No. 669,452. Patented Mar. 5, 1901.

H. V. ASHBY & F. M. SLOCUM.

PUZZLE.

(Application filed June 6, 1900.)

(No Model.)

Fig. 1.

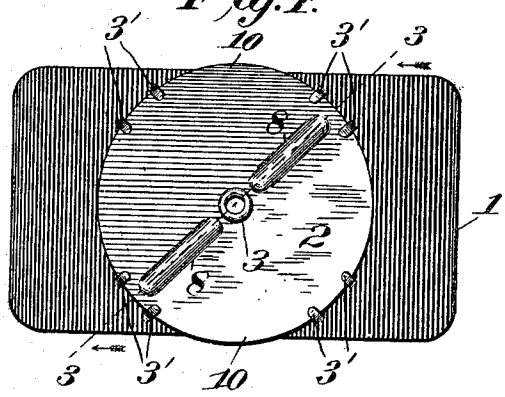


Fig. 2.

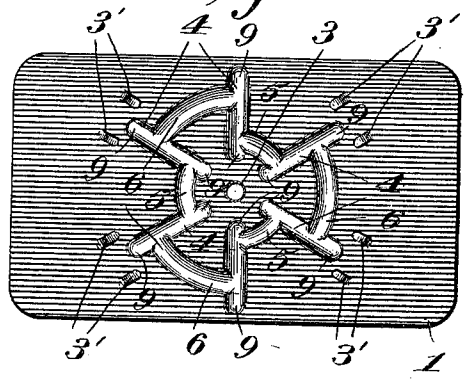


Fig. 3.

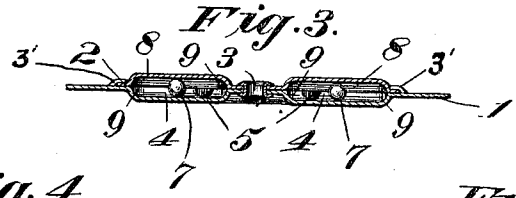


Fig. 4.

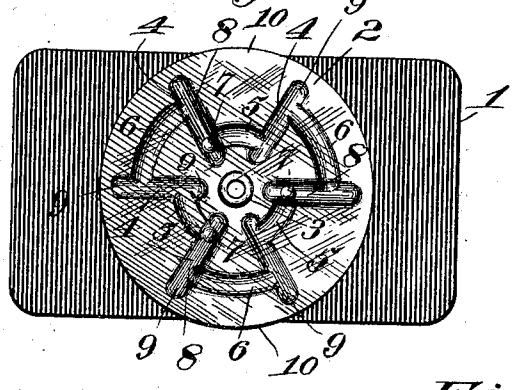


Fig. 6.

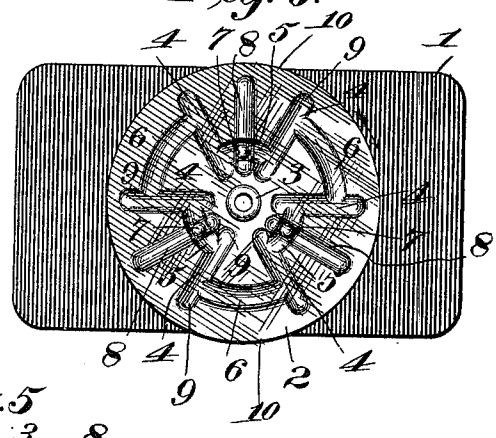
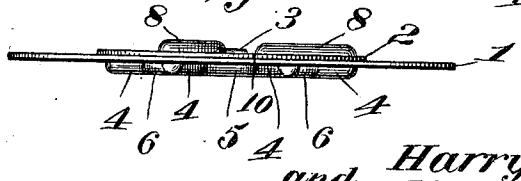


Fig. 5.



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# UNITED STATES PATENT OFFICE.

HARRY V. ASHBY AND FITZ M. SLOCUM, OF ERIE, PENNSYLVANIA.

## PUZZLE.

SPECIFICATION forming part of Letters Patent No. 669,452, dated March 5, 1901.

Application filed June 6, 1900. Serial No. 19,274. (No model.)

*To all whom it may concern:*

Be it known that we, HARRY V. ASHBY and FITZ M. SLOCUM, citizens of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Puzzles, of which the following is a specification.

Our invention relates to puzzles; and the object is to provide a simple, cheap, and durable puzzle which can be solved by careful manipulation of its parts and which will furnish amusement to persons attempting its solution.

The puzzle consists, essentially, of a plate upon which is mounted a revoluble disk and a series of balls arranged in suitable grooves or channels formed in the adjacent faces of said plate and disk and acting to prevent movement of the disk except when adjusted into a particular relation to certain of the grooves or channels in the plate.

We have illustrated our invention in the accompanying drawings, in which—

Figure 1 is a view of one face of our puzzle. Fig. 2 is a similar view with the revoluble disk removed. Fig. 3 is a sectional view, on an enlarged scale, taken on the line 3 3 of Fig. 1. Fig. 4 is a face view of a slightly-modified form in which the revoluble disk is made of transparent material. Fig. 5 is an edge view of the same. Fig. 6 is a view similar to Fig. 4, except that the disk has been adjusted through part of a revolution.

Referring to the drawings, 1 designates the base or supporting plate. This may be of any suitable size, form, and material, although preferably it is made of metal and is of substantially the form shown. A revoluble disk 2 is suitably secured to one face of said plate. This disk may be made of the same material as the plate 1 or of any other suitable material. If desired, it can be made of glass, celluloid, or similar transparent material, in which case the puzzle will be more readily worked than when the disk is made of metal, as the balls and the grooves between the plate and disk will be visible. The disk 2 is held from movement away from the plate 1 by means of a central pivot 3 and suitable lips 3′, which may be integral with and struck up from the body of the supporting-plate, as shown in Fig. 1. The lips 3′ may in some instances be omitted, as shown in Fig. 4. Said disk may be seated in a suitable depression formed in the adjacent face of the plate 1 or merely secured against said face by the pivot 3. In either case said disk is free to rotate, except as it is held stationary and locked to the plate by means to be hereinafter described.

In the plate 1, below or in rear of the revoluble disk 2, are formed a series of radial grooves or channels 4, Fig. 2. These radial grooves 4 are connected at different distances from their inner ends by curved grooves or channels 5 6. The alternate grooves 5 6 are concentric, but at different distances from the pivotal point 3, so that a complete circular path is not formed by said grooves or channels. These grooves or channels 4 5 6 are readily stamped in the plate 1, if it be made of metal, and within such grooves or channels are arranged a suitable number of balls 7. These balls are of such diameter that they readily roll in the said grooves or channels, but extend above the surface of the plate 1 and into radially-arranged grooves 8 provided therefor in the adjacent surface of the revoluble disk. These may be formed by suitably stamping or pressing the material of which the disk is made, thereby forming upon the upper surface thereof rib-like projections. The number of balls 7 employed may be varied, it being only necessary to have two and to provide in the disk as many grooves or channels as there are balls. If only two balls are employed, the grooves or channels in the disk are arranged diametrically opposite each other, as shown in Fig. 1, whereas if three balls are provided the channels in the disk are arranged in the relation shown in Figs. 4 and 6. The grooves or channels in the disk 2 are of substantially the same length as the radial grooves 4 in the base-plate.

The object of working the puzzle is to rotate the disk 2. This can only be accomplished by moving the balls 7 into such position in the radial grooves or channels 4 that they all aline with the proper curved grooves 5 6. When the balls are adjusted into those positions, the disk 2 can be rotated until the balls 7 are brought into the next succeeding radial grooves, when it will be locked against rotation until said balls are again adjusted.

While the balls 7 are freely movable lon-

gitudinally of the grooves or channels 4, it will be seen that careful manipulation of the parts is necessary to adjust all of the balls into and retain them in alinement with the proper curved grooves in order that they may simultaneously enter said grooves, which is necessary to permit the disk 2 to be rotated. The curved grooves 5 6 communicate with the radial grooves at points intermediate of the length of such radial grooves, so that pockets 9 are formed at both ends of each of said radial grooves into which the balls tend to roll as the plate 1 is shifted from a horizontal position, as is necessary to adjust the balls 7 longitudinally of the grooves 4. In the form of the invention illustrated in Fig. 1, in which but two balls are used, it will be seen that between each step-by-step movement of the disk 2 one of said balls must be brought into alinement with one of the grooves 5 and the other ball simultaneously brought into alinement with one of the grooves 6. When three balls are employed, however, the balls must each be brought into alinement with one of the grooves 5, when the disk can be moved from the position shown in Fig. 4 to that shown in Fig. 6, and this movement can be continued in the direction of the arrow until the balls 7 enter the next succeeding radial grooves. Before the disk can be further rotated the balls 7 must be moved longitudinally of the radial grooves and brought into alinement with the curved grooves 6.

By reference to the drawings it will be seen that the diameter of the disk 2 is slightly greater than the width of the plate 1, so that two diametrically opposite sections 10 project slightly beyond said plate. In moving the disk it is grasped at these portions 10.

It will be evident that many different designs or arrangements of grooves in the plate may be substituted for those shown in the drawings without departing from the spirit and scope of our invention. The outline of the plate may be varied and in some instances it may be circular, conforming in size to the disk. The grooves in the disk may also be varied, as it is not essential that they be strictly radial.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a puzzle the combination of a supporting-plate, a revoluble disk mounted on said plate, both said plate and disk having grooves or channels formed in their inner faces, and a series of freely-movable balls arranged within said grooves and adapted to prevent rotation of the disk on the plate excepting when the balls and grooves are adjusted into particular relations and when properly adjusted to be moved by the disk through grooves in the plate.

2. In a puzzle, the combination of a supporting-plate having formed in one of its faces a series of radial channels or grooves and a series of curved channels connecting said radial channels, a series of balls arranged in said radial channels, and freely movable longitudinally thereof as the plate is moved from a horizontal position, and a revoluble disk secured against the grooved face of the plate and having grooves engaging said balls, whereby it is locked against rotation except when the balls are adjusted into alinement with certain of the curved grooves in the plate and when the balls are so adjusted can be moved relatively to the plate a distance equal to the space between two of the radial grooves therein, the balls being moved through the curved grooves in the plate by such movement of the disk.

3. In a puzzle, the combination of a plate having in one face a series of grooves radiating from a common center, and two series of circular grooves connecting said radial grooves, each circular groove extending from one radial groove to the next, a revoluble disk mounted on the plate and extending over the grooves therein, said disk having in its inner surface two grooves conforming in length and width to the radial grooves of the plate, and two balls loosely mounted in grooves in the plate and extending into the grooves in the disk and locking the latter against rotation except when they are adjusted by movement of the supporting-plate into alinement with certain of the circular grooves in the plate.

4. In a puzzle, the combination of a supporting-plate, a disk revolubly secured against one face of said plate, said plate having formed in its face adjacent said disk a series of straight radial grooves and a series of curved grooves connecting said radial grooves intermediate of the ends thereof, and the disk having two grooves formed in its face adjacent the plate and adapted to alternately aline with the said radial grooves and to extend across the curved grooves in the plate as the disk is rotated, the curved groove between two adjacent radial grooves being out of alinement with the corresponding groove between each of said radial grooves and the next one of the series, and two balls mounted between the plate and disk and extending into grooves in both, said balls being adapted to be adjusted in said grooves by movement of the plate and to lock the disk against rotation except when adjusted into a predetermined relation to the curved grooves in the plate.

In testimony whereof we affix our signatures in presence of two witnesses.

HARRY V. ASHBY.
FITZ M. SLOCUM.

Witnesses:
GEO. E. BARGER,
BERT HUFFMAN.