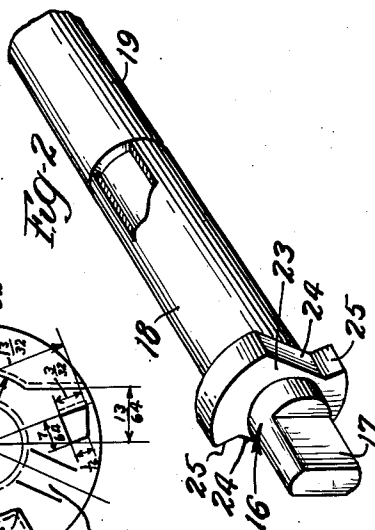


Filed June 27, 1950

SHADE ROLLER

2 SHEETS--SHEET 1



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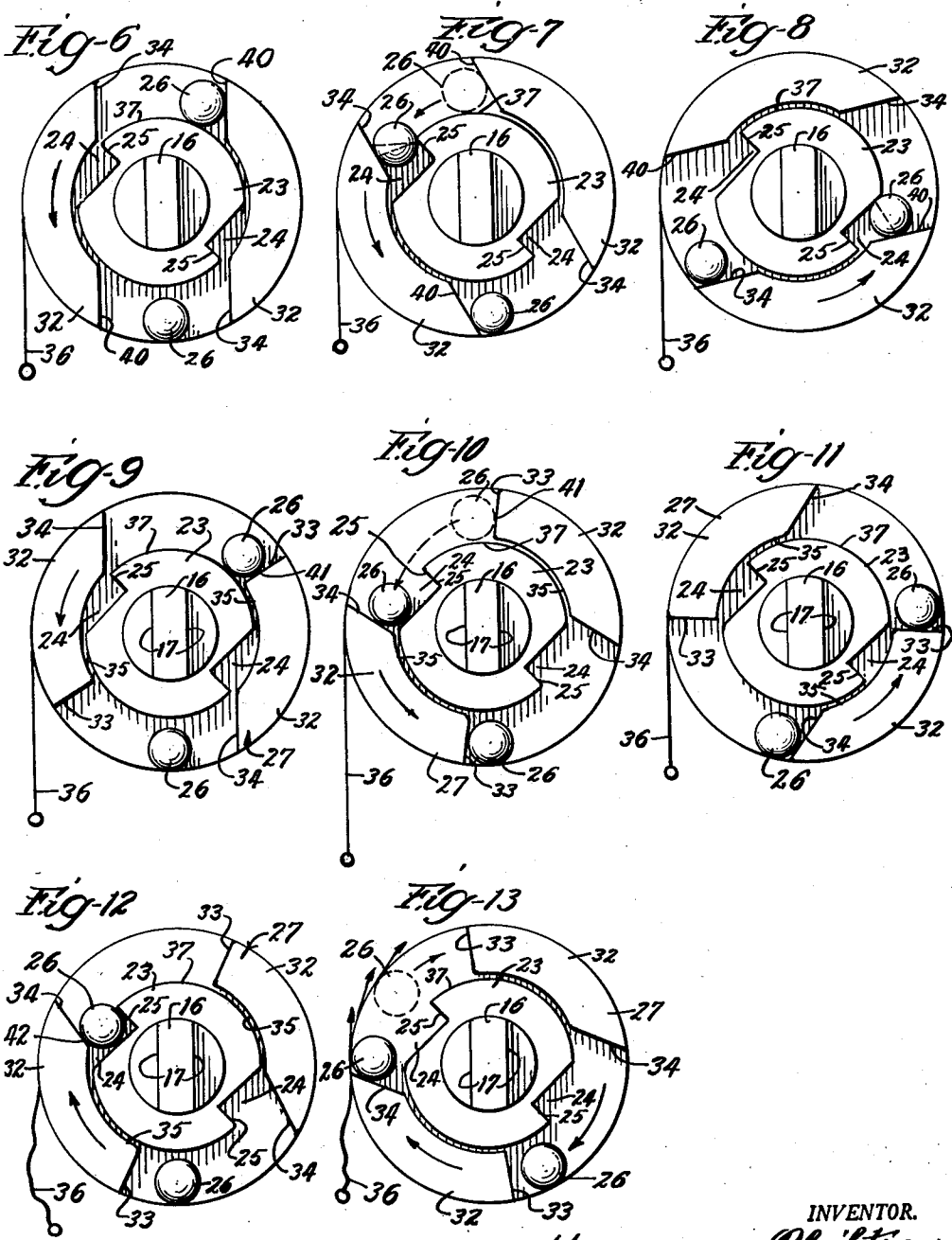
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SHADE ROLLER

2,614,629

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2 SHEETS—SHEET 2



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UNITED STATES PATENT OFFICE

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SHADE ROLLER

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6 Claims. (Cl. 160-297)

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This invention relates to shade rollers, and has for its principal objects to simplify the construction, reduce the number of parts and the cost of manufacture, and to insure certain stable locking in an adjusted position with quick release for readjustment.

Generally speaking, this is accomplished by replacing the familiar pawl and ratchet mechanism with a special ball or tumbler clutch illustrated in the drawings, in which:

Fig. 1 is a longitudinal section through the shade roller and the mechanism;

Fig. 2 is a perspective view of the fixed shaft received within the hollow end of the shade roller and cooperating with the rewinding spring;

Figs. 3, 4, and 5 are front elevation and perspective views of opposite sides of a clutch or tumbler plate forming part of the mechanism;

Figs. 6, 7, and 8 are diagrams of the clutch mechanism showing certain design limits that may give faulty locking likely to be followed by involuntary release; and

Figs. 9-13 are similar diagrams showing the preferred design and illustrating the correctness of the locking together with the freedom for release.

The familiar shade roller indicated by 10 is equipped with a customary spindle 11 and ferrule 12 at the right end in Fig. 1.

Adjacent to the left end, the roller 10 has a bore 13 provided with a reduced extension 14.

The bore receives a shaft 16 (Fig. 2) having its projecting end flattened at 17 to fit in the familiar form wall bracket by which the shaft is made fast in a fixed position.

The shaft 16 has a hollow cylindrical portion 18 telescoped with a wooden pin 19 slotted at the inner end 20 to receive the bent end portion 21 of a helical spring 22, the outer end of which is made fast to the outer end of the roller 10. The shaft 16 being fixed and the spring connected between and acting between its inner end and the outer end of the shade roller, the spring acts to rotate the roller to raise the shade from any selected lower position.

The inner end of the wooden pin 20 fits into the reduced extension 14 of the bore 13 in the roller.

The outer end of the roller 10 is equipped with a familiar ferrule which substantially closes the end of the shade roller and holds the clutch mechanism, shaft, and spring in place.

The shaft 16 is provided with a cylindrical ball or tumbler race 23 recessed at 24 in opposite places to provide locking shoulders 25 to cooperate with balls or tumblers 26.

The end of the shade roller 10 is equipped with a clutch plate or tumbler plate shown in Figs. 3, 4 and 5 and indicated generally by 27. It includes a circular flat port on 28 having studs 29 struck from it to be driven into the end of the shade roller and form a driving connection between the plate and the roller.

It also has opposite eyes 30 struck inwardly through which the outer convolution of the

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spring 22 is threaded and made fast by bending over against one of those eyes. This arrangement serves to connect the outer end of the spring to the outer end of the shade roller through the clutch plate.

The flat, disk-like portion 28 is also provided with a flange or collar 31 which surrounds the cylindrical portion of the shaft 16 just inwardly of the race 23, and serves as a bearing for the roller on the shaft.

The clutch plate 27 is also provided with spaced lobes 32 projecting over the ball or tumbler race 23 and cooperating with the balls 26. Each lobe 32 is provided with a tumbler lifting flank 33 and a tumbler locking flank 34, spaced circumferentially from the corresponding flanks of the other.

Between the two flanks, each lobe has a circular wall 35 overlying the circumference of the ball or tumbler race 23 with working clearance.

In the diagram shown in Fig. 9, the parts appear in a position they assume as the shade cord 36 is drawn downwardly to lower the shade, and one of the balls 26 is being pushed up over the race 23 by the lifting flank 33 at the right. As the shade cord is pulled downwardly from the position shown in Fig. 9, the parts proceed to the positions shown in Fig. 10, in which the lifting flank 33 has moved the ball 26 beyond the crest 37 of the race 23, and it has run down, as indicated in the dotted line, to a position within the recess 24 between the locking shoulder 25 on the race and the locking flank 34 on the adjacent lobe 32.

If the downward movement of the shade cord 36 is continued from the position shown in Fig. 10 through the position shown in Fig. 11, the balls proceed to the position shown in that figure.

But, if the pull on the shade cord 36 in Fig. 10 is relaxed, the spring 22 will rotate the shade roller clockwise, as indicated in Fig. 12, and a ball 26 will be caught between the locking flank 34 and the locking shoulder 25 in a secure position, which will retain the shade until it is purposely released.

The release is accomplished by pulling the cord 36 down again and quickly slackening it, with the result that the rewinding spring will spin the roller clockwise and by centrifugal force throw the ball 26 clear of the locking shoulder 25, as illustrated in Fig. 13.

Referring now to Figs. 6, 7, and 8, in which the flank 33 is replaced by a lifting flank 40 parallel to the locking flank 34 and spaced from it an effective distance less than that shown in Figs. 9-13: It will be observed that when the parts move from Fig. 6 to the position shown in Fig. 7, the ball 26 going over the crest 37 can reach a position between the locking flank 34 and the locking shoulder 25, when there is no room for it to properly seat in the recess 24 but is caught in a labile position from which involuntary release may take place upon some slight vibration caused by wind or footsteps.

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Fig. 8 shows a similar faulty locking position of one of the balls.

The faults of Figs. 6, 7, and 8 are completely removed by the arrangement shown in Figs. 9-13, in which the effective point 41 in the lifting flank 33 is sufficiently spaced circumferentially from the effective point 42 (Fig. 12) of the locking flank 34 to insure that the ball 26 passing the crest 37, as shown in Fig. 10, will fall beyond the locking shoulder 25 and enter the recess 24, as shown in Fig. 10, in time to effect the proper locking when the shade cord 36 is slack, as illustrated in Fig. 12.

The spacing indicated in Figs. 9-13 is more than required, but has been found satisfactory in practice.

Tests with a transparent enlarged specimen having some lobes corresponding to those shown in Figs. 6, 7, and 8 demonstrated a need for spacing corresponding to that shown in Figs. 9-13, and it was found advantageous to make the lifting flank 33 substantially radial. The locking flank 34 was retained in the inclined position with respect to a radius to better insure the locking relation shown in Fig. 12 and prevent elastic rebound from effecting an involuntary release, but the incline shown is not indispensable.

Tests with the same specimen indicated that with the flattened portion 17 arranged to hold the shaft with the diameter through its longer dimension in a vertical position, arranging the locking shoulders 25 at 45 degrees to that diameter increased the ease with which the balls 26 would be released and centrifugally ejected beyond the locking shoulder, but that position of the shoulders 25 may be changed. The right angular recesses are preferred but not indispensable.

The forms shown in Figs. 9-13 are for these reasons preferred, although it is realized that others will be acceptable. This mechanism contains seven parts as compared with twelve in the familiar pawl and ratchet mechanism. It lends itself to production at much lower cost, and gives better locking of the shade.

The shaft 16 lends itself to manufacture by die casting, and it can be readily secured to the rod 19 by either crimping or a spline.

The clutch plate 28 is readily formed up from sheet metal strips, either low carbon galvanized steel or spring steel. Specimens of the former have withstood 20,000 operations without showing appreciable wear.

I claim:

1. In a shade roller mechanism of the class described, a shaft having means for fixing it in axially horizontal position, a tumbler race on the shaft having an upper crest and recessed to provide a downwardly facing tumbler locking shoulder substantially midway of an upper quarter, a tumbler on the race, a shade roller telescoped over and rotatable about the shaft, a rewinding spring connected to and acting between the shaft and the roller, a tumbler plate fast to the roller, and spaced lobes on the tumbler plate overlapping the tumbler race, each presenting to the tumbler a lifting and a locking flank, the locking flank of each lobe being spaced from the lifting flank of the other lobe more than the tumbler locking shoulder is spaced from said upper crest of the tumbler race.

2. In a shade roller mechanism of the class described, a shaft having means for fixing it in axially horizontal position, a tumbler race on the shaft having an upper crest and recessed

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to provide a downwardly facing tumbler locking shoulder in an upper quarter, a tumbler on the race, a shade roller telescoped over and rotatable about the shaft, a rewinding spring connected to and acting between the shaft and the roller, a tumbler plate fast to the roller, and a tumbler lifting shoulder and a tumbler locking shoulder formed on the tumbler plate and overlapping the race with the tumbler between them, said tumbler plate shoulders being spaced circumferentially farther apart than the spacing between the upper crest, and the downwardly facing locking shoulder on the tumbler race.

3. In a shade roller mechanism of the class described, a shaft having means for fixing it in axially horizontal position, a tumbler race on the shaft having an upper crest and recessed to provide a downwardly facing tumbler locking shoulder in an upper quarter, a tumbler on the race, a shade roller telescoped over and rotatable about the shaft, a rewinding spring connected to and acting between the shaft and the roller, a tumbler plate fast to the roller, and a tumbler lifting shoulder and a tumbler locking shoulder formed on the tumbler plate and overlapping the race with the tumbler between them, said tumbler plate shoulders being spaced angularly farther apart than the angular spacing between the upper crest and the downwardly facing locking shoulder on the tumbler race.

4. In a shade roller mechanism of the class described, a shaft having means for fixing it in axially horizontal position, a tumbler race on the shaft having an upper crest and recessed below the crest to provide a downwardly facing tumbler locking shoulder, a tumbler on the race, a shade roller telescoped over and rotatable about the shaft, a rewinding spring connected to and acting between the shaft and the roller, and a tumbler plate fast to the roller and having a tumbler lifting shoulder and a tumbler locking shoulder overlapping the race with the tumbler between them, the tumbler plate locking shoulder supporting the tumbler in the tumbler race recess beneath the downwardly facing shoulder thereof when the tumbler drops from the crest in response to movement imparted by the lifting shoulder.

5. The combination claimed in claim 4, in which the angle of the tumbler plate locking shoulder relative to the radius of the shaft moves the tumbler into locking engagement between said shoulder and the downwardly facing shoulder of the race upon rewinding rotation of the roller.

6. The combination claimed in claim 4, in which the angle of the tumbler plate locking shoulder relative to the radius of the shaft moves the tumbler into locking engagement between said shoulder and the downwardly facing shoulder of the race upon relatively slow rewinding rotation of the roller and to throw the tumbler outwardly beyond said downwardly facing shoulder upon relatively rapid rewinding rotation of the roller.

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