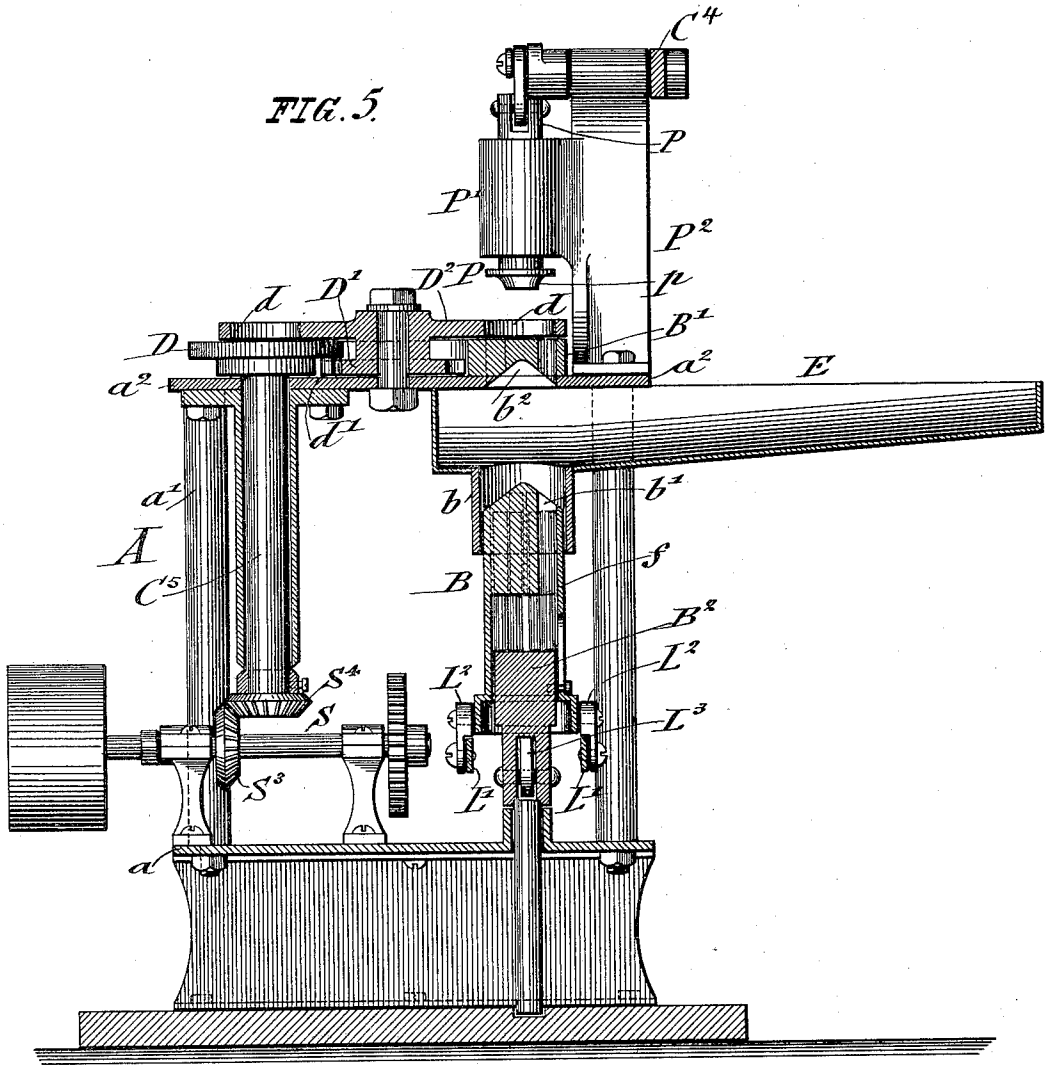
E. KLAHN.

MACHINE FOR ASSEMBLING BALL RETAINERS FOR BALL BEARINGS.

(Application filed Apr. 27, 1898.)

(No Model.) 7 Sheets—Sheet 5.

FIG. 5.




WITNESSES:

Rhino von Zedtwitz Liebenau

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No. 608,611. Patented Aug. 9, 1898.

E. KLAHN.

MACHINE FOR ASSEMBLING BALL RETAINERS FOR BALL BEARINGS.

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FIG. 6.

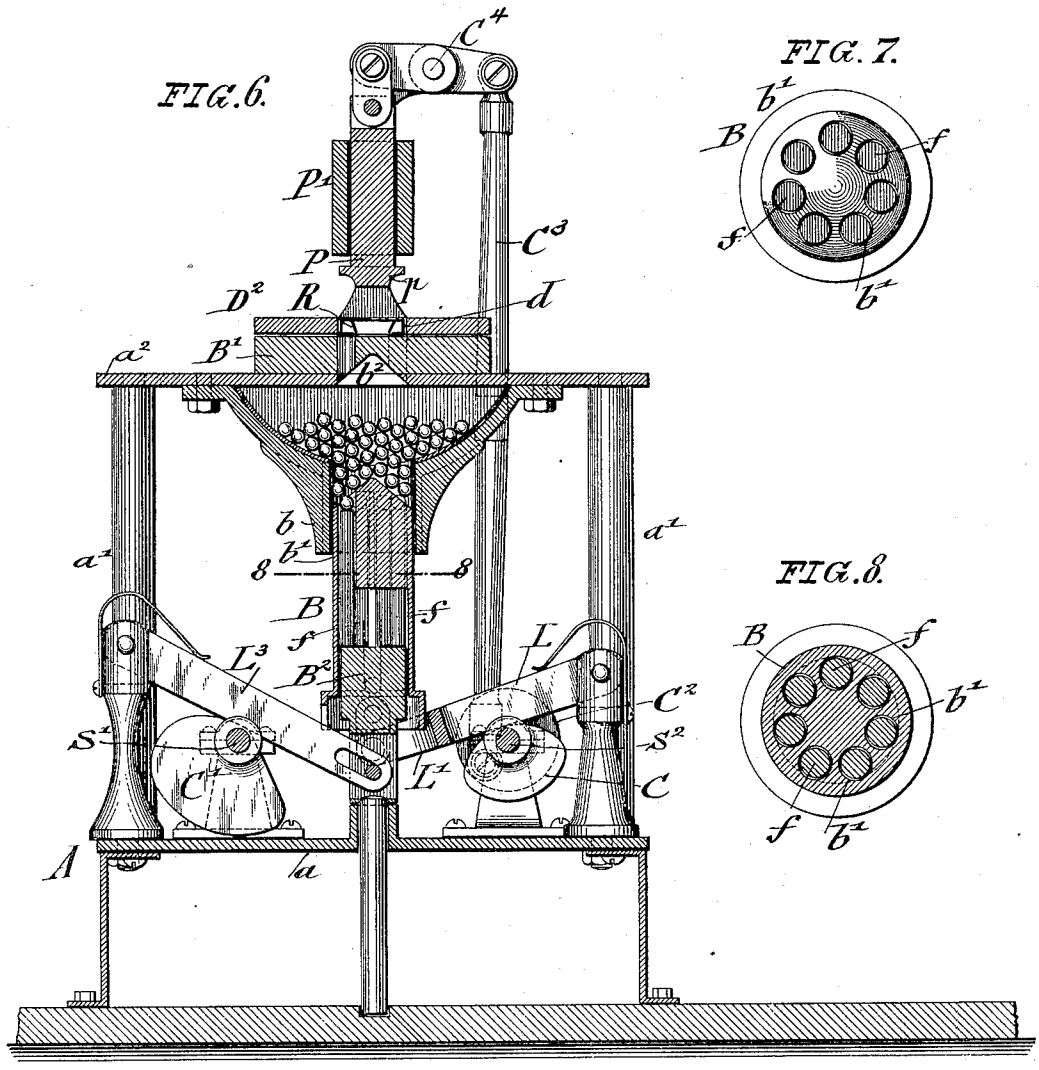



FIG. 7.




FIG. 8.




WITNESSES:

Bruno von Bültzingslöwen

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INVENTOR

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No. 608,611. Patented Aug. 9, 1898.

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MACHINE FOR ASSEMBLING BALL RETAINERS FOR BALL BEARINGS.

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FIG. 9.

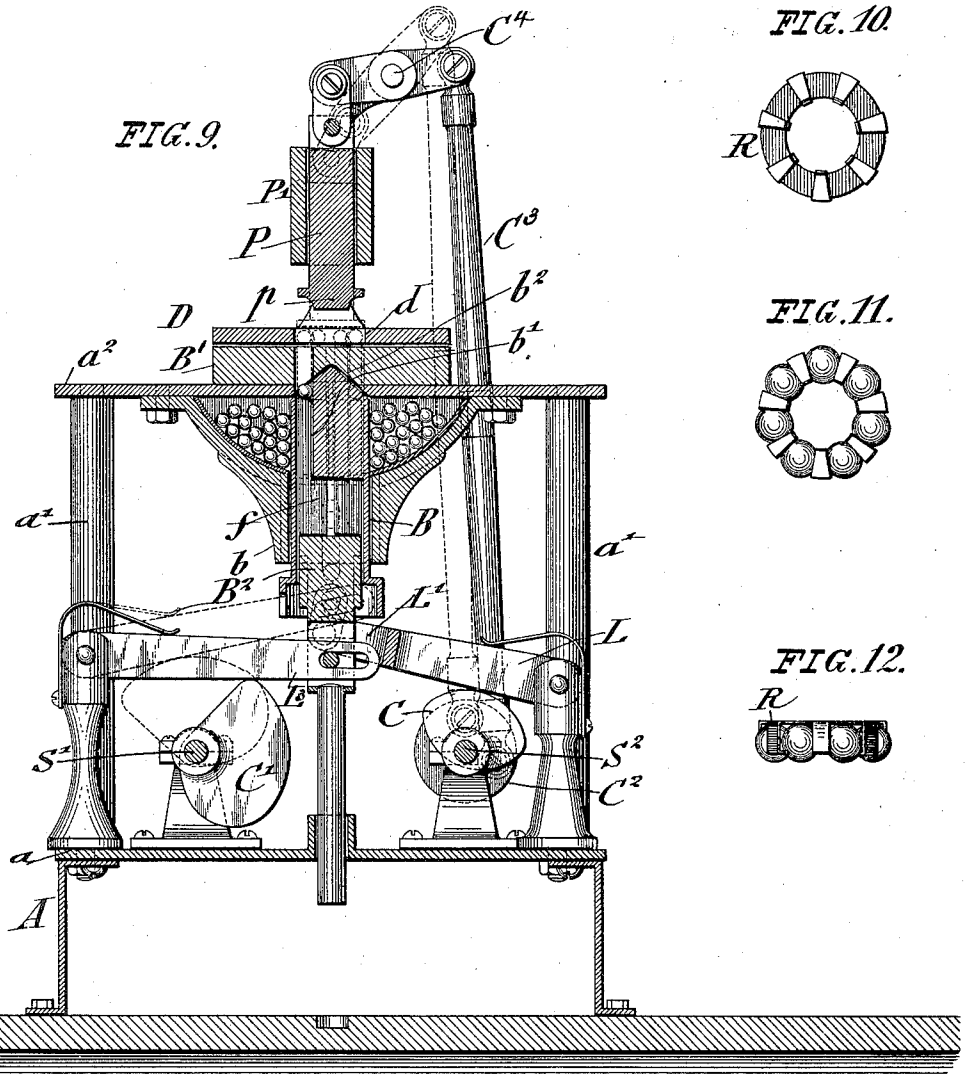



FIG. 10.




FIG. 11.



FIG. 12.




WITNESSES:

Bruno von Bültzingslöwen

Geo. W. Jaekel.

INVENTOR

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Goepel & Weinel

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# UNITED STATES PATENT OFFICE.

EMIL KLAHN, OF WEST HOBOKEN, NEW JERSEY, ASSIGNOR TO THE MANUFACTURERS AND MERCHANTS WAREHOUSE COMPANY, OF CHICAGO, ILLINOIS.

## MACHINE FOR ASSEMBLING BALL-RETAINERS FOR BALL-BEARINGS.

SPECIFICATION forming part of Letters Patent No. 608,611, dated August 9, 1898.

Application filed April 27, 1898. Serial No. 678,981. (No model.)

*To all whom it may concern:*

Be it known that I, EMIL KLAHN, a citizen of the United States, residing at West Hoboken, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Machines for Assembling Ball-Retainers for Ball-Bearings, of which the following is a specification.

This invention relates to an improved machine for assembling the so-called "ball-retainers" that are used in the ball-bearings of velocipedes and of which the ball-retainer shown and described in Letters Patent No. 600,311, granted to H. Hansen under date of March 8, 1898, forms the type, and in which a ring having prongs at its inner and outer edges, which are bent toward each other, so as to form retainers for the antifriction-balls, is shown.

The invention consists of a machine for assembling the retainer with all the balls by direct automatic action, so as to turn them out quickly and at a considerable saving of time and labor, which machine consists, in its general outlines, of the following instrumentalities: a charging-barrel having vertically-sliding stickers, means for feeding the balls to said charging-barrel, a rotary turret-disk having openings through which the balls for the retaining-rings are successively fed, and a plunger by which the retainer is pressed over the required number of balls fed by the barrel, as will be fully described hereinafter and finally pointed out in the claims.

In the accompanying drawings, Figure 1 represents a front elevation of my improved machine for assembling ball-retainers, for ball-bearings, the main driving-shaft being in section. Fig. 2 is a vertical section on line 2 2, Fig. 3. Fig. 3 is a plan view of the entire machine. Fig. 4 is a plan view, partly in horizontal section, on line 4 4, Fig. 1. Fig. 5 is a vertical transverse section on line 5 5, Fig. 3. Fig. 6 is a vertical longitudinal section on line 6 6, Fig. 3. Figs. 7 and 8 are respectively a plan view and a horizontal section on line 8 8, Fig. 6, of the charging-barrel and its stickers. Fig. 9 is a vertical longitudinal section on the same line as Fig. 6, showing the charging-barrel in raised position with the balls ready to be inserted into the retainer. Fig. 10 is a bottom view of the retainer before filling with balls. Figs. 11 and 12 are a bottom view and a side view of the type of ball-retainers that are assembled by the machine.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A represents the supporting-frame of my improved machine for assembling the ball-retainers for ball-bearings. The supporting-frame consists of a base-plate $a$, upright pillars $a'$, and a top plate $a^2$, supported by said pillars. On the base-plate are supported the bearings of the motion-transmitting shafts by which motion is transmitted to the different operative parts of the machine, there being a center shaft and two side shafts, which are arranged parallel with each other. The center shaft S receives motion by a suitable belt-and-pulley transmission and transmits this motion by gear-wheels W W' $W^2$, of equal size, to the side shafts S' $S^2$, as shown in Fig. 1. The side shafts S' $S^2$ are provided with cams C C', of the required size and shape for respectively imparting the properly-timed motions to a vertically-reciprocating ball-charging barrel B and to vertically-reciprocating stickers or lifters $f$, guided in openings in the barrel B. The shaft $S^2$ transmits motion by a crank-disk $C^2$ and crank-rod $C^3$ through a fulcrumed pivot-link $C^4$ to a vertically-reciprocating plunger P, that is guided in a sleeve-shaped guide P' at the upper end of the machine, said guide being supported by a suitable bracket-arm $P^2$, attached to the top plate $a^2$. The main driving-shaft S transmits motion by bevel-gears $S^3$ $S^4$ to a vertical shaft $C^5$, which passes through the top plate $a^2$ and which carries at its upper end a disk D, that engages, by a tappet-pin $d'$, at each full rotation a stop-wheel D', which is pivoted at the center of the top plate $a^2$ and which carries a turret-disk $D^2$, having a number of openings $d$—say, for instance, eight—of a slightly-larger size than the retainer R. The axes of the charging-barrel B and the vertical shaft $C^5$ are arranged in a vertical plane passing through the center of the machine and are located

vertically below diametrically-arranged openings in the rotary disk $D^2$. While the barrel receives a vertical reciprocating motion, the rotary turret-disk receives an intermittent step-by-step motion, the motions of the charging-barrel, its stickers, the rotary turret-disk, and the plunger being so timed as to take place in proper successive order.

*The charging-barrel.*—The charging-barrel is made of cylindrical shape and is guided at its upper end in a sleeve *b*, supported from the top plate $a^2$ vertically in line with the barrel B and arranged at the lowermost end of an inclined tray or receiver E, into which the balls that are to be transferred to the retainers are placed in large quantities, so that a sufficient number of balls is always ready for being taken up by the vertically-reciprocating barrel B. The upper end of the barrel is made conically tapering, with as many holes *b'* arranged equidistant from the center as there are balls to be fed to the retainer. When the retainer is to be provided with eight balls, eight longitudinal holes *b'* are made in the barrel, while when a larger or smaller quantity of balls is used in the retainer a corresponding number of holes has to be provided. The balls fill the space above the charging-barrel B when the same is in its lowermost position, as shown in Fig. 6. As soon as the barrel is raised each hole takes up a separate ball, and it is raised above the remaining balls, as shown in Fig. 9. The conical upper end of the barrel in its upper position (shown in Fig. 9) abuts against the wall of a corresponding recess $b^2$ in the block B', said block limiting the upward motion of the charging-barrel. This motion is accomplished by the cam C on the shaft $S^2$, said cam acting on a pivoted and spring-actuated lever L, that is forked at its inner end L' and pivoted to links $L^2$, pivoted at the lower end of the charging-barrel, as shown clearly in Figs. 4, 6, and 9. In the longitudinal holes *b'* of the charging-barrel are arranged the lifters or stickers *f*, which rest on a vertically-reciprocating pusher or block $B^2$, that is guided in the lower tubular portion of the charging-barrel, the shank of said block being connected with the slotted end of a pivoted and spring-actuated lever $L^3$, that is acted upon by cam C' on the shaft S', whereby when the charging-barrel arrives at its uppermost position, as shown in Fig. 9, the motion of the stickers *f* is continued by the upward motion of the pusher $B^2$, so that the balls are lifted into a plane with the rotary turret-disk, as shown in dotted lines in Fig. 9. In this position they are ready to be pressed into the prongs of the retainer R by the action of the descending plunger P, so as to complete the retainer.

*The rotary turret-disk.*—The retainers are charged into the openings of the rotary turret-disk D either by hand or by arranging a special feed mechanism for the same above the disk, so that they are supplied automatically to the openings of the disk. The retainer is dropped into the charging-opening *d* and then guided over the intermediate block B', along an arc-shaped guide or rib H, which extends centrally across the openings, said guide-rib being concentric with the center of the turret-disk. The arc-shaped guide-rib *g* serves for holding the retainers, which are fed prongs downward, in proper position so as to bring each one in the same position vertically over the balls fed through the charging-holes of the barrel B. The arc-shaped guide-rib prevents any shifting of the retainers, and hence the crushing of the same under the action of the plunger. This is an important feature, as the regular feed of the retainers to the charging-openings and plunger is produced. When one retainer arrives vertically above the balls in the charging-barrel, the charging-barrel is in raised position and the stickers are raised, so as to bring the balls between the prongs of the retainer. Simultaneously therewith the plunger is lowered, and by the simultaneous pressure of the stickers and the plunger the balls are forced into the recesses of the retainers, the prongs "giving" sufficiently by their spring action so as to take up all the balls at the same time. After the balls are "sprung," so to say, into the retainer the plunger is lowered still more, so that the balls are forced in outward direction for assuming their final position in the retainer, which operation is assisted by the conically-tapering shape of the lower part *p* of the plunger P. When the balls have been transferred into the retainer and properly centered in the same, the plunger is raised again and the turret-disk moved again, so as to bring the next opening *d* in line with the charging-barrel, and the complete retainer is dropped along the inclined end $b^0$ of the intermediate block onto an inclined chute G, over which the same is gradually fed to the successively-completed retainers, one pushing the other forward until they drop over the edge of the chute G into a suitable receptacle. The delivery-chute G is arranged at right angles to the feed-tray or supply-hopper E. (Shown clearly in plan in Fig. 3.) The improved retainers are assembled automatically by the operation described, so as to dispense with the hand-filling of the same and at the same time produce an evenly-charged ball-retaining device in which every lug or prong is set to the proper position with the same degree of accuracy as can be produced by the most skilful hands.

Having thus described my invention, what I claim is—

1. The combination with a rotary turret-disk provided with a series of openings, each for receiving a retainer for ball-bearings, and means for intermittently rotating the turret-disk, of a charging-barrel, stickers guided therein, a plunger, and means for reciprocating the barrel, stickers and plunger, whereby a set of balls is applied to the retainer

moved in line with them, substantially as set forth.

2. The combination with a rotary turret-disk provided with means for supporting a number of retainers for ball-bearings, and means for intermittently rotating the turret-disk, of a charging-barrel, stickers guided therein, said barrel and stickers being arranged on one side of said turret-disk, a plunger arranged on the opposite side, and means for reciprocating the barrel, stickers and plunger, whereby a set of balls is applied to the retainer moved in line with them, substantially as set forth.

3. The combination with a rotary turret-disk provided with a series of openings, each for receiving a retainer for ball-bearings, and means for intermittently rotating the turret-disk, of a charging-barrel, stickers guided therein, a plunger provided with a conical operative end, and means for reciprocating the barrel, stickers and plungers, whereby a set of balls is applied to the retainer moved in line with them, substantially as set forth.

4. The combination with a rotary turret-disk provided with means for supporting a number of retainers for ball-bearings, and means for intermittently rotating the turret-disk, of a charging-barrel, a hopper or tray into which the barrel is guided, stickers guided in the barrel, a plunger, and means for reciprocating the barrel, stickers and plunger, whereby a set of balls is applied to the retainer moved in line with them, substantially as set forth.

5. The combination with a rotary turret-disk provided with means for supporting a number of retainers for ball-bearings, and means for intermittently rotating the turret-disk, of a charging-barrel provided with a conical upper end, a hopper or tray into which the said conical end works, stickers guided in the barrel, a plunger, and means for reciprocating the barrel, stickers and plunger, whereby a set of balls is applied to the retainer moved in line with them, substantially as set forth.

6. The combination with a rotary turret-disk provided with means for supporting a number of retainers for ball-bearings, and means for intermittently rotating the turret-disk, of a hopper or tray for containing a quantity of balls, a reciprocating plunger, and means for transferring a set of balls from the said hopper or tray, to the retainer, said plunger coacting with said means of transfer, substantially as set forth.

7. The combination with a rotary turret-disk provided with means for supporting a number of retainers for ball-bearings, and means for intermittently rotating the turret-disk, of a charging-barrel, having a hollow or tubular lower end, stickers guided in the upper part of the barrel, a pusher guided in the lower part of the barrel, and acting on said stickers, a plunger, and means for reciprocating said barrel, pusher and plunger, substantially as set forth.

8. The combination with a rotary turret-disk provided with means for supporting a number of retainers for ball-bearings, means for intermittently rotating the turret-disk, and an arc-shaped guide coacting with said turret-disk for holding the retainers in proper position, of means for inserting balls in said retainers held in said turret-disk, substantially as set forth.

9. The combination with a rotary turret-disk provided with a series of openings for receiving a number of retainers for ball-bearings, means for intermittently rotating said turret-disk, and an arc-shaped guide, under said openings, concentric with said turret-disk, of means for inserting balls in the retainers arranged in the openings in said turret-disk, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

EMIL KLAHN.

Witnesses:
PAUL GOEPEL,
GEO. W. JAEKEL.