G. BURSON.

EXPLOSIVE ENGINE STARTER.

APPLICATION FILED JAN. 10, 1909.

960,072.

Patented May 31, 1910.

2 SHEETS—SHEET 1.

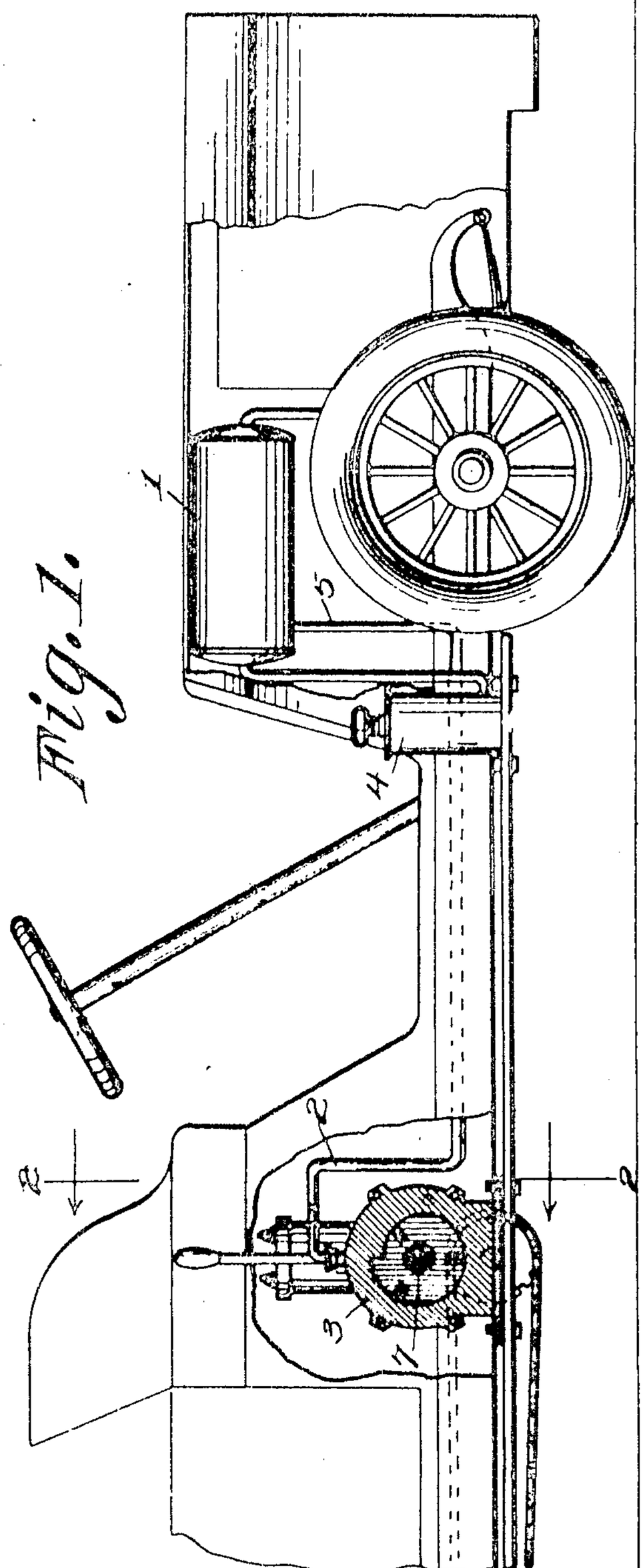

Fig. 1.

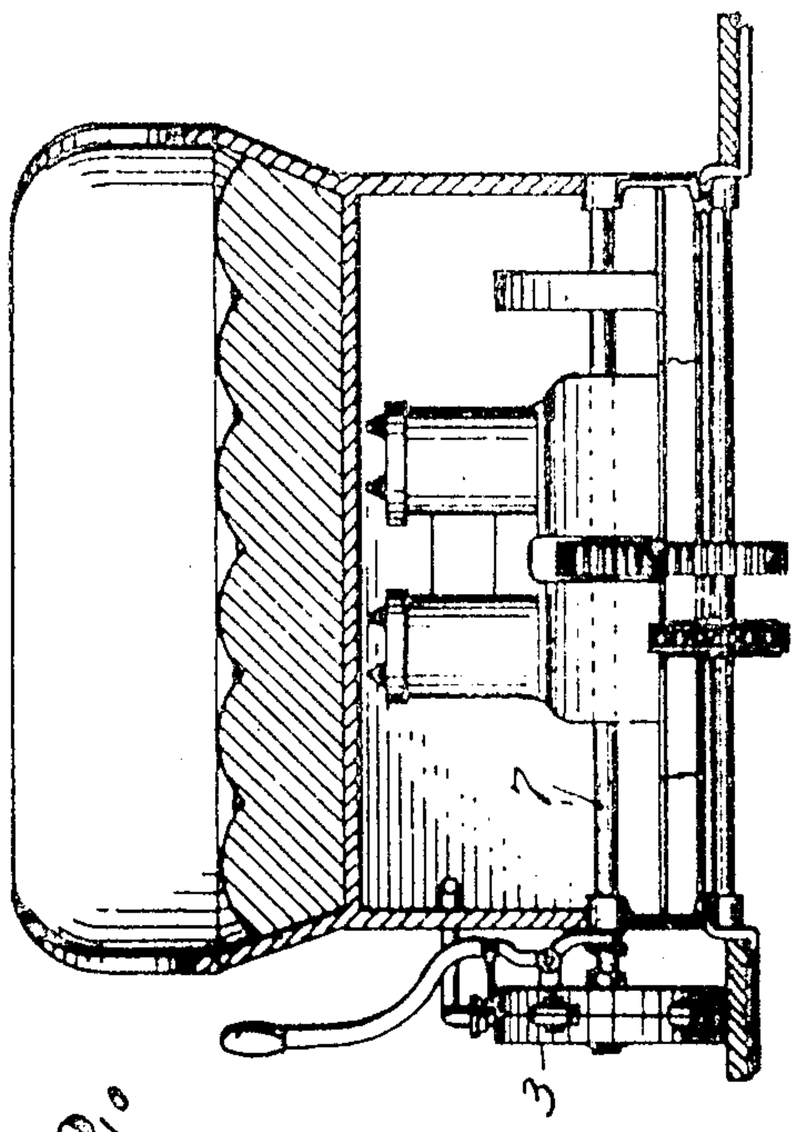

Fig. 2.

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EXPLOSIVE ENGINE STARTER.

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960,072.

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2 SHEETS—SHEET 2.

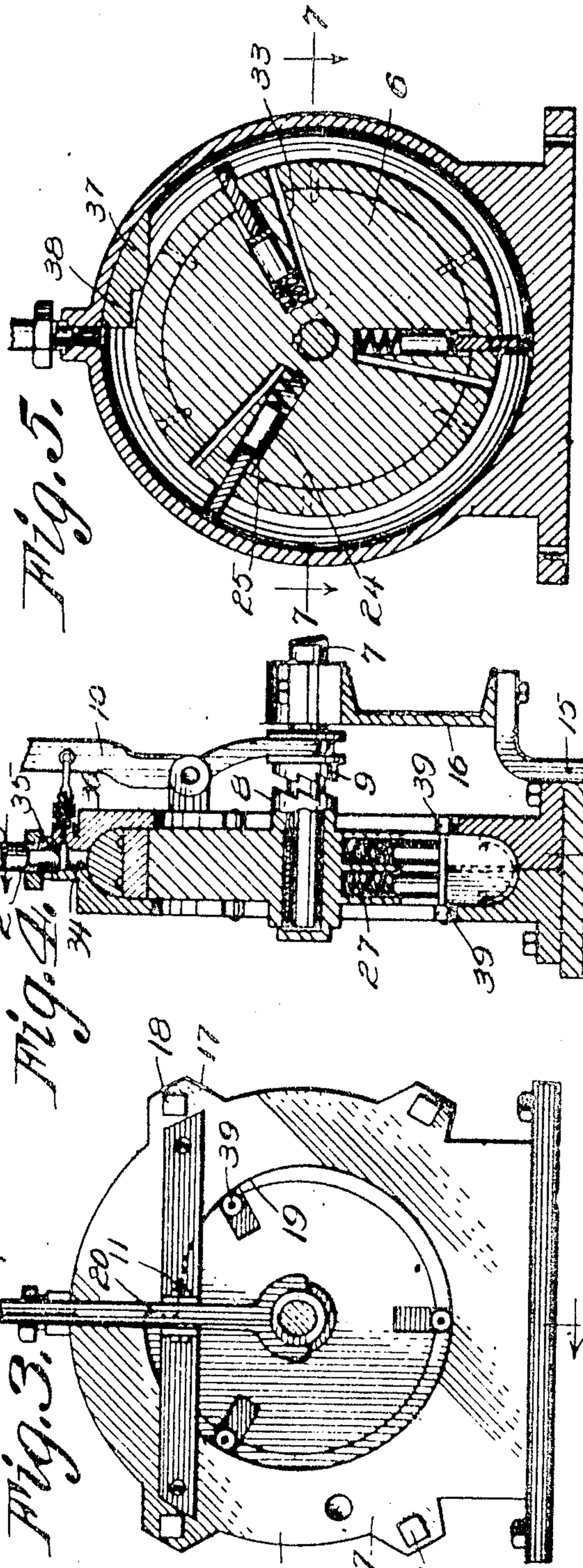

Fig. 5.

Fig. 4.

Fig. 3.

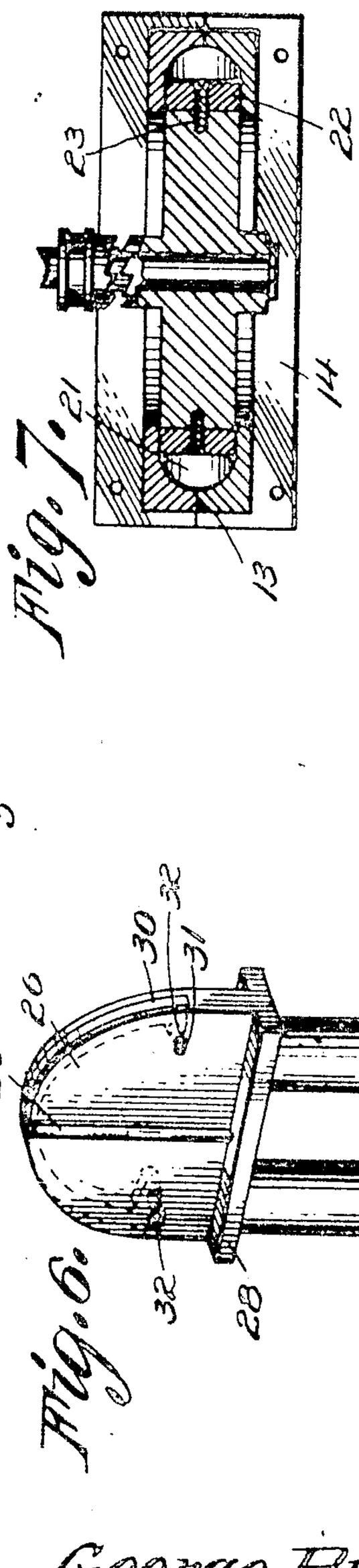

Fig. 7.

Fig. 6.

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UNITED STATES PATENT OFFICE.

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EXPLOSIVE-ENGINE STARTER.

960,072. Specification of Letters Patent. Patented May 31, 1910.

Application filed January 19, 1909. Serial No. 473,060.

To all whom it may concern:

Be it known that I, GEORGE BURSON, a citizen of the United States, residing at Winamac, in the county of Pulaski and State of Indiana, have invented new and useful Improvements in Explosive-Engine Starters, of which the following is a specification.

This invention relates to explosive engine starters and is especially designed with reference to the needs of motormen in starting the engine of motor vehicles, avoiding the necessity of cranking the engine as now commonly resorted to.

With the above and other objects in view, the nature of which will more readily appear as the description proceeds, the invention consists in the novel construction, combination and arrangement of parts as herein fully described, illustrated and claimed.

In the accompanying drawings:—Figure 1 is a side elevation partly in section, showing a sufficient portion of a motor car to illustrate the application of the present invention thereto. Fig. 2 is a vertical cross section on the line 2—2 of Fig. 1. Fig. 3 is a side elevation of the main part of the starter. Fig. 4 is a vertical cross section through the same on the line 4—4 of Fig. 3. Fig. 5 is a vertical longitudinal section on the line 5—5 of Fig. 4. Fig. 6 is an enlarged detail perspective view of one of the rings or blades and the parts associated therewith. Fig. 7 is a horizontal section on the line 7—7 of Fig. 5.

The motor vehicle to which the invention is applied with a compressed fluid tank 1 from which a feed pipe 2 leads the compressed fluid into a cylinder indicated at 3 for imparting movement to a piston working in said cylinder. Any suitable means may be employed for compressing the fluid in the tank 1 as by the engine itself or by means of an auxiliary air compressor shown at 4 and having an air pipe 5 leading therefrom into the storage tank 1.

In the preferred embodiment of the invention, the piston 6 is mounted directly on the engine shaft 7 and has one end of the hub thereof provided with a clutch face 8 adapted to be engaged by the corresponding face of a shiftable clutch 9 which is splined to the engine shaft 7 and adapted to be moved into and out of engagement with the clutch face 8 of the piston by means of a manually operated element such as a hand lever 10, the latter being fulcrumed at 11 on a fulcrum bar 12 secured to one side of the cylinder 3 as shown in Fig. 3.

The cylinder 3 is made in separable sections as indicated in Fig. 4 where it is shown to be divided on a central line 13 to enable the piston to be placed therein and removed therefrom. The sections of the cylinder are provided with base flanges 14 adapted to be bolted to one or more supporting brackets 15 secured to the frame 16 of the motor vehicle as indicated in Fig. 4. The cylinder sections are also provided with lugs 17 adapting them to be securely fastened together by means of bolts 18 passing through said lugs as shown in Fig. 3. The centers of the cylinder sections are provided with large openings and the edges of the sections which bound said openings are shaped in eccentric form to provide cam faces or edges 19 and an abrupt substantially radial offset 20, the purpose of which will hereinafter appear.

The relation between the piston and the cylinder is well illustrated in Figs. 4, 5 and 7, in which it will be observed that a substantially semi-cylindrical and circular fluid chamber 21 intervenes between the outer periphery of the piston and the inner peripheral wall of the cylinder the last-named wall being substantially semi-circular in contour in cross section. The piston comprises an addition to the main body portion and surrounding rim 22 which is secured to the main body of the piston by suitable fasteners as shown at 23. The body of the cylinder is provided at intervals with plunger pockets 24 preferably arranged in pairs side by side as indicated in Fig. 4, in which are arranged a corresponding number of cylindrical plungers 25, two of such plungers by preference being carried by each one of a series of piston wings or blades 26 each substantially in the form of a half disk as shown in Fig. 6.

Behind the plungers 25 and within the plunger pockets 24 are arranged expansive coiled springs 27 which act to urge the plungers outward and thereby force the corresponding piston wing or blade 26 outward until it lies and works in contact with the inner peripheral wall of the cylinder. The blade 26, where it passes through the rim 22 is comparatively thin as shown in Figs. 5 and 6, being provided with an opening of corresponding size and in order to hold the piston wings in place when the piston is removed from the cylinder, each wing is provided at its base with a stop flange 28

which is adapted to come in contact with the inner surface of the rim 22. Each wing is further provided on the side with a guide rib 29 which works in a corresponding groove in the rim 22 thereby acting to center the wing. The wing is also formed in its peripheral edge with a recess in which is inserted a packing strip or segment 30 having at the extremities thereof pins 31 which work in slots 32 in the wing 26, thus allowing for the expansion and contraction of the packing strip and enabling said packing strip to adjust itself accurately to bear firmly against the inner peripheral wall of the cylinder. This prevents leakage of the compressed fluid past the piston wings.

In order to enable the springs to perform their function and to prevent the compressed fluid ever offering any material resistance to the outward movement of the piston wings, passages 33 extend from the periphery of the piston inward to the inner ends of the pockets 21, thereby equalizing the pressure on both sides of the plungers 25.

The feed pipe 2 communicates with the cylinder through an inlet port 34 which is shown as located at the top of the cylinder, such location not being essential. The admission of the fluid to the cylinder is controlled by means of a valve or gate 35 preferably of the sliding type as shown in Fig. 4, said valve having the stem thereof connected to the lever 10 by means of a link 36 or its equivalent. In this way as the clutch 9 is thrown into engagement with the piston, the valve 36 is opened to admit the fluid to the chamber 21. Immediately adjacent to the inlet port 34 there is arranged an abutment 37, the same being provided in its inner surface with ports 38 which lead the compressed fluid into the passages 33 above described just before the adjacent piston wing starts on its outward movement under the influence of the springs 27. Each piston wing is further provided at opposite sides with rollers 39 which work in contact with the cam faces or edges 19 of the cylinder sections, hereinabove described, these cam faces being so designed as to operate on the rollers 39 and draw the piston wings inward just before they reach the abutment 37. After the wings pass the abutment, the rollers 39 move across the abrupt faces 20 referred to and the piston wings are pushed outward just as they pass by the abutment 37, after which the compressed fluid acts behind the piston wings and filling the space between the wings and the abutment 37, rotary motion is imparted to the piston.

The operator of the car or vehicle, in order to start the engine, moves the hand lever 10 inward, thereby clutching the piston 6 to the engine shaft and at the same time opening the valve 35 to admit the compressed fluid to the cylinder. As soon as the motor of the vehicle is thus started and attains its normal working position, the driver reverses the movement of the lever 10 which cuts off the supply of compressed fluid and unclutches the piston 6 from the shaft after which the starter remains idle until it is again required in use.

I claim:—

The combination of a motor, a motor actuated shaft, a tank adapted to contain fluid under pressure, means for compressing fluid therein, a motor starting device embodying a cylinder to which the compressed fluid is fed, a rotary piston working in said cylinder and mounted loosely on the motor actuated shaft, a clutch connecting said piston to the motor actuated shaft, a valve controlling the admission of fluid to said cylinder, and a manually operated element acting to simultaneously shift the clutch and valve.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE BURSON.

Witnesses:
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