Sept. 8, 1925. 1,552,598

A. E. DRISSNER ET AL

INDEXING MECHANISM FOR CYLINDERS OR THE LIKE

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Fig. 3.

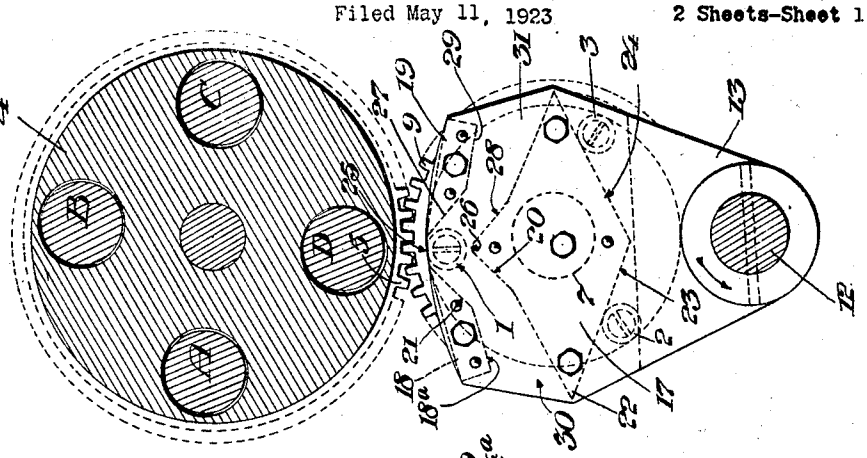


Fig. 2.

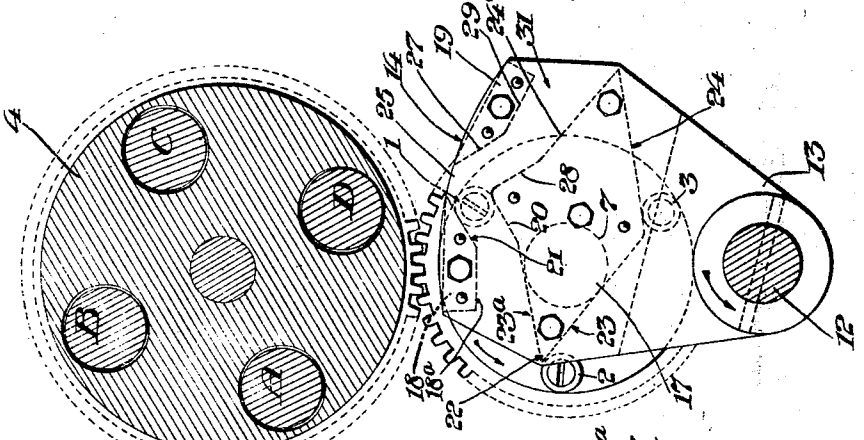
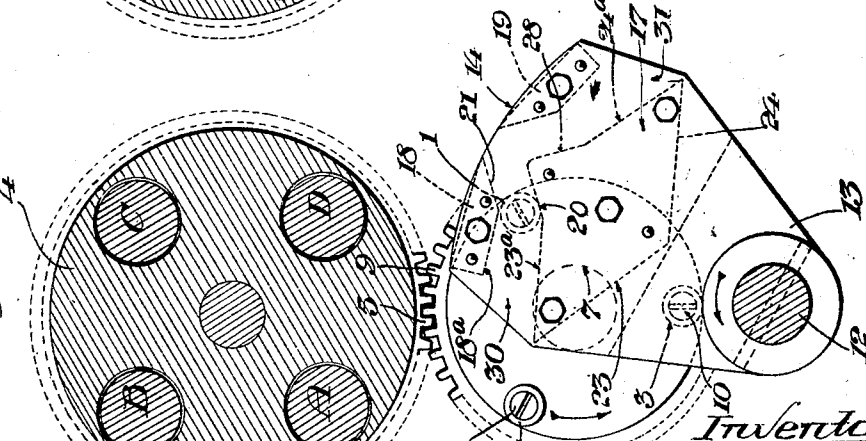


Fig. 1.



Inventors
F. K. Rand
A. E. Drissner
by their Attorneys
Weed & Gray

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Fig. 6.

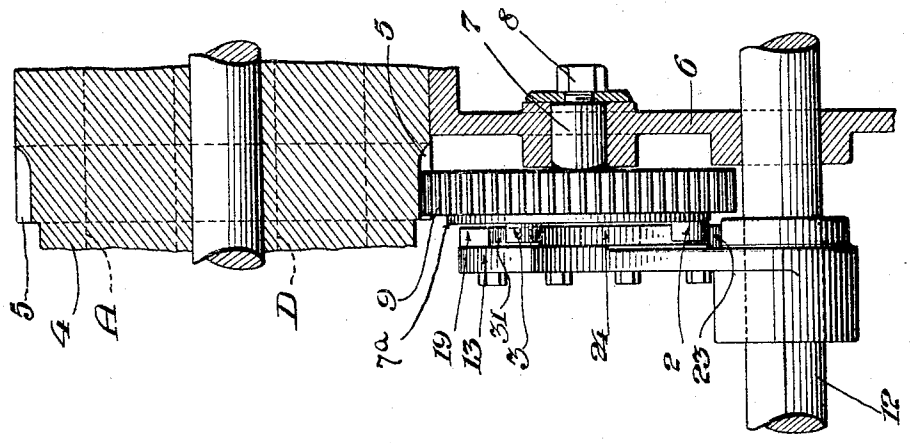


Fig. 5.

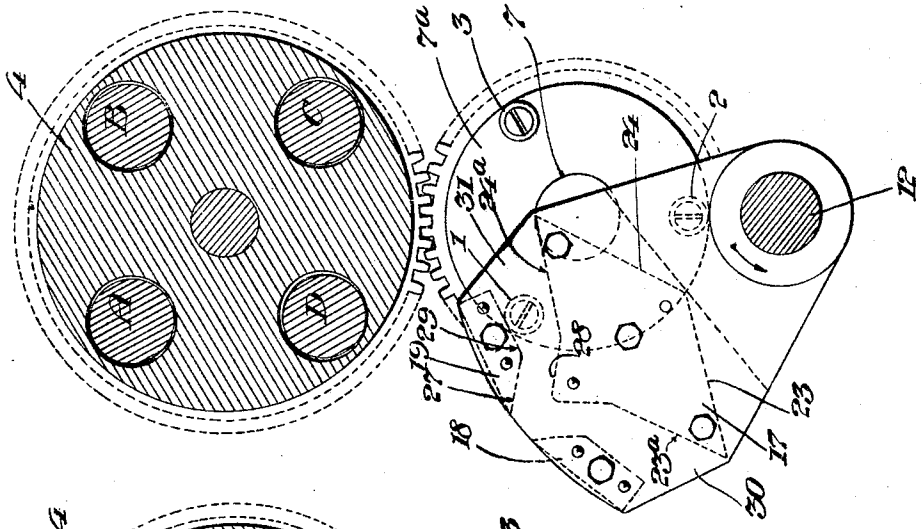
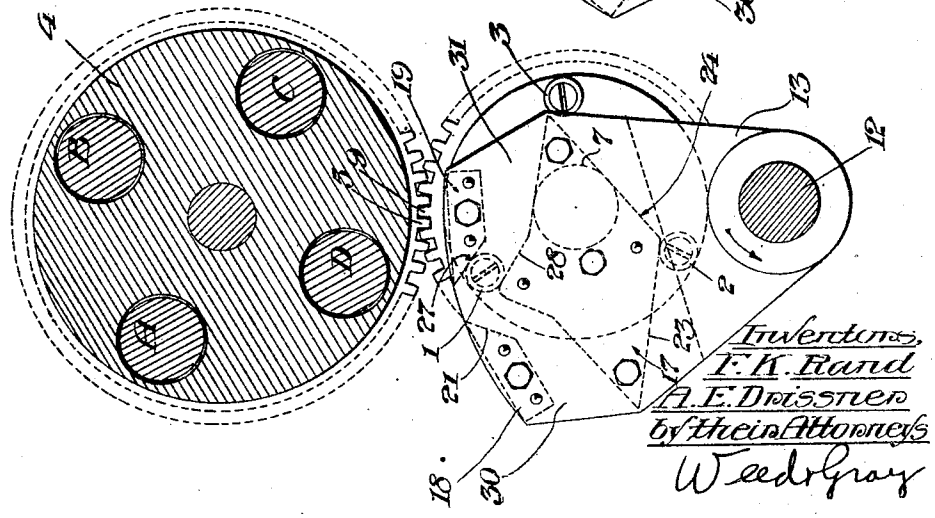


Fig. 4.



Inventors,
F. K. Rand
A. E. Drissner
by their Attorneys
Weed & Gray

Patented Sept. 8, 1925.

1,552,598

UNITED STATES PATENT OFFICE.

ALFRED E. DRISSNER, OF CLEVELAND, AND FRED K. RAND, OF CLEVELAND HEIGHTS, OHIO, ASSIGNORS TO THE NATIONAL ACME COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

INDEXING MECHANISM FOR CYLINDERS OR THE LIKE.

Application filed May 11, 1923. Serial No. 638,338.

To all whom it may concern:

Be it known that we, ALFRED E. DRISSNER and FRED K. RAND, both citizens of the United States, said DRISSNER residing at Cleveland, county of Cuyahoga, and State of Ohio, and said RAND residing at Cleveland Heights, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Indexing Mechanism for Cylinders or the like, of which the following is a specification.

This invention relates to indexing mechanism for cylinders, turrets, or spindle carriers, particularly adapted for use in various types of metal working machines, an object of the invention being to provide an improved indexing mechanism operative for indexing the cylinder or the like without imparting momentum to the cylinder upon completion of the indexing operation.

A further object of this invention is to provide an improved indexing mechanism, which will index or rotate the cylinder or turret from one station to the next, and which at the same time will positively control or absorb the momentum of the cylinder, so that when the cylinder is completely indexed it will be at rest without momentum. Hence, in the present mechanism the operation is such as to prevent any shock upon the locking mechanism for the cylinder, thereby providing a mechanism of greater durability, efficiency and effectiveness in operation and enabling the same to function more efficiently, smoothly, and quietly.

A further object of this invention is to provide an improved indexing mechanism for cylinders or the like on high speed machines, and comprising cams adapted to index the cylinder accurately at all times without imparting momentum thereto at the completion of the indexing operation, and adapted to index the cylinder without resulting in any shocks upon the locking mechanism for the cylinder.

Other objects of this invention will appear in the following description and appended claims, reference being had to the accompanying drawings forming part of this specification, wherein like reference characters indicate corresponding parts in the several views, and wherein Fig. 1 is a sectional end elevation illustrating the mechanism in starting position; Figs. 2, 3, 4, and 5 are similar views illustrating successive steps in the indexing operation; and Fig. 6 is a fragmentary side elevation of the machine illustrating the mechanism.

Before explaining in detail the present improvement and mode of operation thereof, we desire to have it understood that the invention is not limited to the details of construction and arrangement of parts which are illustrated in the accompanying drawings, since the invention is capable of other embodiments, and that the phraseology which we employ is for the purpose of description and not of limitation.

Heretofore in mechanisms for indexing cylinders, spindle carriers or turrets, the mechanism merely acted to rotate the cylinder a partial turn from one station to another, thereby imparting upon the completion of the indexing operation considerable momentum to the cylinder. This momentum was arrested by means of the cylinder striking the locking mechanism. The disadvantages of such a construction and operation are apparent, since the shocks upon the locking mechanism resulted in the breakage thereof and in general impair the accurate indexing of the cylinder. Furthermore the shocks incident to the stopping of the rotation of the cylinder after indexing resulted in considerable noise, vibration and jarring, thus resulting in a serious disadvantage in the proper functioning of the machine.

The foregoing disadvantages have been eliminated by virtue of the present invention, and the indexing mechanism in this instance operates to positively control the momentum of the cylinder, so that the locking mechanism does not have to stop the cylinder upon the completion of the indexing operation, since the indexing mechanism itself absorbs the momentum of the cylinder, so that when the indexing is completed the cylinder is at complete rest and the locking bolt merely drops into place to lock the cylinder. On high speed machines this is especially advantageous, and it has been found in actual practice and operation of this improved mechanism that the elimination of shocks heretofore present when

the locking bolt stopped the cylinder results in greater efficiency, accuracy and smoothness in operation.

In the drawings only such parts of the machine as are necessary for a complete understanding of the present invention having been shown, and it will be seen that the cylinder 4 having a plurality of spindles A, B, C, and D located therein is suitably mounted for rotation upon the machine, and is securely locked in position by suitable locking mechanism (not shown) at the several indexing stations. In the bed 6 of the machine below the cylinder 4 a hole is bored for the reception of a stud 7, which is securely held therein by means of a nut 8. On the opposite end of the stud 7 is mounted an indexing gear 9, the teeth of which mesh with teeth 5 preferably machined on the periphery of the cylinder 4. The number of teeth on the indexing gear and cylinder are so related that when the indexing gear 9 turns one-third of a revolution the cylinder 4 will be turned thereby one-quarter of a revolution, or that fraction of a revolution corresponding to the number of stations or spindles. The gear 9 turns freely on the stud 7, the latter being suitably held from turning, and the indexing gear is held in place against endwise movement by means of a flange 7^a on the end of the stud 7.

Mounted upon the flange 7^a and secured thereto for rotation as by means of pivot screws 10, are a plurality of cam rollers 1, 2, and 3, these being shown in the present instance spaced at equal distances apart.

Secured to the cam shaft 12 for rotation therewith is an indexing lever 13. The lever 13 projects radially from the cam shaft and is provided with an enlarged end 14, the inner surface of which is preferably flat, so as to permit a series of cams 17, 18, and 19 to be readily secured in position thereon. These cams, as will be seen, are bolted to the inner flat face of the lever 13, and are so spaced from each other and shaped as to form a channel therethrough to permit the passage of the rollers. These cams are so machined as to cause them to act upon the rollers 1, 2, and 3 at predetermined times and thereby index the cylinder.

In the operation of the present improved indexing mechanism and referring particularly to Fig. 1, it will be seen that the cam shaft which revolves in the direction of the arrow will revolve the lever 13, causing the latter to move in the direction of the arrow. The cam roller 1 travels into the channel at 30, and passes between the tapering faces 23^a and 18^a of the cams 17 and 18. When the inclined or angular face 20 of the cam 17 strikes the roller 1, the indexing lever will cause the gear 9 to start turning, thereby commencing the indexing of the cylinder 4. It will be seen that the angular face 21 of the cam 18 is parallel to the angular face 20 of the cam 17 and hence as the roller 1 is acted upon by the face 20, the opposed cam face 21 also engages the roller and maintains it against the angular face 20, so that the momentum created by the cylinder 4 will not accelerate the rotation of the index gear 9 and interfere with the accurate timing of the mechanism.

As the indexing lever 13 rotates or swings further to the position shown in Fig. 2 the angular faces 23 and 24 of the cam 13 will be brought into position to engage the cam rollers 2 and 3. From the position shown in Fig. 2 to the position shown in Fig. 3, the indexing gear 9 is turned by means of the cam faces of the cam 17 engaging the rollers 1 and 2, it being seen that the angular face 23 engages roller 2 and forces it to travel downwardly thereover to the position illustrated in Fig. 3, at which point in the indexing operation the cam roller 1 will have passed above the apex 26 formed by angular faces 20 and 28 of cam 17 to the top center 25 of the indexing lever. During this movement from the position of Fig. 2 to the position of Fig. 3 the cam roller 3 engages the angular face 24 of cam 17, and travels thereover, this roller acting to guide or steady the indexing lever, and to absorb the momentum created by the cam 17 acting upon rollers 1 and 2.

From the position shown in Fig. 3 to the position shown in Fig. 4 the rotation of the cam lever 13 will bring the cam roller 1 into engagement with the inclined cam face 27 of cam 19, and at this time it will be seen that the cam 19 cooperates with the cam face 23 of cam 17. It will be seen that the cam 19 acting on roller 1 cooperates with the cam face 23 acting on roller 2 for the purpose of further rotating the indexing gear 9. During this time the cam face 28 engages roller 1, and together with the roller 3 acting on cam face 24 resists the tendency of the cylinder to gather momentum. From the position shown in Fig. 4 to the position shown in Fig. 5, the rotation of the indexing lever will cause the cam rollers 2 and 3 to ride off the angular faces 23 and 24 of the cam 17, and the completion of the indexing is caused by the angular face 27 of cam 19 acting upon the cam roller 1, and during this time any tendency of the cylinder to gather momentum is prevented partially by means of roller 2 and by means of the angular face 28 of cam 17 engaging the cam roller 1 and holding it against cam face 27.

In the position illustrated in Fig. 5, the cam roller 1 has reached the same position as cam roller 2 in Fig. 1 and the indexing of the cylinder is then completed. Further rotation of the cam shaft 12 will cause the roller 1 to pass out of the end 31 of the

channel between the cams. Upon completion of the indexing operation the cylinder is locked in position, and the usual lock bolt (not shown) simply drops into place in the station on the cylinder and does not have to stop the cylinder, so that as a result there is no shock whatsoever upon the lock bolt.

It will be seen from the foregoing operation that the indexing mechanism not only operates to index the cylinder but also acts to positively prevent any tendency of the cylinder to gather momentum during the indexing thereof, since the cooperation of the cams on the indexing lever with the cam rollers on the indexing gear absorbs the momentum of the cylinder. Therefore, when the indexing is completed it will be seen that the cylinder is completely at rest, and will have been indexed or turned exactly to the point necessary for the locking mechanism to move into position for locking the cylinder. Hence, at the end of the indexing there is no shock on the locking mechanism for the cylinder, nor is there any necessity for separate stop means for arresting the momentum of the cylinder, since in the present instance the cylinder has no momentum after it is indexed, and as a result there are no shocks or vibrations imparted to the cylinder, which tend to impair the effective operation thereof.

It will also be seen from the foregoing that when the index gear 9 starts to revolve through the action of the camming mechanism located between the index gear and the index lever 13, the cylinder 4 also revolves by virtue of the gear teeth 5 on the cylinder meshing with the teeth on the index gear. The indexing of the cylinder thus changes the positions of the spindles, and after each indexing operation each spindle will be moved to the position occupied by the spindle in advance thereof. As shown in Fig. 5, after the completion of the indexing, spindle A occupies the position of spindle B in Fig. 1 at the commencement of the indexing operation.

Referring to Figures 4 and 5 it will be seen that when the cam roller 1 reaches the lower end of the working face 27 of the cam 19 it will be at rest since the tendency of the cylinder to gather momentum and throw the index gear ahead will be prevented by cam face 28 engaging the roller. As the roller 1 passes out of channel 31 it will travel between the outwardly tapering faces 29 and 24ª, and will ride lightly over the angular face 29.

From the foregoing it will be seen that we have provided means for indexing the cylinder or turret into a position of rest at the completion of the indexing operation. The camming mechanism is so organized and so operates that while certain cam faces coact with cam rollers to rotate the indexing gear, other cam faces will coact with certain cam rollers to counteract the tendency of the cylinder to gather momentum. The mechanism of this invention therefore positively prevents the cylinder from becoming out of time, operates efficiently and smoothly and quietly, is compact and relatively simple in construction and is easily manufactured and assembled. This indexing mechanism is readily adapted for use with various types of machines having rotatable cylinders, turrets, work carriers or spindle carriers, and in the present instance by way of example is applied to an Acme multiple spindle automatic screw machine manufactured by The National Acme Company.

It is to be understood that by describing in detail herein any particular form, structure, or arrangement, it is not intended to limit the invention beyond the terms of the several claims or the requirements of the prior art.

Having thus explained the nature of this invention and described a way of constructing and using the same, although without attempting to set forth all of the forms in which it may be made, or all the modes of its use, we claim:

1. The combination of an intermittently rotatable member, means for intermittently rotating the same and comprising a cam element, and a pair of angular cam faces successively operating upon said element to rotate said member, and cam means operating intermediate the operations of said angular cam faces for rotating said member.

2. The combination of an intermittently rotatable member, means for intermittently rotating the same and comprising a cam element, and a pair of angular cam faces successively operating upon said element to rotate said member, cam means operating intermediate the operations of said angular cam faces for rotating said member, and means for guiding said member against acceleration during the rotation thereof.

3. The combination of an intermittently rotatable member, a rotatable member for indexing the same, one of said members having a pair of cams secured thereto and the other member having a cam element acted upon by adjacent faces of said cams during the indexing operation, and a cam element acted upon by an exterior face of one of said cams during the indexing operation.

4. The combination of an intermittently rotatable member, a rotatable member for indexing the same, one of said members having a pair of cams secured thereto and the other member having a cam element acted upon by adjacent faces of said cams during the indexing operation, and a pair of cam elements acted upon by exterior faces of one of said cams during the indexing operation.

5. The combination of an intermittently

rotatable member, a rotatable member for indexing the same, said members having one a guide channel tapering inwardly at opposite ends thereof, said guide channel intermediate said tapering portions having two pairs of parallel walls angularly related, and said other member having a cam element adapted to travel through said guide channel during the indexing operation.

6. The combination of an intermittently rotatable member, a rotatable member for indexing the same, said members having one a guide channel tapering inwardly at opposite ends thereof, and an exterior cam face, said guide channel intermediate said tapering portions having two pairs of parallel walls angularly related, and said other member having a cam element adapted to travel through said guide channel during the indexing operation, and a cam element coacting with said exterior cam face.

7. The combination of an intermittently rotatable member, means for intermittently rotating the same and comprising a cam element and a pair of cam faces acting upon said element for rotating said member, and means for guiding said member against acceleration during the rotation thereof.

8. The combination of an intermittently rotatable member, means for intermittently rotating the same and comprising a pair of cam elements and three cam faces acting successively upon said cam elements to rotate said member.

9. The combination of an intermittently rotatable member, means for intermittently rotating the same and comprising a pair of cam elements and three cam faces acting successively upon said cam elements to rotate said member, and means for guiding said member against acceleration during the rotation thereof.

10. The combination of an intermittently rotatable member, means for intermittently rotating the same and comprising a single cam element and two pairs of parallel cam faces acting thereon, and means independent thereof for guiding said member against acceleration.

11. The combination of a rotatable cylinder, gear mechanism cooperating therewith, a shaft, an indexing member connected to said shaft, a plurality of cam operated elements carried by said gear mechanism, and a pair of cams carried by said indexing member and having cam faces acting successively upon said elements for indexing the cylinder.

12. The combination of a rotatable cylinder, gear mechanism cooperating therewith, a shaft, an indexing member connected to said shaft, a plurality of cam rollers, camming means having a cam face movable into engagement with one of said rollers for rotating the cylinder, a second camming means having a cam face movable into position to engage said cam roller for rotating the cylinder, said first camming means having a second cam face engageable with another roller for rotating the cylinder, and said cam rollers and camming means being carried one by said gear mechanism and the other by said indexing member.

13. The combination of a rotatable cylinder, gear mechanism cooperating therewith, a shaft, an indexing lever connected to said shaft, and a pair of spaced cams and cam operated elements carried by said gear mechanism and indexing lever, one of said cams engaging a cam element for rotating the gear mechanism, and one of the cams engaging another cam element for guiding movement during the rotation of the gear mechanism.

14. The combination of a rotatable cylinder, gear mechanism cooperating therewith, a shaft, an indexing lever connected to said shaft, and cooperating cam means and cam operated elements carried by said gear mechanism and indexing lever, a pair of said cam means operating upon an element during part of the indexing operation, and one of said cam means operating upon a pair of elements during a part of the indexing operation.

15. The combination of a rotatable cylinder, gear mechanism cooperating therewith, a shaft, an indexing lever connected to said shaft, and cooperating cams and cam rollers carried by said gear mechanism and indexing lever, a pair of said cams operating upon a roller during part of the indexing operation, one of the cams operating upon a pair of rollers during a part of the indexing operation, and a different pair of cams operating upon one of the rollers during a part of the indexing operation.

16. The combination of an intermittently rotatable member, means for intermittently rotating the same and comprising a pair of cam elements and three angular cam faces acting thereon to rotate said member.

17. The combination of an intermittently rotatable member, means for intermittently rotating the same and comprising a plurality of cam elements and a pluarity of cam faces, three cam faces acting upon two rollers to rotate said member and three cam faces acting upon two rollers to maintain the same against momentum.

18. The combination of a cylinder, means for indexing the same and comprising a rotatable indexing member and a driven member intermittently rotated thereby, one of said members having a channel forming opposite interior cam faces and also having an exterior cam face, and the other member having a cam element acted upon by said interior cam faces and a cam element acted

upon by said exterior cam face during the indexing operation.

19. The combination of a cylinder, means for indexing it comprising a rotatable indexing member and a driven member intermittently rotated thereby, one of said members having a channel forming opposite interior cam faces and also having a pair of exterior cam faces, and the other member having a cam element acted upon by said interior cam faces, and a pair of cam elements acted upon by said exterior cam faces during the indexing operation.

20. The combination of a turret, means for indexing the same and comprising a plurality of cam faces and rollers, a plurality of cam faces acting simultaneously upon one roller, and a plurality acting upon a plurality of rollers to accomplish the indexing operation.

21. The combination of a turret, means for indexing the same and comprising a plurality of cam faces and rollers, a pair of cam faces acting on a single roller and another cam face acting on a roller to index said turret.

22. The combination of a rotatable cylinder, means for indexing the cylinder and comprising gear mechanism and a rotatable indexing member, said mechanism and member having cam means and cam rollers, and including four cam faces acting upon three rollers at one time.

23. The combination of a rotatable cylinder, cam means for indexing the cylinder and comprising a plurality of cam faces and cam rollers, a pair of cam faces acting upon a roller at the beginning of the indexing operation, three or more cam faces operating upon three rollers at another time, and a pair of cam faces operating upon a roller during the completion of the indexing operation.

24. The combination of a rotatable cylinder, cam means for indexing the cylinder and comprising a plurality of cam faces and cam rollers, a pair of cam faces being parallel and operating upon a roller at a given time, and a pair of cam faces being angularly related and operating upon a pair of cam rollers at a given time.

25. The combination of a rotatable cylinder, cam means for indexing the cylinder and comprising a plurality of cam faces and cam rollers, a pair of cam faces being parallel and operating upon a roller at a given time, a pair of cam faces being angularly related and operating upon a pair of cam rollers at a given time, and another pair of cam faces being parallel and operating upon a cam roller at a given time.

26. The combination of an intermittently rotatable member, and cam mechanism for intermittently rotating the same, said mechanism comprising a plurality of sets of means for rotating said member and three sets of means for maintaining the same against momentum.

27. The combination of a rotatable cylinder, means for indexing the same and including a plurality of cam faces and cam rollers, a pair of said cam faces operating upon a roller and located at an angle to each other, another cam face operating on a roller and located at an angle to one of said pair of cam faces, and another cam face operating on a roller and located at an angle to one of said cam faces.

28. The combination of a rotatable cylinder, means for indexing the same and including a plurality of cam faces and cam rollers, a pair of said cam faces operating successively upon a roller and located at an angle to each other, another pair of cam faces being parallel to said first pair and operating also on said roller, another cam face operating on a second roller and located at an angle to one of said cam faces, and another cam face operating on a third roller and located at an angle to said last mentioned cam face.

Signed at Cleveland, Ohio, this 7th day of May 1923.

ALFRED E. DRISSNER.
FRED K. RAND.