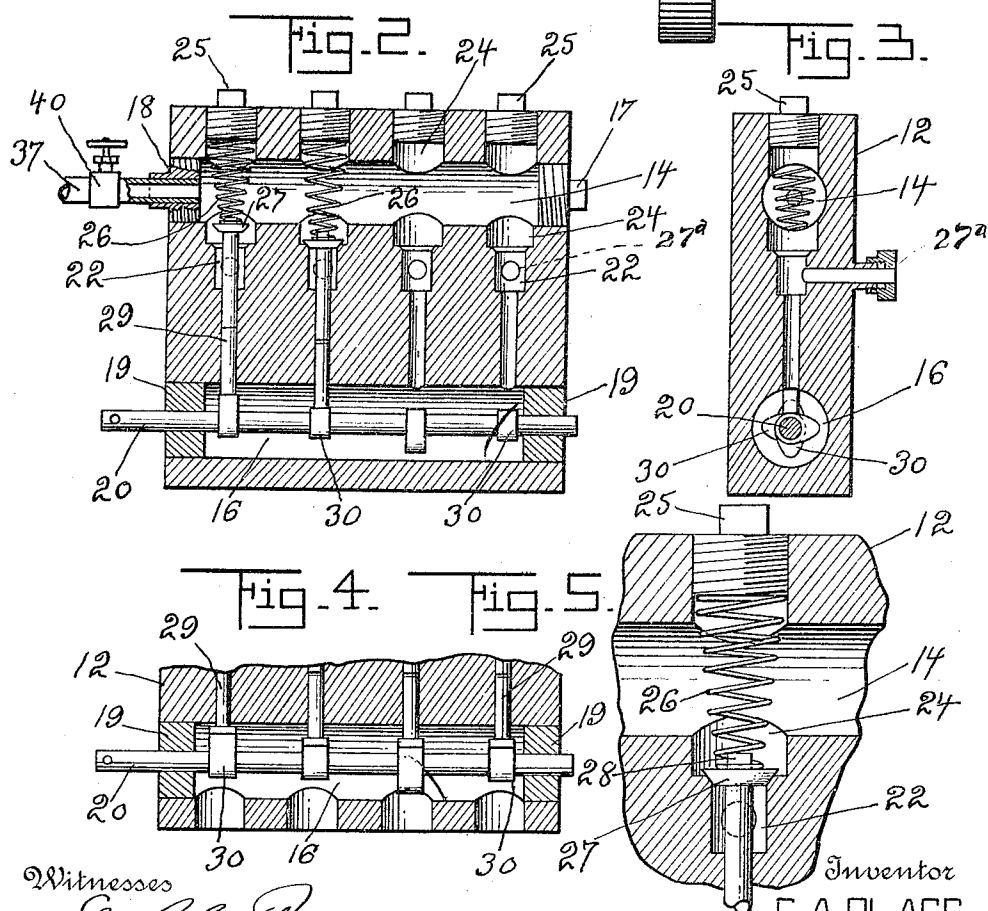


1,137,788.

Fig. I.



Witnesses

L. Clough Newman. 334
Chr. R. Nielsen.

Inventor

C.A.PLACE.

Attorneys

UNITED STATES PATENT OFFICE.

CHARLES A. PLACE, OF NEWMAN, ILLINOIS.

SELF-STARTER FOR INTERNAL-COMBUSTION ENGINES.

1,137,788.

Specification of Letters Patent.

Patented May 4, 1915.

Application filed April 23, 1913. Serial No. 763,006.

To all whom it may concern:

Be it known that I, CHARLES A. PLACE, a citizen of the United States, residing at Newman, in the county of Douglas and State of Illinois, have invented new and useful Improvements in Self-Starters for Internal-Combustion Engines, of which the following is a specification.

This invention relates to starting devices for internal combustion engines, and particularly to that type in which compressed air is used by being introduced into the cylinders when the exhaust and intake valve of the engine are closed, whereby to move the piston under the expansive action of the air.

It is an important object of the invention to enable the manufacture of the device in an inexpensive manner, and in a way whereby the device may be used upon any type of automobile of usual construction.

It is of course a purpose to enable the device to be made in small size.

It is a further purpose to simplify the mounting of valves controlling the distribution of the compressed air to the respective cylinders at the proper time, with regard to the position of the valves of the engine in the respective cylinders.

It is a most valuable attainment of the invention that the distributing housing and mounting for the several moving parts are adapted to be formed integrally and by the use of simple machine operations involving only three operations of a gang drill.

Additional objects and advantages will appear, some of which are apparent from the following description and the drawings, in which,

Figure 1, is a side view of the device attached to an engine of ordinary construction, Fig. 2, is a vertical sectional view in the major plane of the device. Fig. 3, is a vertical sectional view at right angles thereto. Fig. 4, is a detail of a modification. Fig. 5 is a fragmentary sectional view showing the valve mounting.

There is shown a portion of an automobile equipped with an engine of ordinary construction having four cylinders A, B, C, and D respectively, the engine being equipped with my invention as designated at 11. The device is adapted to be mounted either on the dashboard 12^a, or on the forward end of the crank case, or other situations, which will be understood by those versed in the art. As illustrated,

it is simply secured to the side of the forward cylinder, on the side opposite the valves. The extremely small size of the device adapts it to be mounted without interference with other elements of the engine or vehicle.

The invention comprises a body casting 12 of rectangular form, the actual size as at present used in practice being one-and-a-half inches in thickness and having a height and length of 5 inches each.

A large horizontal bore 14 is formed adjacent the top of the casing, extending throughout its length, and a similar bore 16 is formed parallel therewith adjacent the lower side of the casing. For convenience, each of these extends entirely through the casting, the upper one being closed at the right hand end by a plug 17, as is the right hand end of the upper bore 14. The left hand end of the latter is fitted with a suitable plug 18 adapted for air supply connections, of any suitable form. Each end of the bore 16 is fitted with a bearing plug 19, supported by which is the cam shaft 20. It will be noted that the lower horizontal bore 16 is considerably greater in diameter than the other mentioned.

Four equally spaced vertical bores are formed through the casing, having a smallest diameter at their lower parts and extending slightly above the bore 16, having also intermediate slightly enlarged portions 22, stopping a little short of the lower side of the bore 14, and having a larger portion extending through the top of the casings. This method of forming the passage has specific advantages which will be brought out hereinafter. The large upper ends 24 of each vertical passage is closed by a plug 25, bearing upwardly against which there is a small helical spring 26 seated on the upper side of a mushroom valve 27 having a small central teat 28 on its upper side for maintaining the spring properly centered thereon, the upper end of the spring being held within the large part of the bore, the plug stopping short of the lower part of the bore for that purpose. The valves are provided with stems fitting snugly in the lower reduced parts of the bores stopping within a short distance of the lower horizontal bore.

Small push rods 29 are engaged in the lower part of the vertical bores, each projecting into the lower passage 16 for engagement of the cam portion 30 of the shaft 20,

located in registry with respective push rods. The push rods 29 may have heads on their lower ends, if desired, although this will not be essential. In the event that heads are
5 formed thereon, it will be necessary to form an access opening through the casting at the lower end of each vertical bore as in Fig. 4 for the introduction of the push rods. Leading through the front of the casing
10 from each of the intermediate portions 22 of the vertical bores, there is an air outlet 27^a provided with individual air pipe connections whereby connections may be made with respective cylinders of the engine as
15 shown. The cams 30 are adjusted to correspond in relative position to one set of those of the cam shaft of the ordinary engine 10, which is not difficult, in view of the fact that a standard is followed in such
20 manufacture, and this will result, with proper connections in operation of the valves in similar order to the working strokes of the engine under rotation of the shaft 20, which shaft projects from one end of the
25 casing and is provided with a sprocket 33, as illustrated. Around this sprocket there is engaged a chain 34 extended to the sprocket 35 on the crank shaft of the engine, the teeth of the latter numbering two to one
30 on the sprocket 35.

The device is adjusted to the engine by turning the engine until the piston of the front cylinder is at the beginning of the working stroke, and my invention is then
35 connected with the front valve thereof just opening, so that when the engine is to be started, and air is admitted through the air supply pipe 37 to the passage 14, the air will be conducted to that cylinder of the
40 engine in condition for the working stroke, whereby it will be started.

By the use of suitable bits it will be apparent that the vertical passages including the enlargements and the reduced portions
45 may be formed in one operation, and by extending the largest portion of the passages slightly below the passage 14, I am able to form valve seats with great facility.

It will be apparent that the operation,

manufacture and assemblage of the inven- 50
tion are simple, and the starter is adapted to be repaired or have parts renewed without difficulty. It will be apparent that the device may be mounted upon the dash board
if desired and operated by means of worm 55
connections with the main shaft substantially as shown in dotted lines, or any other usual mechanical construction, found more convenient than those illustrated.

When it is desired to start the engine, it 60
is only necessary to admit air to the passage 14 by means of a suitable valve 40 disposed in the pipe, air being supplied from a suitable reservoir located at a suitable point, supplied with compressed air in any suitable 65
well known manner.

What is claimed is:

A device of the class described, comprising a casting having a plurality of vertical bores therethrough including a lower re- 70
duced part, a slightly enlarged intermediate part, and an upper enlarged portion, valve seats formed at the outer terminals of each intermediate portion, air ducts in communication with the intermediate portions, a 75
transverse bore being formed in the casing intersecting the outer enlarged portions of the bores, means for supplying air thereto, a large transverse bore intersecting the reduced bores of the said housing, a cam 80
shaft mounted therein revolubly, operative connections for the cam shaft, valves upon said seats, having stems engaged in the reduced portions of the bores, projecting into the last named transverse bore for engage- 85
ment by respective cam portions of said shaft, springs for seating the valves and plugs closing the upper ends of all of the vertical bores, and the end of the first named transverse bore opposite the said air supply 90
means.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CHARLES A. PLACE.

Witnesses:

CHARLES FARMER,
JOHN W. GREEN.

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