F. H. AYER.

REVERSIBLE CLUTCH MECHANISM.

APPLICATION FILED DEC. 23, 1915.

1,199,738.

Patented Sept. 26, 1916.

2 SHEETS—SHEET 1.

Fig. 1.

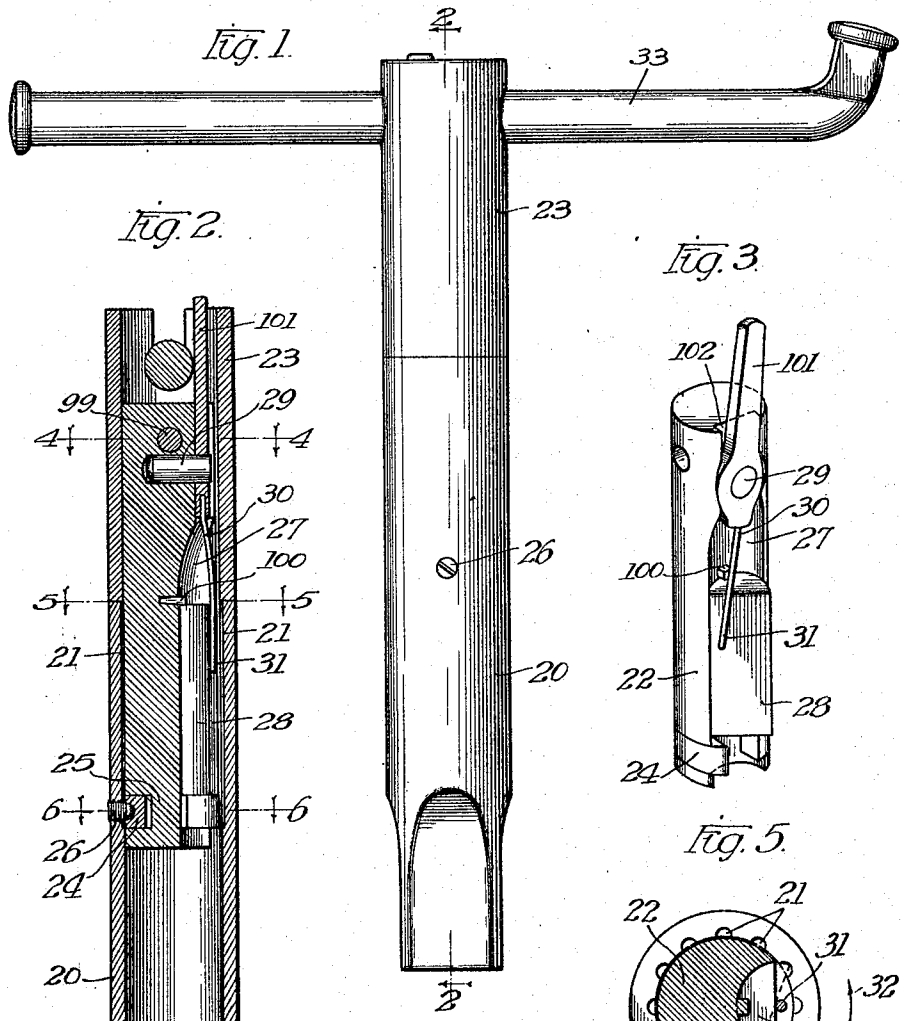


Fig. 2.

Fig. 3.

Fig. 4.

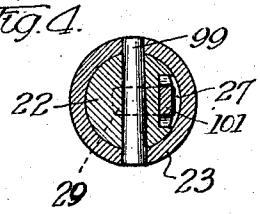
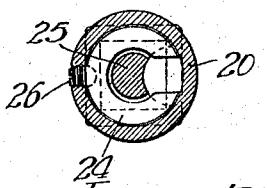


Fig. 5.

Fig. 6.



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2 SHEETS—SHEET 2.

Fig. 7.

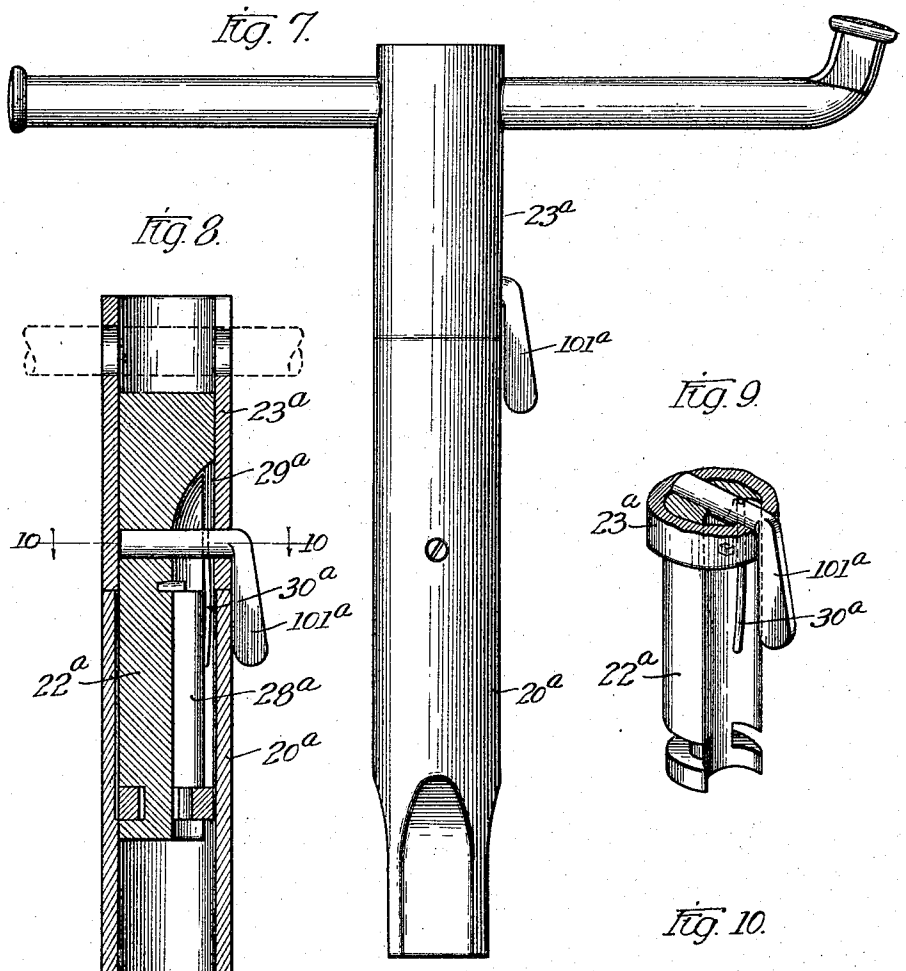
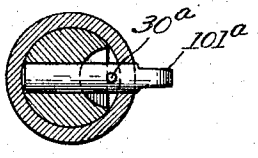


Fig. 8.

Fig. 9.

Fig. 10.



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UNITED STATES PATENT OFFICE.

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REVERSIBLE CLUTCH MECHANISM.

1,199,738. Specification of Letters Patent. Patented Sept. 26, 1916.

Application filed December 23, 1915. Serial No. 68,363.

To all whom it may concern:

Be it known that I, FREDERICK H. AYER, a citizen of the United States, residing at Chicago Heights, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Reversible Clutch Mechanisms, of which the following is a specification.

The invention relates to improvements in reversible clutch mechanisms and has particular reference to a type of reversible clutch mechanism which is well suited for use in connection with ratchet wrenches adapted for use on or about automobiles.

Reversible clutch mechanisms have long been employed in connection with automobile wrenches, and many of such constructions have been invented in the effort to produce an efficient reversible clutch mechanism for this purpose. In my United States Letters Patent No. 1,072,807, issued to me on September 9, 1913, I have described a reversible clutch mechanism which has gone into extensive use and which is of the same general type as that described in this specification. This patented construction of mine has been found to be quite efficient in actual practice, but the mechanism described herein will be found to have some advantages thereover.

This invention is in some respects rather similar to that described in a companion application of mine for improvement in ratchet mechanisms, Serial No. 68,362, executed and filed of even date herewith. The differences between this application and my companion application just referred to reside in the specific construction of the switch mechanism for reversing the clutch.

The objects of this invention are to provide in a type of reversible clutch mechanism similar in character to those referred to above, improved mechanism for switching the movable dog member; to provide a construction of the general character referred to in which the various parts of the mechanism may be simple of design and economical to manufacture; and, in general, to provide an improved reversible clutch mechanism of the character referred to.

The invention will be readily understood by reference to the following description in connection with the accompanying drawings, in which—

Figure 1 is an elevation of an automobile wrench containing my improved reversible clutch mechanism; Fig. 2 is a longitudinal section taken through the center of the wrench taken on the line 2—2 of Fig. 1; Fig. 3 is a perspective view of certain parts of the mechanism; Fig. 4 is a section taken on the line 4—4 of Fig. 2; Fig. 5 is a section taken on the line 5—5 of Fig. 2; Fig. 6 is a section taken on the line 6—6 of Fig. 2; Fig. 7 is an elevation of a wrench in which is embodied a slightly modified form of construction; Fig. 8 is a longitudinal section of Fig. 7; Fig 9 is a perspective view of a portion of the mechanism, certain parts being broken away in order more clearly to disclose the construction; and Fig 10 is a section taken on the line 10—10 of Fig. 8.

Referring to the above drawings, it will be seen that in the particular automobile wrench illustrated, 20 is the tubular shank or nose of the tool, the lower end of which is pressed into a square cross-section, as shown in dotted lines in Fig. 6, so that it may receive the shanks or stems of the various tools or attachments to be used with the wrench. As seen in Fig. 5, the upper half of said shank 20 is milled out or scored around its interior periphery so as to provide a series of longitudinally extending grooves 21 equi-spaced circumferentially. Within the upper end of the tube 20 is rotatably mounted a cylindrical stem or insert 22, the upper end of said insert extending beyond the upper edge of the tube 20 and being rigidly secured in a thimble or head 23 by means of a transverse pin 99. The head 23 is of substantially the same diameter as the tube 20, their respective edges abutting closely together. The longitudinal position of the insert 22 within the top of the tube 20 is maintained by means of a circular ring 24, which is rotatably located in a rectangular groove surrounding the reduced neck portion 25 at the lower end of the insert 22. The ring 24 is held in position by a set screw 26 threaded into the wall of the tube. It should be understood that the fixed collar or ring 24 prevents axial movement of the part 22, but permits the latter to rotate freely within the tube 20.

In the particular type of wrench illustrated, the head 23 is turned manually, and, by means of the clutch mechanism now to be described, its rotation is communicated to the tube 20 when it is moved in the

particular direction for which the wrench is set or adjusted.

In the lower end of the stem piece or insert 22 there is milled a groove 27 which is approximately semi-circular in contour and extends longitudinally a considerable distance along the side of the insert 22. Within said semi-circular groove 27 I seat a section of steel 28, made semi-circular in cross-section to correspond with the curvature of the groove 27, whereby it may be rotated in said groove. The longitudinal position of the insert 22 in the groove 27 is maintained constant by means of a fixed pin 100 driven into the bottom of the groove 27 just above the upper end of the insert 22.

In the upper end of the insert 22 I drill a radial cylindrical hole in which is rotatably mounted a pin 29. On the outer end of said pin 29 is mounted a manually-operable switch finger 101 which lies in a flat-bottomed recess 102 in the upper end of the internal member 22. The finger 101 extends slightly below the pin 29 and is drilled out to receive a resilient rod or length of stiff steel wire 30 which is suitably bent to constitute a spring, the lower end 31 of which tends to seek the axis of the mechanism. The lower end 31 of the spring rests upon the upper end of the pawl or dog 28, the edges of which are adapted to engage the longitudinal grooves 21 in the interior of the upper part of the tube 20. When the finger 101 occupies a central position the spring rests upon the middle line of the dog 28 which occupies the position shown in Fig. 5. In said position the head 23 may be revolved freely in either direction upon the tube 20, since neither of the longitudinal edges of the pawl 28 will engage the interior of the tube 20. If it be desired to rotate the tube in the direction of the arrow 32, the finger 101 is rocked to one side so as to move the spring 31 into the dotted line position shown in Fig. 5, thereby rocking the dog 28 in the groove 27 and causing the edge remote from the spring 31 to engage one of the grooves 21 in the tube as soon as an attempt is made to turn the head 23 in the direction of the arrow. It is evident that when the parts are in this position, movement of the head 23 in a direction opposite the arrow 32 will cause the pawl 28 to slip past the grooves 21 without revolving the tube. In order to drive the tool shank 20 in a direction opposite to the arrow 32, the switch finger 101 is moved over or rocked on its pivot 29 in order to shift the end 31 of the spring tangentially across the outer face of the dog 28. In order to permit free sliding movement of the end 31 of the spring across the face of the insert, the latter is made flat and smooth between its longitudinal edges.

The finger 101 and spring 30 are self-retaining in position on account of the fact that when the end 31 of the spring is off center, the dog 28 is tipped or inclined to such an extent that there is no tendency for the spring to drift toward the center of the dog.

The upper end of the thimble or head 23 is extended a substantial distance beyond the upper end of the internal member 22 so as to permit the application of a sliding handle 33 usual in automobile wrenches of this type. The length of the switch finger 101 is such that it projects a sufficient distance from the top of the thimble 23 to be conveniently manipulated by means of the fingers, when it is desired to reverse the direction of rotation of the wrench. It should be noted in this connection that the outer surfaces of the thimble 23 and the tube 20 are entirely free from projecting parts of the mechanism, so that there is no tendency to effect improper switch movements of the clutch during the ordinary use of the wrench. At the same time, the clutch switching mechanism is readily accessible whenever necessary to reverse its direction of rotation.

A modified form of my improved construction is illustrated in Figs. 7, 8, 9 and 10. As will be seen from said figures, the principal parts of the mechanism are substantially the same as in the preferred form previously described, the difference residing in the means for rotating the switch pin. In the modification, 20^a is the tool shank, 23^a is the driving head or thimble in which is secured the stem or internal grooved member 22^a. The dog 28^a is rocked or operated upon by means of a spring 30^a secured in the transverse switch pin 29^a rotatably mounted in the stem 22^a. So far, the construction is substantially the same as that of the preferred form. In this modification, however, the switch pin 29^a is extended radially outward through the side of the head 23^a and bent down, as shown at 101^a, the end being suitably flattened to facilitate its movement by means of the finger. It is manifest that the part 101^a in the modified construction fulfils the same function as the finger piece 101 in the preferred embodiment. A detailed description of the manner of operation of this modified construction is obviously unnecessary. The modification is in some respects somewhat cheaper to manufacture than the construction shown in Figs. 1 to 6 and is slightly easier to manipulate when it is desired to reverse the direction of rotation of the shank. It is, however, open to the objection that the finger piece 101^a is rather liable to be operated improperly by striking some obstruction while the head is being rotated.

The description of the details of construction is not intended to be a limitation upon

the invention, which is capable of many applications in different forms, except as specified in the appended claims.

I claim:

1. In a reversible clutch mechanism, the combination of a tubular shank, a male member drivingly related to said shank and having a longitudinal substantially cylindrical extension rotatably contained within said shank, said extension being provided with an arcuate longitudinal groove in its outer surface, a pawl loosely fitting and rotatably seated within said groove and having a pair of longitudinal, opposite, spaced apart outer edges adapted alternately to engage the internal periphery of said tube whereby the latter may be driven in alternate directions, a longitudinal spring rod extending along said male member, one of its ends engaging said pawl and tending to seek the center of the shank, and a member mounted on said male member supporting the other end of said spring and having an exposed extension whereby it may be manually moved to effect transverse movement of the former end of said spring across said pawl from a position adjacent to one edge to a position adjacent to the other edge of said pawl.

2. In a reversible clutch mechanism, the combination of a tubular shank provided with a series of internal longitudinal ratchet grooves, a head driving said shank and having a longitudinal cylindrical extension journaled within said shank, said extension having an arcuate longitudinal groove in its outer surface, a longitudinal arcuate pawl loosely fitting and rotatably seated within said arcuate groove and having a pair of parallel, opposite, spaced apart outer edges adapted alternately to engage the ratchet grooves in said tube, a transverse pin rotatably mounted in said head, a longitudinal attenuated spring member extending along said head and having one of its ends supported by said pin, the other end of said spring resting upon the outer surface of said pawl and tending to seek the center of said shank, said pin being provided with a manually accessible extension whereby it may be rotated to cause the operative end of said spring to be shifted transversely across said pawl from the vicinity of one end to the vicinity of the other end thereof, said pawl being suitably arranged to permit free sliding movement of said spring.

3. In a reversible clutch mechanism, the combination of a tubular shank, a male member drivingly related to said shank and having a longitudinal, substantially cylindrical extension rotatably contained within said shank, said extension being provided with an arcuate longitudinal groove in its outer surface, a pawl loosely fitting and rotatably seated within said groove and having a pair of longitudinal, opposite, spaced apart outer edges adapted alternately to engage the internal periphery of said tube whereby the latter may be driven in alternate directions, a longitudinal spring rod extending along said male member, one of its ends engaging said pawl and tending to seek the center of the shank, and a member mounted on said male member supporting the other end of said spring and having an exposed extension whereby it may be manually moved to effect transverse movement of the former end of said spring across said pawl from a position adjacent to one edge to a position adjacent to the other edge of said pawl, said exposed extension projecting from said head but lying wholly within the axially extended circumference of said shank.

FREDERICK H. AYER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents Washington, D. C."