Dec. 26, 1939. R. CLADE 2,184,513

UNIVERSAL VALVE

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Fig. 2.

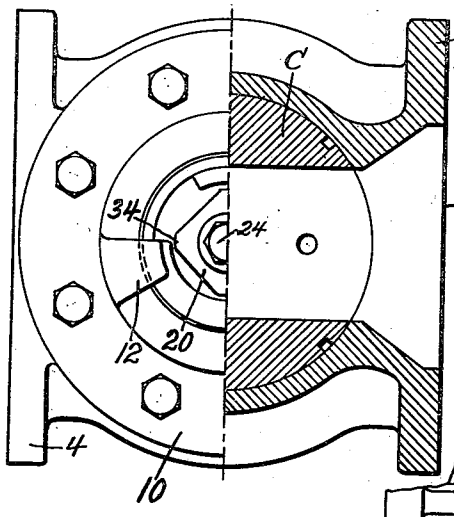


Fig. 12

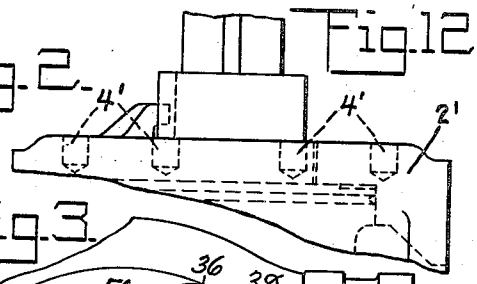


Fig. 3.

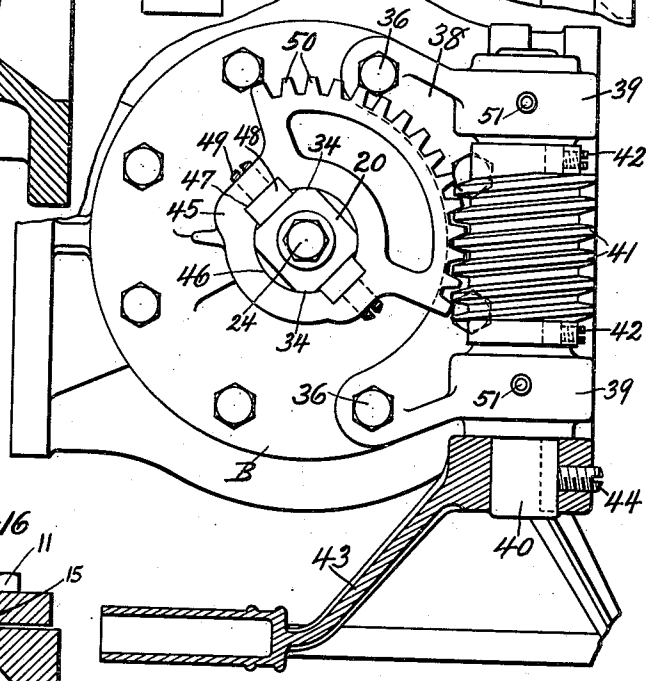


Fig. 1.

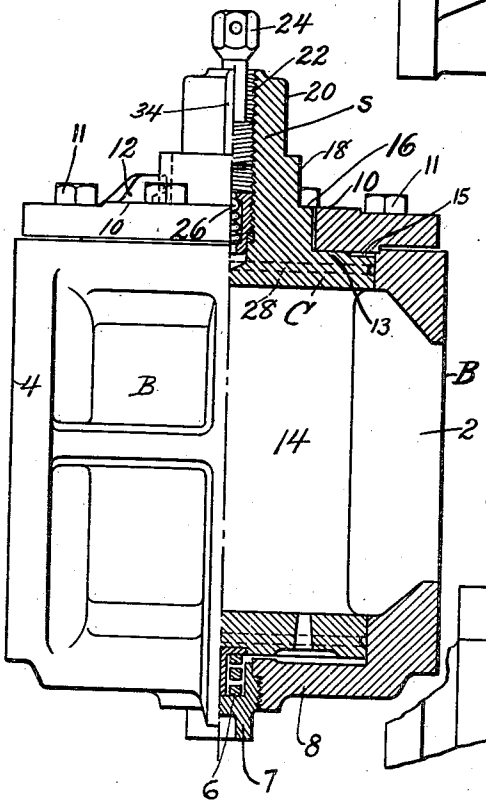
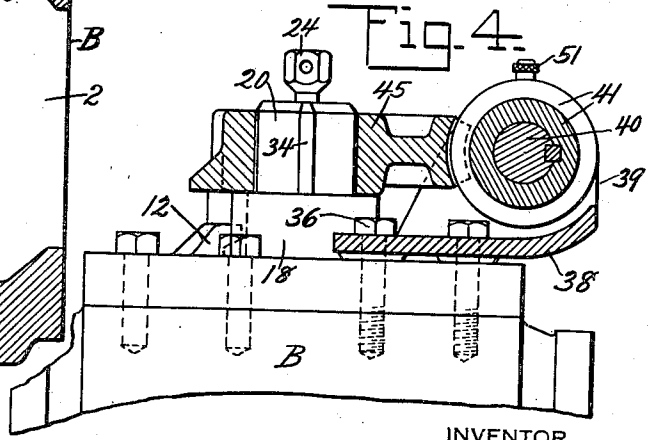


Fig. 4.



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Fig. 8.

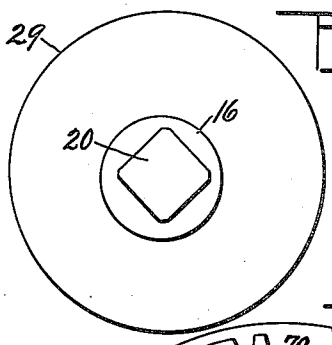


Fig. 9.

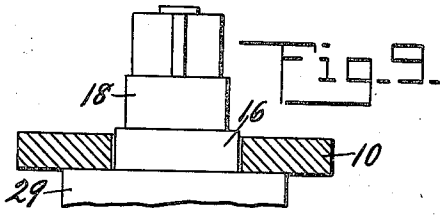


Fig. 10.

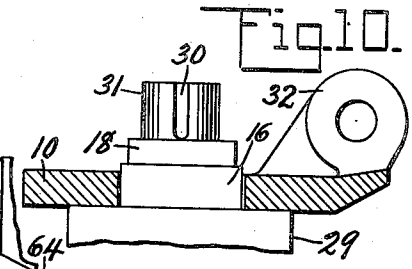


Fig. 6.

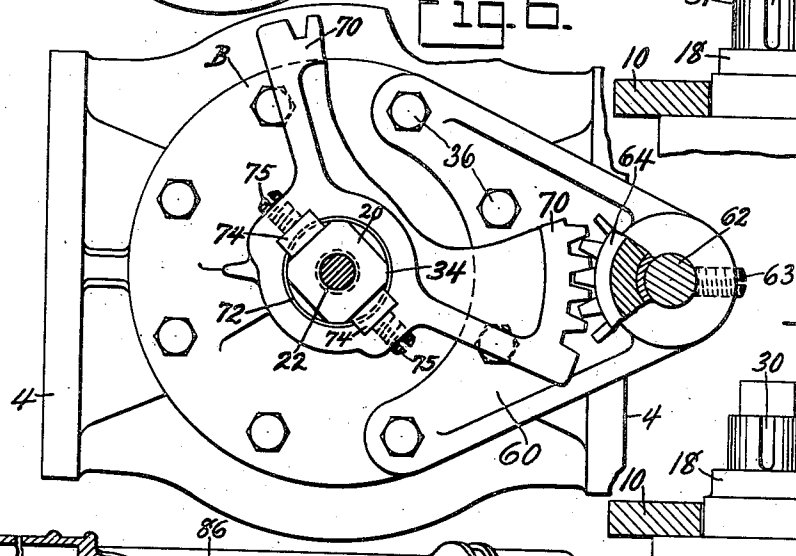
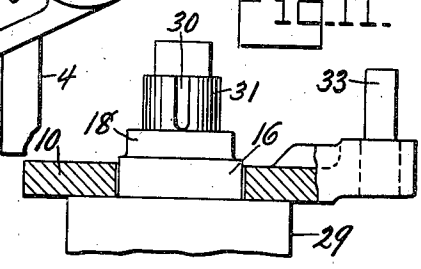


Fig. 11.



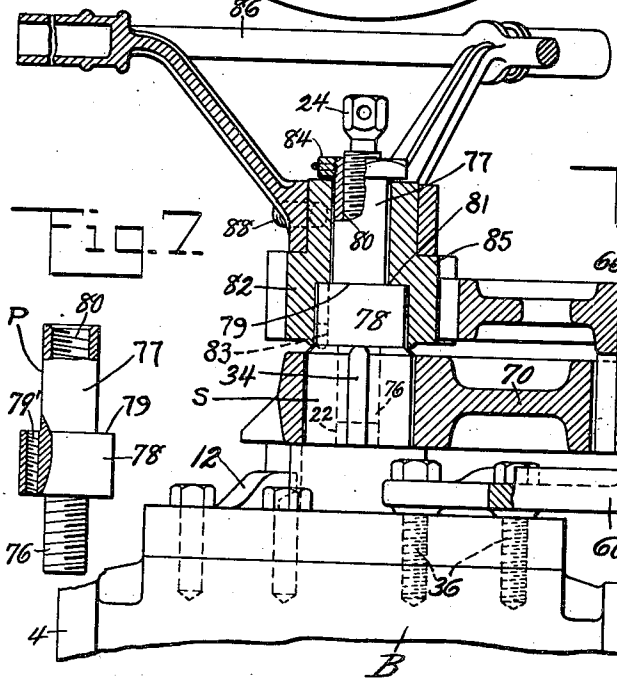
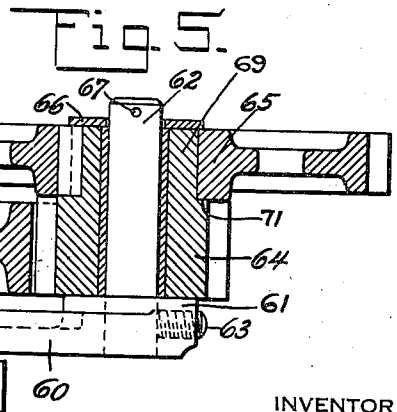


Fig. 7.

Fig. 5.



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UNITED STATES PATENT OFFICE

2,184,513

UNIVERSAL VALVE

Robert Clade, Detroit, Mich., assignor to American Car and Foundry Company, New York, N. Y., a corporation of New Jersey

Application February 25, 1938, Serial No. 192,523

1 Claim. (Cl. 137—139)

This invention relates in general to valves and in particular to lubricated valves which may be operated either by wrench or by various gear arrangements. Valves as previously constructed have required the carrying in stock of several types, that is, a type intended for wrench operation, another type intended for worm gear operation and still a third type intended for spur gear operation. Each of these types were of different formation and it was impossible to change the manner of operation without returning the valve to the shops for extensive rebuilding. The manufacture of the three separate types of valves necessitated the carrying in stock of a large number of various sizes of each type and very frequently orders were received for one type of valve in excess of the number on hand and it was necessary, in order to fill the order, to either make extensive changes on one of the other types or delay filling the order and manufacture additional valves of the type desired. It is obvious that such a procedure often resulted in loss of at least part, if not the entire order, in cases where a rush delivery was desired. It is also obvious that this practice required a tremendous stock to be carried on hand at all times, thus seriously handicapping both the shops and the warehouse.

In a large number of instances a customer has desired a valve of one type, and after installation thereof has discovered that the valve if operated by means of gearing would be far better suited to his needs. With the valves as previously manufactured it is necessary to completely disconnect the valve and return it to the shop for conversion to another type, thus inconveniencing the customer and causing him considerable loss both in time and money. It is an object, therefore, of this invention to provide an improved valve which may be readily converted even while in use to a different type.

A further object of the invention is the provision of a single type of valve which may be operated either by wrench, by worm or by spur gearing without necessitating any change in the valve structure itself.

A still further object of the invention is the provision of a single type of valve which may be manufactured and after manufacture readily converted to another type by merely attaching or removing certain parts.

These and other objects of the invention will be apparent to persons skilled in the art from a study of the following description and accompanying drawings, in which:

Figure 1 is a side view partly in section of the improved valve as formed for wrench operation;

Fig. 2 is a plan view partly in section of the valve shown in Figure 1;

Fig. 3 is a plan view of the same valve with a part attached in order to operate the valve by means of worm gearing;

Fig. 4 is a side view partly in section of the converted valve of Fig. 3;

Fig. 5 is a side view partly in section of the valve of Fig. 1 with stock parts added to convert it for spur gear operation;

Fig. 6 is a plan view of the valve shown in Fig. 5;

Fig. 7 is a side view of the grease gun extension as used in connection with Fig. 5;

Fig. 8 is a plan view of a valve plug as received in the machine shop;

Fig. 9 is a partial sectional view showing the old type of wrench operated valve;

Fig. 10 is a partial sectional view of the old type of worm gear operated valve;

Fig. 11 is a partial sectional view of the old type of valve as designed for spur gear operation, and

Fig. 12 is a fragmentary detail view showing an integral head type valve body, adapted for the present invention.

Referring now more particularly to the drawings, the valve shown in Figs. 1 to 6 inclusive is of a well known type and comprises a body B and a plug C. The valve shown is of the cylindrical type, that is, the plug is cylindrical and the body is provided with a substantially cylindrical valve seat arranged transverse to a passageway extending through the body and in communication with fluid transfer ports 2 and 4.

Figs. 1 to 6 inclusive show a valve in which the plug is inserted into the body through the head portion thereof and is resiliently supported in the base of the body by suitable resilient means such as a spring 6 or the like arranged in a base plug 7 secured to an integral base 8.

The head portion of the valve is provided with a substantially centrally apertured gland or cover plate 10 secured as by bolts 11 or the like to the body B and so formed as to provide a bearing surface 9 resting upon a shoulder 13 at the upper end of the plug surrounding a stem indicated generally at S.

The valve plug is substantially similar to that shown in Patent No. 2,038,887 issued to Clade et al. April 28, 1936, except that shoulder 13 provides for a lubricant chamber 15 at the periphery of the plug. The stem S is bored to

provide a lubricant reservoir 22, and is tapped to secure a ram 24 by which lubricant may be forced from reservoir 22 past check valve 26 into passages or ducts 28; all as substantially disclosed in the aforesaid patent.

The stem S may be considered as formed of three parts, namely, a cylindrical portion 16 arranged in the aperture in gland 10 with the periphery slightly spaced from the gland as clearly shown in Fig. 1, a stop engaging portion 18, and an upper or operator receiving portion 20.

As plugs are received from the foundry, it will be apparent that the various portions and surfaces may not be concentric with respect to each other; that is (referring now to Fig. 8), the seating surface 29 of the plug and the operator receiving portion are very likely to have respectively different centers.

It has been the practice to machine the seating surface 29 and the periphery of the cylindrical stem portion 16 whereby they may be concentric with each other. If the plug was designed for wrench operation the operator portion 20 was not touched. In the event the plug was to be operated by a gear, it was necessary to machine the operator portion 20 (Fig. 1) until it was concentric with the seating surface of the plug and the periphery of portion 16 of the stem S. This cylindrical operator portion is indicated at 31, Figs. 10 and 11. In order to secure a gear to portion 31, it was necessary to cut a keyway 30 in portion 31—a difficult, expensive and time consuming operation.

For worm gear operation, it was necessary to provide lugs 32 on the body, as shown in Fig. 10, and for spur gear operation it was necessary to provide a bearing pin 33 on the valve body, as shown in Fig. 11.

From the above it can be seen that it has been the practice to provide three separate and distinct types of valve bodies and plugs to be prepared to furnish the particular type of valve desired, this necessitating a manufacturer being obliged to stock a large quantity of valve plugs and bodies. The present invention eliminates this disadvantage and provides what may be termed a standard plug and standard valve body, adapted either for wrench, gear, spur gear or worm gear operation.

The plug of the present invention is provided with a seating surface which is concentric with the periphery of stem surface 16, as is usual, but, in machining the plug, the corners 34 of the operator receiving portion 20 of the stem S are removed to provide four segments concentric with the axis of the plug. It is therefore obvious that with the plug so prepared a stem portion is provided which will receive a wrench, while at the same time, due to the turning of the corners, various gears may be placed on this plug without any change being necessary, since the corners were turned at the same time and on the same centers as the cylindrical surface of the plug.

With the valve plug constructed as above described, it is only necessary that it be assembled in the valve body in order to provide a valve suitable for wrench operation as shown in Figs. 1 and 2. If the valve is required for worm gear operation, it is only necessary to provide longer bolts 36 to securely clamp the worm gear supporting bracket 38 in position upon the valve body. This bracket is formed with spaced upstanding bearing portions 39 adapted to receive the ends of a shaft 40 upon the intermediate part of which is mounted a worm 41. The worm is non-rotatably secured upon the shaft by suitable means, such as set screws 42, and the shaft is of sufficient length to extend beyond one of the bearing portions in order to receive a hand wheel 43 non-rotatably secured to the shaft by a set screw 44. A worm gear sector 45 is provided having a central bore 46 of substantially the same diameter as the circle of which the stem corners 34 are segments. This bore has at least one and preferably two or more keyways 47 cut therein each adapted to receive a key 48 to bear against the operator receiving portion, said keys being held in place by suitable means such as set screws 49. The worm gear sector is formed with a sufficient number of teeth 50 to insure at least a ninety degree movement of the valve plug and these teeth, of course, are so designed as to properly mesh with the teeth of the worm. For convenience in lubrication, the bearing portions of the worm supporting bracket are provided with suitable grease connections 51 as clearly shown.

To provide for operating the valve plug by spur gear mechanism, as in Figs. 5 and 6, a spur gear supporting bracket 60 is attached to the valve body by means of bolts 36 and as described with reference to the worm operated valve of Figs. 3 and 4. This bracket may be a substantially flat plate formed with an apertured upstanding projection 61 providing a seat for a driven pinion 64; journaled on a pin 62 extending into seat 61 and retained by set screw 63 or the like. Extending upwardly from the pinion 64 is a projection 69 providing a shoulder 71 supporting a spur gear 65, which is keyed or otherwise suitably secured to said projection to prevent movement relative thereto. Pinion 64 is in meshing relation with a spur gear segment 70 formed with a hub portion provided with a central bore 72 of substantially the same diameter as the circle of which the arcs 34 are a part. Bore 72 is provided with keyways receiving keys 74 arranged in engagement with the stem of the plug between segments 34 as shown in Fig. 6.

Arranged in meshing relation with spur gear 65 is driving pinion 82 journaled on a bearing pin P, shown clearly in Fig. 7, and comprising a lower portion 76, suitably threaded and of a diameter such as to fit the bore 22 previously referred to, and an upper portion 77 on which the pinion 82 is journaled. The bearing pin is tubular and internally threaded to receive ram 24 and the lower portion 76 is of reduced diameter as shown in Fig. 7. The pin includes an intermediate portion 78 of greater diameter than upper portion 77 to provide a seat 79 on which pinion 82 is supported, as shown in Fig. 5; the hub of said pinion being provided with an internal seat 81 resting upon said seat 79. Formed in the intermediate portion 78 is a tapped opening 79' receiving a set screw 83 or the like for locking the bearing pin P to the upper end of the stem S of the plug. As will be obvious, the tubular pin P constitutes a lubricant reservoir 80 arranged in communication with the tubular valve stem to permit passage of lubricant to the seating surfaces of the valve plug and valve body.

The driving pinion 82 is provided with an external shoulder 85 constituting a seat for the hub of hand wheel 86 secured to said pinion by screw means 88 or the like. For retaining pinion 82 against removal, a lock nut 84 is provided, as shown in Fig. 5.

It is, of course, obvious that hand wheel 86 and pinion 82 may be made as an integral unit, if desired, and that gears 64 and 65 may be an inte-

gral structure, but it is preferred that the assembly be as above described, since, for a single reduction gearing, the hand wheel may be secured to the hub of pinion 64, in which case the stud or body bearing will be unnecessary and ram 24 will occupy the position shown in Figs. 1 and 3.

The spacing of the holes on the brackets 38 and 60 is identical and, therefore, either bracket may be interchanged and moved from one valve body to the other at will and this spacing is the same as the spacing of the clamping bolts used on valves having the removable head as shown herein. Therefore, the brackets may be applied to valves of the latter type merely by removing some of the head securing bolts and attaching the brackets.

Fig. 12 shows the upper portion of a valve of the type shown in Fig. 1, but in which the head portion 2' is formed integral with the body of the valve. In adapting the instant invention to valves of the integral head type, a plurality of suitably spaced tapped openings 4' are formed in the head portion to receive brackets 38 or 60 as the case may be.

From the preceding description it is obvious that a single type of valve body and plug will be manufactured and that this valve may be used without any change either as a wrench, worm or a spur gear operated valve. It will, of course, also be obvious that other types of gearing and arrangements may be used merely by providing a bracket of a different type attached to the body by the same means as has been described. It will also be obvious that with valve plugs and bodies produced as described it will only be necessary to carry a single type of valve in stock with the suitable brackets, gearing and operating wheels carried as accessories which may be applied as desired or ordered either in the shop or in the field while in operation.

While the invention has been described more or less in detail, it is obvious that various changes, modifications and rearrangements of parts will be apparent to those skilled in the art and all such changes, modifications and rearrangements of parts are contemplated as fall within the scope of the following claim.

What is claimed is:

In a valve, a valve body, a plug rotatable in the body and provided with a stem formed with a flattened wrench receiving portion, a gear mounted on the valve body, a gear formed with a central bore mounted on said plug stem at the wrench receiving portion in cooperative relation with said first gear, means engaging said stem at the flattened portion for removably securing said gear in fixed position, said wrench receiving portion of the plug stem having spaced outer surfaces formed concentric with the longitudinal axis of the plug for engagement with the wall of the bore of said removable gear to center the latter with respect to the longitudinal axis of said plug, whereby the said gears are properly aligned for driving cooperation and rotation of said plug.

ROBERT CLADE.