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G. M. WALLACE ET AL

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DEVICE FOR SPOTTING INTERNAL COMBUSTION ENGINES

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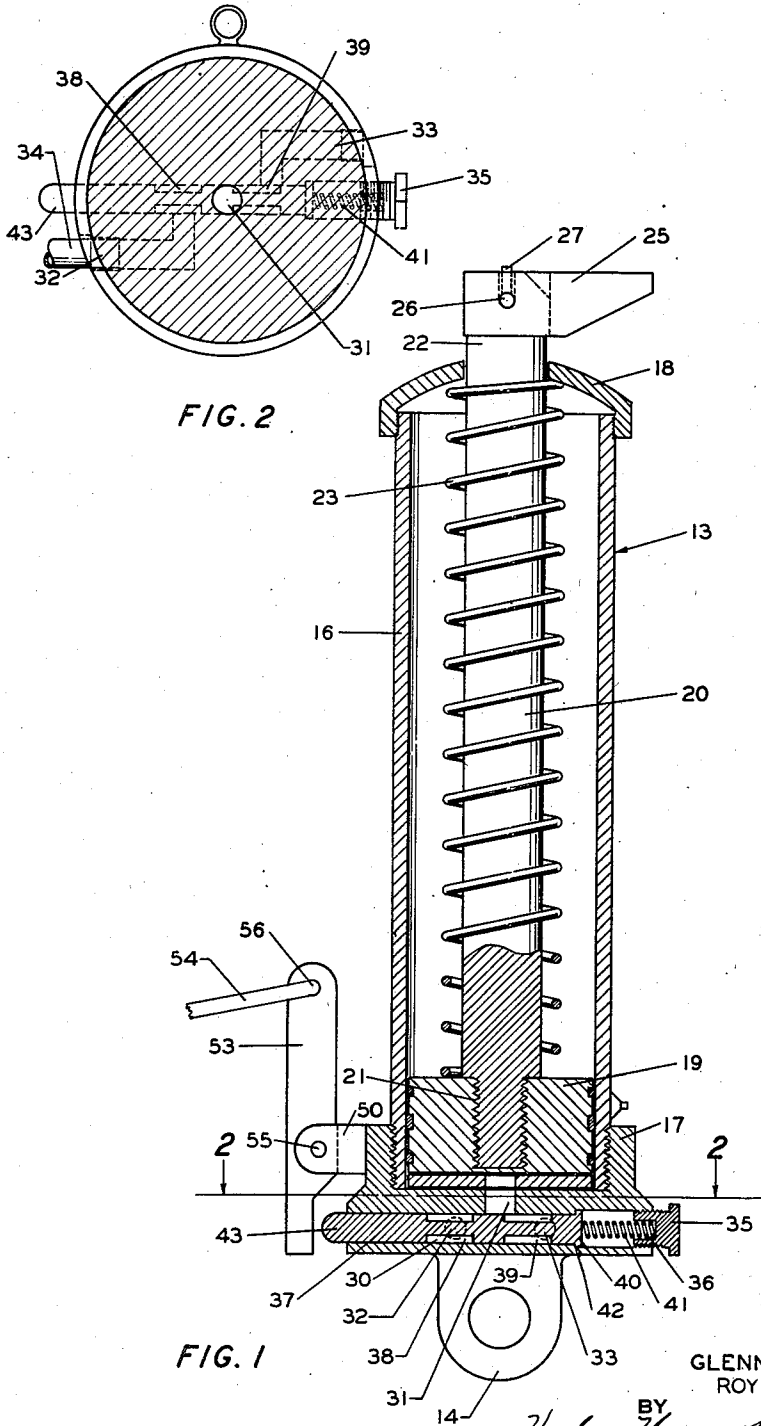


FIG. 2

FIG. 1

INVENTOR  
GLENN M. WALLACE  
ROY MAGERKURTH

BY  
*Hudson, Young, Shanley & Finger*  
ATTORNEYS



## UNITED STATES PATENT OFFICE

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DEVICE FOR SPOTTING INTERNAL  
COMBUSTION ENGINESGlenn M. Wallace, Bryant, and Roy Magerkurth,  
Oklahoma City, Okla., assignors to Phillips  
Petroleum Company, a corporation of Delaware

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This invention relates to a device for spotting an internal combustion engine on firing position preparatory to starting the engine; it is also adapted to slowly rotate the drive shaft of such engines during the fitting of bearings and may be used in case of an emergency to impart sufficient momentum to the flywheel for the purpose of starting the engine.

It has been the practice heretofore in the spotting of stationary internal combustion engines to employ the so-called "crowbar type spotter." This device consists of an iron bar pivotally supported on a fulcrum intermediate its ends. One end of the bar is adapted to engage suitable notches in the face of the flywheel and the other end is manually operated to place the first mentioned end in engagement with the flywheel and thereby slowly rotate the flywheel to the desired position. This device is not satisfactory from an operating point of view in that it is necessary for the operator to first spot the engine from the compressor end and then walk around to the power end of the engine to start the same. Another major disadvantage to this old method is that the crowbar type of jack has been the cause of numerous accidents, due primarily to the engine back-firing. This often results in straining the operator's back muscles and at times breaking his arms. Furthermore, the bar extended so far from the engine that men in the vicinity would, at times, trip over the bar, thereby injuring themselves.

The present invention eliminates all of the objections recited above, and provides spotting means whereby the operator can both "spot" and start the engine from its power end. Our device is compact in design and there is no danger to the operator in the event that the engine should back-fire. Our device includes a jack operable by a suitable fluid under pressure, preferably compressed air; means connected to the jack for cooperating with the flywheel of the engine to rotate the same; and control means for placing the jack in service.

The primary object of this invention is to provide safe, positive, and dependable means for spotting, starting or slowly rotating the drive shaft of stationary internal combustion engines.

This invention has for another object the provision of a device of the character indicated which is simple, compact, and rugged in design, and inexpensive to manufacture, operate, and maintain.

These and other objects and advantages will be apparent to those skilled in the art on ref-

erence to the following description and annexed drawings which respectively describe and illustrate a preferred embodiment of this invention, and wherein

Figure 1 is an elevation view partly in cross section of the jack employed in our invention; Figure 2 is a horizontal cross section view taken along line 2-2 of Figure 1;

Figure 3 represents our invention mounted in a position for cooperating with the flywheel of an internal combustion engine;

Figure 4 is a fragmentary view of the face of the flywheel illustrated in Figure 3;

Figure 5 is a side elevation view of another type of jack head in engagement with the sides of a flywheel;

Figure 6 is a plan view of the jack head illustrated in Figure 5;

Figure 7 is a side elevation view of a third embodiment of the jack head in engagement with the sides of a flywheel; and

Figure 8 is a plan view of the jack head illustrated in Figure 7.

Referring to the drawings, and more particularly to Figures 1, 2, 3, and 4, thereof, we have denoted therein a support 10 on which is positioned a plate 11 having a bracket 12 near one end for pivotally supporting a jack housing, which is generally indicated by reference numeral 13, through the cooperation of a pair of parallel arms 14 and a pin 15. The jack housing consists of a cylinder 16, a base 17, and a top 18. A piston 19 reciprocates within cylinder 16, and has a piston rod 20 which has its lower end threadedly connected to the piston, as indicated at 21, and its upper end 22 extending through top 18. The piston is normally maintained in the position shown in Figure 1 due to the action of a compression spring 23 which is concentrically mounted with respect to piston rod 20 and is disposed between top 18 and the upper face of piston 19. The extreme upper end 24 of the piston rod is machined substantially square in shape to receive a jack head 25. A readily removable pin 26 maintains the jack head 25 in position on the piston rod and a set screw 27 in the top of the piston rod prevents this pin from becoming dislodged during the practice of our invention. It will be observed from an inspection of Figure 3 that the jack head is adapted to engage with a series of equally spaced notches or teeth 28 that extend around the entire peripheral face of a stationary internal combustion engine flywheel 29.

Referring next to the details of construction of

base 17 as shown in Figures 1 and 2, we have depicted therein a valve passageway 30 which communicates with the interior of the jack housing through a duct 31. An inlet port 32 and an exhaust port 33 establish communication between passageway 30 and the exterior of the base. A conduit 34 is used to connect inlet port 32 with a suitable source of high pressure fluid (not shown) for operating our device. While various fluids under pressure may be used for the purpose of actuating the piston, we find that compressed air is entirely satisfactory from the viewpoint of economics and the fact that it is noninflammable in character. An externally threaded plug 35 having a recess 36 closes off one end of valve passageway 30. A slide valve 37 is provided with a pair of annular grooves 38 and 39 and is flanged at one end 40 so that a coil spring 41 will normally urge the valve against shoulder 42, establishing communication between duct 31, annular groove 39 and exhaust port 33. It will be noted that under these circumstances, none of the compressed air passes from inlet 32 through duct 31 and thence into the interior of the jack housing. Our type of construction contemplates having one end 43 of the valve project a short distance beyond the base when the valve is in exhaust position, as illustrated in Figure 1.

We have shown two systems of levers for controlling our device in Figure 3. One system is employed to tilt the jack housing into operable position, while the other system of levers is employed to actuate the slide valve. The tilting mechanism includes a post 44 rigidly mounted to the housing; a manually operated lever 45 pivotally supported to plate 11 at 46; and a link 47 pivotally connected to post 44 and lever 45 at 48 and 49 respectively. The valve actuating mechanism or system of levers consists of a bracket 50; a manually operated lever 51 pivotally connected to plate 11 at 52; and a pair of links 53 and 54, all of which are assembled into a unitary organization by pivot connections 55, 56, and 57.

Figures 5, 6, 7, and 8 illustrate two additional forms of jack head construction, either of which may be substituted for jack head 25 illustrated in Figures 1 and 3, and each is adapted to cooperate in a positive and dependable manner with the usual flywheel of internal combustion engines. The jack head 58 is provided with a pair of jaws 59 which have their opposite, inside faces 60 serrated for gripping the sides 61 of the flywheel. Jack head 62 is similar to jack head 58, but instead of having serrated jaws, this type of construction utilizes a pair of ratchet rollers 63 which are rotatably supported on pins 64. It will be evident from an inspection of Figure 7 that the ratchet rollers will firmly grip the sides of the flywheel.

In describing the operation of our instant invention, let us first assume that plate 11, together with the apparatus mounted thereupon, has been placed on support 10 adjacent flywheel 28, as shown in Figure 3. The operator takes a position near support 10 facing the jack housing and the peripheral face of the flywheel, gripping the upper portion of levers 45 and 51 in his right hand and left hand, respectively. He now exerts a forward thrust on lever 45, thereby tilting the jack housing about pin 15 so that jack head 25 will be in a position to engage with notches 28 on the flywheel. The operator continues to maintain the jack housing in the desired position by retaining a firm grip on lever

45 and he then operates lever 51 to actuate slide valve 37 to admit compressed air to the cylinder, thereby urging the piston 19, piston rod 20 and jack head 25 upwardly. This is attained by imparting a backward thrust or pull to lever 51, which thrust will be transmitted through links 54 and 53, causing the lower or free end of link 53 to contact the projecting end 43 of slide valve 37 and move the slide valve toward the right against the action of compression spring 41. Sufficient movement of slide valve 37 toward the right will allow compressed air to flow through conduit 34, fluid inlet 32, past annular groove 38 and thence through duct 31 into the cylinder, urging the piston 19 upwardly against the action of compression spring 23. The effect of the pressure of the compressed air upon the piston and therefore on the jack head may be varied by controlling the relative position of the slide valve at times when the compressed air is admitted to the jack housing. It will be readily apparent that when the valve control mechanism is operated so that the valve is moved to its furthestmost position to the right, a maximum supply of compressed air will be admitted into the housing. By the same token, if the valve is moved to the right so that only a part of duct 31 is in communication with groove 38, then less compressed air will be admitted to the interior of the jack housing. It will be merely a matter of skill in operation to control the amount and effect of the compressed air upon the piston. With a valve of our type, communication between the interior of the housing and exhaust port 33 will be cut off immediately preceding the establishment of communication between the interior of the jack housing and inlet port 32. When the pull on lever 51 is released, slide valve 37 will be moved toward the left by compression spring 41, thereby placing the interior of the jack housing in communication with exhaust port 33, and cutting off the supply of compressed air to the interior of the housing. Compression spring 23 will then urge the piston downwardly and the air admitted into the housing during the preceding step will be discharged through port 33.

From the foregoing, it is believed that the construction, operation and advantages of our present invention will be readily comprehended by persons skilled in the art. It is to be clearly understood, however, that the form of our invention herewith shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of our invention, as defined by the appended claims.

We claim:

1. In apparatus for rotating the flywheel of an internal combustion engine, the combination comprising a support; a fluid actuated jack pivotally connected to the support, said jack including a housing, a piston reciprocating within the housing, a piston rod connected to the piston and having one end projecting beyond the housing for engaging the flywheel to rotate the same, a fluid inlet port and a fluid exhaust port for the housing, and a valve for controlling the admission and exhaust of fluid into and from the housing; means exterior the housing for operating the valve to control the admission of fluid into the housing; and remotely controlled means for tilting the jack with respect to the support to place the jack in engagement with the flywheel.
2. In apparatus for rotating the flywheel of an

internal combustion engine, the combination comprising a support; a fluid actuated jack pivotally connected to the support, said jack including a housing, a piston reciprocating within the housing, a piston rod connected to the piston and having one end projecting beyond the housing for engaging the flywheel to rotate the same, a fluid inlet port and a fluid exhaust port for the housing, a valve for controlling the admission and exhaust of fluid into and from the housing, and means for normally maintaining the valve in exhaust position; means exterior the housing for operating the valve to control the admission of fluid into the housing; and remotely controlled means for tilting the jack with respect to the support to place the jack in engagement with the flywheel.

3. In apparatus for rotating the flywheel of an internal combustion engine, the combination comprising a support; a fluid actuated jack pivotally connected to the support, said jack including a housing, a piston reciprocating within the housing, a piston rod connected to the piston and having one end projecting beyond the housing for engaging the flywheel to rotate the same, a fluid inlet port and a fluid exhaust port for the housing, and a valve for controlling the admis-

sion and exhaust of fluid into and from the housing; means exterior the housing for operating the valve to control the admission of fluid into the housing; and remotely controlled link means for tilting the jack with respect to the support to place the jack in engagement with the flywheel.

4. In apparatus for rotating the flywheel of an internal combustion engine, the combination comprising a support; a fluid actuated jack pivotally connected to the support, said jack including a housing, a piston reciprocating within the housing, a piston rod connected to the piston and having one end projecting beyond the housing for engaging the flywheel to rotate the same, a fluid inlet port and a fluid exhaust port for the housing, a valve for controlling the admission and exhaust of fluid into and from the housing, and means for normally maintaining the valve in exhaust position; means exterior the housing for operating the valve to control the admission of fluid into the housing; and remotely controlled link means for tilting the jack with respect to the support to place the jack in engagement with the flywheel.

GLENN M. WALLACE.  
ROY MAGERKURTH.