

Feb. 28, 1933.

J. O. FINK

1,899,189

ENGINE

Original Filed Oct. 31, 1930

3 Sheets-Sheet 1

FIG. 1.

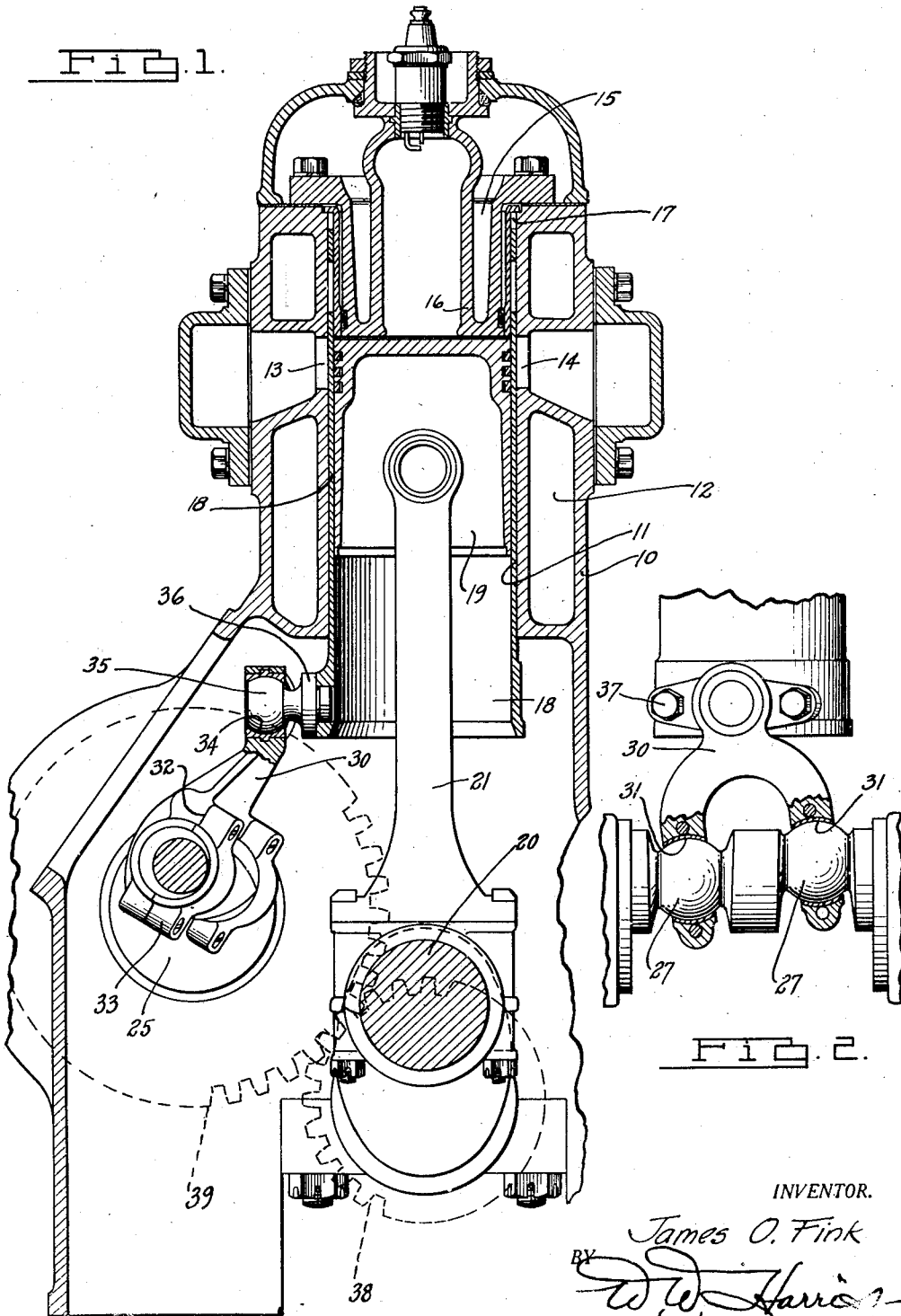


FIG. 2.

INVENTOR.

James O. Fink

BY *W. W. Harris*
ATTORNEY

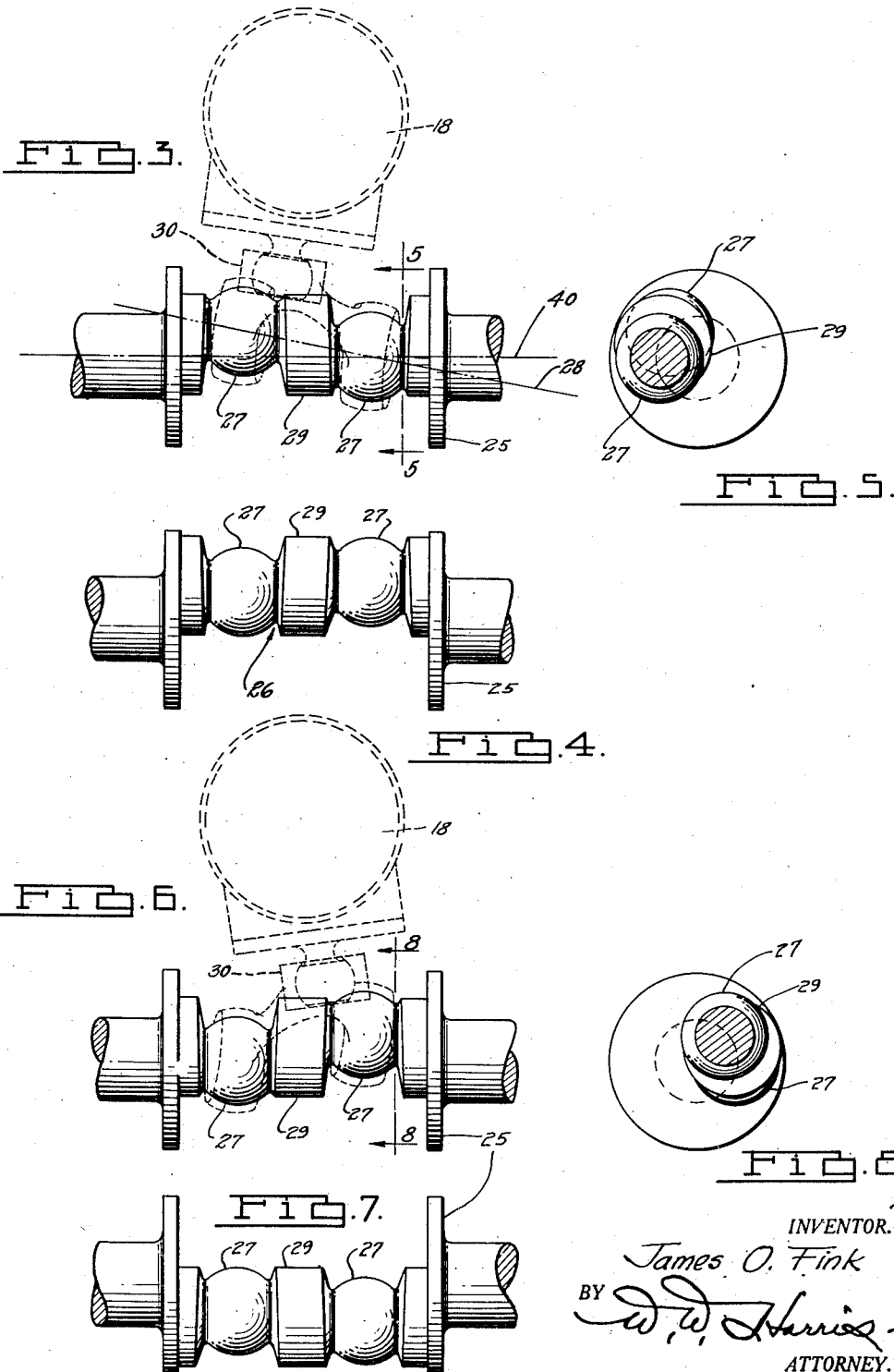
Feb. 28, 1933.

J. O. FINK

1,899,189

ENGINE

Original Filed Oct. 31, 1930 3 Sheets-Sheet 2



Feb. 28, 1933.

J. O. FINK

1,899,189

ENGINE

Original Filed Oct. 31, 1930

3 Sheets-Sheet 3

FIG. 11.

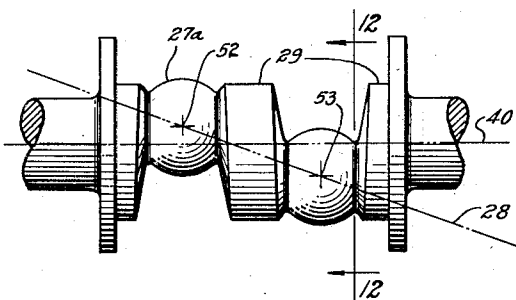


FIG. 12.

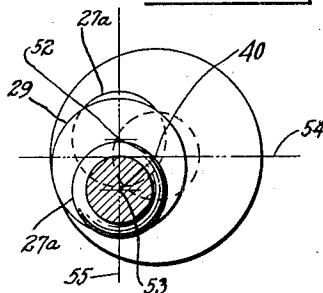


FIG. 9.

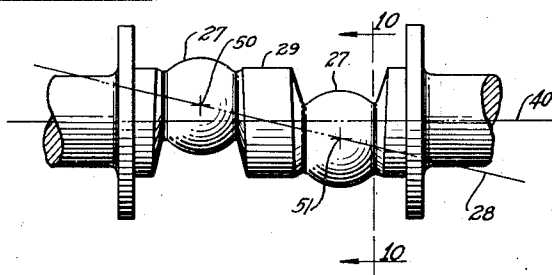


FIG. 10.

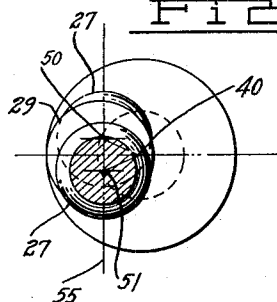


FIG. 13.

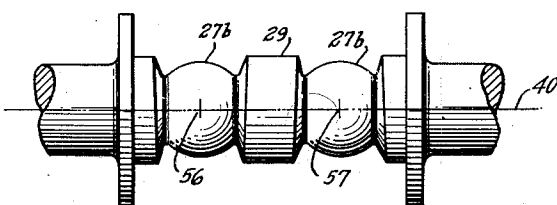
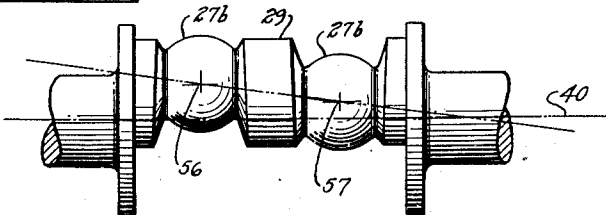


FIG. 14.



INVENTOR.

James O. Fink

BY

W. W. Harris

ATTORNEY.

UNITED STATES PATENT OFFICE

JAMES O. FINK, OF DETROIT, MICHIGAN, ASSIGNOR TO CONTINENTAL MOTORS CORPORATION, OF DETROIT, MICHIGAN, A CORPORATION OF VIRGINIA

ENGINE

Application filed October 31, 1930, Serial No. 492,503. Renewed July 27, 1932.

My invention relates to internal combustion engines of the sleeve valve type and more particularly relates to a sleeve valve operating mechanism for imparting a combined reciprocating and oscillating movement to the sleeve.

I am aware of the fact that a wobble drive for a sleeve valve engine is not broadly new, but heretofore such wobble drives have not proved to be a commercial success because of the difficulties in manufacturing the wobble cranks of the valvesshaft, it being known that such cranks cannot be accurately machined in production.

It is an object of my invention to eliminate the aforesaid difficulties by providing a novel wobble drive structure for an internal combustion engine of the sleeve valve type.

A further object of my invention is to facilitate the manufacture of a sleeve valve wobble drive by providing a valve shaft having one or more wobble cranks that can be very readily, economically and accurately machined and which lends itself to quantity production.

For a more detailed understanding of my invention reference may be had to the accompanying drawings which illustrate one form which my invention may assume, and in which:

Figure 1 is a vertical transverse sectional view through an internal combustion engine illustrating a sleeve valve operating mechanism constructed in accordance with my invention,

Figure 2 is a fragmentary detailed view of a wobble crank carried by the valve shaft and showing the means for connecting the crank portion to the sleeve valve,

Figure 3 is a plan view of a wobble crank showing in dotted lines the sleeve valve and the connecting means between the crank and valve,

Figure 4 is a detail elevational view taken at right angles to Figure 3,

Figure 5 is an end view thereof taken substantially on the line 5—5 of Figure 3,

Figure 6 is a view taken similar to Figure 3 but showing the crank in a position 180° removed from that illustrated in Figure 3,

Figure 7 is an elevational view of the crank portion of the valvesshaft taken at right angles to Figure 6,

Figure 8 is an end view thereof taken substantially on the line 8—8 of Figure 6,

Figure 9 is a plan view of a wobble crank illustrating the arrangement of the ball portions with respect to the valvesshaft axis showing the ball centers offset angularly and located substantially the same radial distance from said valvesshaft axis,

Figure 10 is a sectional view taken on the line 10—10 of Figure 9,

Figure 11 is a plan view of a modified wobble crank construction illustrating the ball centers offset both radially and angularly with respect to each other,

Figure 12 is a sectional view taken on the line 12—12 of Figure 11,

Figure 13 is a plan view of a wobble crank construction in which the ball portions are only offset radially with respect to each other, and

Figure 14 is an elevational view of what is shown in Figure 13, the view being taken at right angles to Figure 13.

The accompanying drawings illustrate a preferred embodiment of my invention employed with a sleeve valve engine comprising a cylinder block 10 having one or more cylinders 11 and the usual water jackets 12 surrounding the cylinders, said cylinder being provided with the usual intake and exhaust ports 13 and 14 respectively. A reentrant cylinder head portion 15 is carried by the cylinder block and provided with a portion 16 depending within the cylinder in spaced relation with the side walls thereof to provide a sleeve pocket 17 for receiving a sleeve valve 18. A piston 19 operates within the sleeve valve and is preferably connected to the engine crankshaft 20 by means of a connecting rod 21.

I have chosen to illustrate my invention as applied to a single sleeve valve engine having a sleeve valve ported for intake and exhaust and being given a combined reciprocating and oscillating movement by means of my novel valve operating mechanism hereinafter described.

The valve operating mechanism is supported in suitable bearings by a portion of the engine structure, the drawings particularly illustrating the valve shaft 25 extending substantially parallel to the engine crankshaft to one side thereof and supported by a lower portion of the cylinder block 10. The valv shaft is provided with one or more wobble crank portions designated as a whole by the character 26, and preferably a crank is provided for each sleeve valve, and an illustration of a single cylinder is believed to be sufficient for the purpose of illustrating the invention and operation of the valve operating mechanism. The crank portion of the valv shaft is constructed by providing ball portions 27 on the crank which are spaced longitudinally of the valv shaft, said ball portions being angularly spaced with respect to each other as shown in Figures 3 and 6. In other words, a plane through the center of one ball and containing the valv shaft axis is angularly spaced with respect to a plane through the other ball center and containing the valv shaft axis. These ball portions might be said to be offset angularly with respect to each other and it will be noted that the dotted line 28 illustrated in Figures 3 and 9 which passes through the ball centers is angularly disposed with respect to the valv shaft axis 40. These ball portions carried by the crank of the valv shaft are preferably separated by an intermediate cheek 29, and said balls are preferably formed by a machining operation in such a way that the same can be readily positioned in a machine and accurately formed. The axes of the ball portions are arranged parallel with the axis of the valve shaft; in other words, the surface of the ball portions is generated by an arc revolving about an axis parallel to the valv shaft axis. It will be noted that such ball portions may be readily machined and ground in a machine since the centers about which said ball portions rotate may be readily found and the work (which in this case is a valv shaft) may be quite readily centered in the machine in such a way as to accurately machine the said ball portions. Thus the centers for the work while machining the ball surfaces are located relatively close to the valv shaft center.

Means are provided for connecting the crank portion of the valv shaft with the associated sleeve valve, this means preferably comprising a forked arm 30, the outer ends of each forked portion being formed with a ball socket 31 adapted to engage the ball portions 27. Preferably the socket portions of the forked arm 30 are split as shown at 32 in Figure 1 and suitable caps 33 which are provided with complementary ball sockets are preferably secured to the arm by means of screws, bolts or other fastening devices. It will be noted that the split between the caps

33 and the main body over the arm structure lies in a plane which passes through the ball centers.

The upper end of the arm 30 is preferably provided with a ball socket 34 adapted for engagement with the ball portion 35 carried on a suitable fixture or other support 36 which is secured to the sleeve valve 18 by means of studs or bolts 37. Preferably the ball socket 34 is lined with babbitt or other suitable wearing material in order to provide a smooth swivelling action between the ball socket and the ball. Obviously the ball could be carried by the arm and the socket by the sleeve if so desired. Such a construction between the arm and sleeve valve as shown in the accompanying drawings is employed for illustration purposes only since it will be obviously understood that other types of connecting devices may be employed if so desired.

In the operation of the device the valv shaft of the engine is rotated because of the driving connection between the valv shaft and the crankshaft, one suitable form of driving means being illustrated in the drawings and comprising a gear 38 fixed or otherwise secured to the crankshaft and arranged to engage a gear 39 fixed or otherwise secured to the valv shaft, said gears being constructed to operate the valv shaft at one-half crankshaft speed, a customary relation employed in four stroke cycle engines. Figure 3 and 6 illustrate two different positions of the wobble crank 180° removed. It will be noted in Figure 3 that one of the ball portions is in advance of the other, thus locating the arm which connects the sleeve valve and the crank in a position disposed angularly with respect to the valv shaft axis, while Figure 6 illustrates how the angular position of the arm with respect to the valv shaft axis is reversed when the valv shaft has been rotated through an angle of 180°. The action of the crank provides an oscillating and reciprocating movement which is imparted to the sleeve valve.

It may be noted by observing Figures 9 and 10 that the ball centers 50 and 51 are located the same radial distance from the valv shaft axis 40, thus these ball portions 27 may be said to be only offset angularly.

In Figures 11 and 12, the ball portions 27a are offset both angularly and radially with respect to each other. It will be noted that the ball center 52 of one ball portion 27a is offset a less distance from a longitudinal plane through the valv shaft containing the valv shaft axis 40 than the ball center 53 of the other ball portion 27a. This feature is more clearly illustrated in Figure 12 in which the aforesaid plane is designated by the reference character 54 and a plane 55 at right angles to plane 54 contains the ball centers 52 and 53. The ball center 53 lies a greater

perpendicular distance from the plane 54 than the ball center 52 and the ball center 53 therefore lies a greater distance from the valv shaft axis 40 than the ball center 52.

5 In Figures 13 and 14, the ball portions 27b are only offset radially with respect to each other, and are not angularly offset as in construction illustrated in the other figures. It will be noted that the ball center 56 is located 10 a greater distance from the valv shaft axis 40 than the ball center 57 and said ball centers both lie in a plane containing the valv shaft axis.

15 It will be noted that the provision of spaced ball or bearing portions on a wobble crank, which have axes of generation parallel to the axis of the valv shaft, provides for simple machining, that tends to make the manufacture of a valv shaft of this character 20 a very simple production operation. The ball portions and the ball socket portion carried by the connecting means provide a very efficient swivel joint between the arm and the valv shaft any binding tendency being 25 eliminated on account of the accuracy with which said parts may be machined. In each of the figures the ball portions are spaced longitudinally of the associated crank of the valv shaft.

30 Although I have illustrated but one form of my invention and have described in detail but a single application thereof, it will be apparent to those skilled in the art to which my invention pertains that various modifications 35 and changes may be made therein without departing from the spirit of my invention or from the scope of the appended claims.

What I claim as my invention is:

40 1. A driving mechanism for an engine sleeve valve including, a shaft driven by the engine and adapted to impart combined reciprocating and oscillating movement to a sleeve valve, said shaft having a crank portion 45 provided with a plurality of ball portions having their longitudinal axes disposed parallel to the axis of said shaft.

50 2. A driving mechanism for an engine sleeve valve including, a shaft driven by the engine and adapted to impart combined reciprocating and oscillating movement to a sleeve valve, said shaft having a crank portion 55 provided with a plurality of ball portions having their longitudinal axes disposed parallel to the axis of said shaft, said ball portions having their centers relatively angularly spaced about said shaft axis.

60 3. A driving mechanism for an engine sleeve valve including, a shaft driven by the engine and adapted to impart combined reciprocating and oscillating movement to a sleeve valve, said shaft having a crank portion 65 provided with a plurality of ball portions having their longitudinal axes disposed parallel to the axis of said shaft, said ball por-

tions having their centers located at different distances from said shaft axis.

70 4. A driving mechanism for an engine sleeve valve including, a shaft driven by the engine and adapted to impart combined reciprocating and oscillating movement to a sleeve valve, said shaft having a crank portion 75 provided with a plurality of ball portions having their longitudinal axes disposed parallel to the axis of said shaft, said ball portions having their centers relatively angularly spaced about said shaft axis, said ball portions having their centers located at substantially equal distances from said shaft axis. 80

85 5. A driving mechanism for an engine sleeve valve including, a shaft driven by the engine and adapted to impart combined reciprocating and oscillating movement to a sleeve valve, said shaft having a crank portion 90 provided with a plurality of ball portions having their longitudinal axes disposed parallel to the axis of said shaft, said ball portions having their centers relatively angularly spaced about said axis, said ball portions having their centers located at different distances from said shaft axis.

95 6. A wobble crank for imparting reciprocation and oscillation to a sleeve valve, comprising a shaft having an offset crank portion, said crank portion having a pair of spaced ball portions adapted to engage two points of a three point sleeve actuating element, said ball portions having their longitudinal axes disposed parallel to the axis 100 of said shaft.

105 7. A wobble crank shaft for imparting combined reciprocating and oscillating movement to a sleeve valve, said wobble crank having a pair of longitudinally and angularly spaced bearing portions having their axes 110 disposed parallel to the axis of said shaft, said bearing portions being adapted to actuate two points of a three point sleeve actuating element.

115 8. A wobble cranked shaft for imparting combined reciprocating and oscillating movement to a sleeve valve, said wobble crank having a pair of spaced portions having their axes disposed substantially parallel to the axis of said shaft, said portions being adapted to actuate two points of a three point sleeve actuating element.

120 9. A wobble cranked shaft for imparting combined reciprocating and oscillating movement to a sleeve valve, said wobble crank having a pair of longitudinally and angularly spaced portions having their axes disposed substantially parallel to the axis of said shaft, said portions being adapted to actuate two 125 points of a three point sleeve actuating element.

In testimony whereof I affix my signature.

JAMES O. FINK. 130