A. G. ELVIN.

FLUID PRESSURE MOTOR.

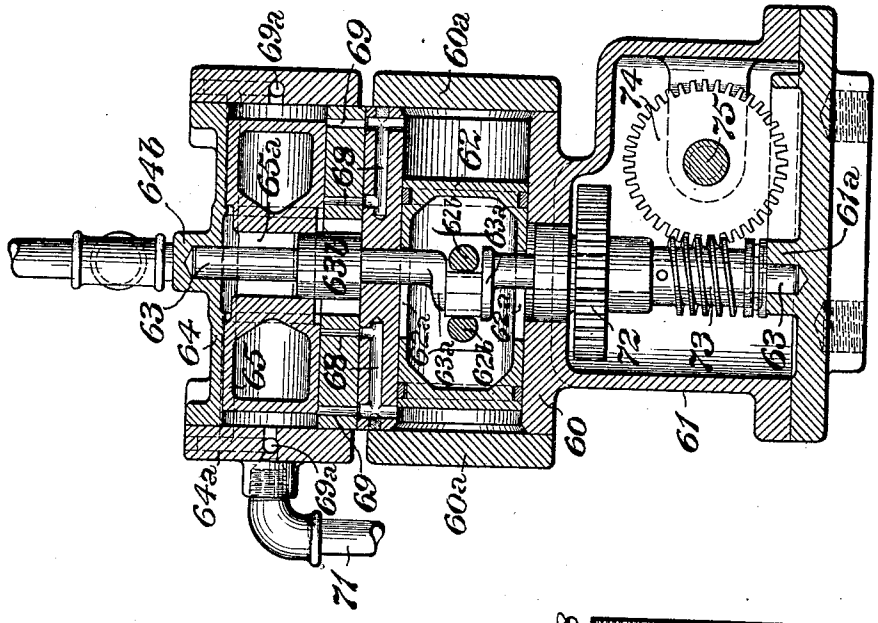
APPLICATION FILED JULY 24, 1912.

1,050,528.

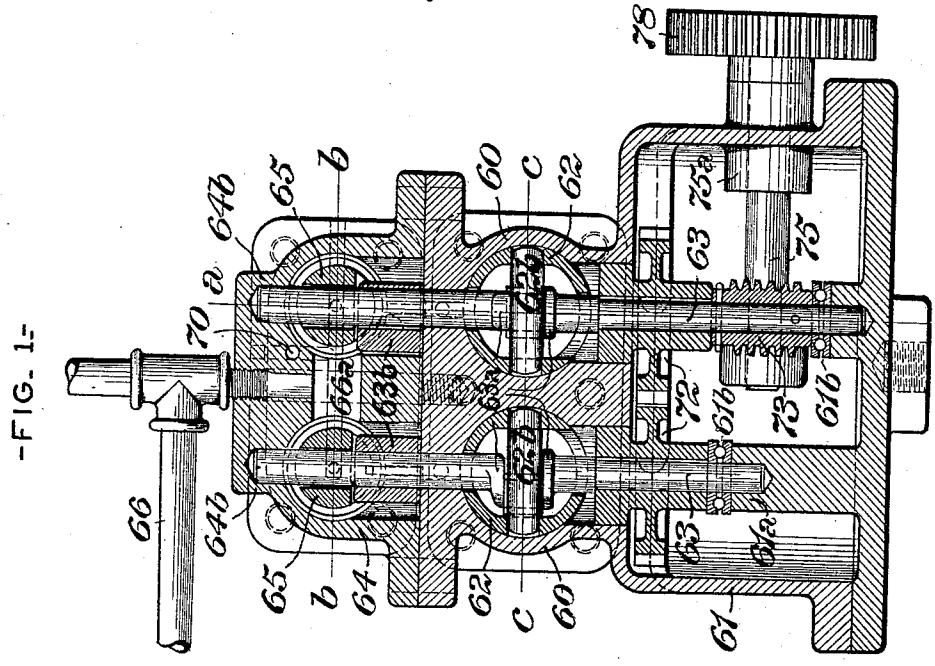
Patented Jan. 14, 1913.

2 SHEETS—SHEET 1.

-FIG. 2-



-FIG. 1-



WITNESSES

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2 SHEETS—SHEET 2.

-FIG. 3.-

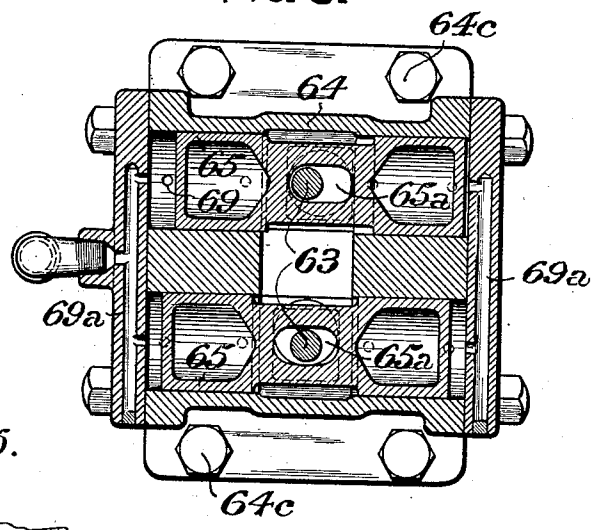
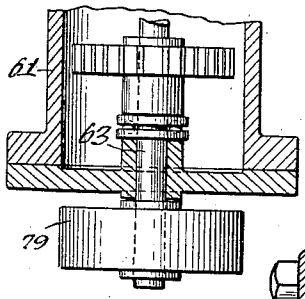
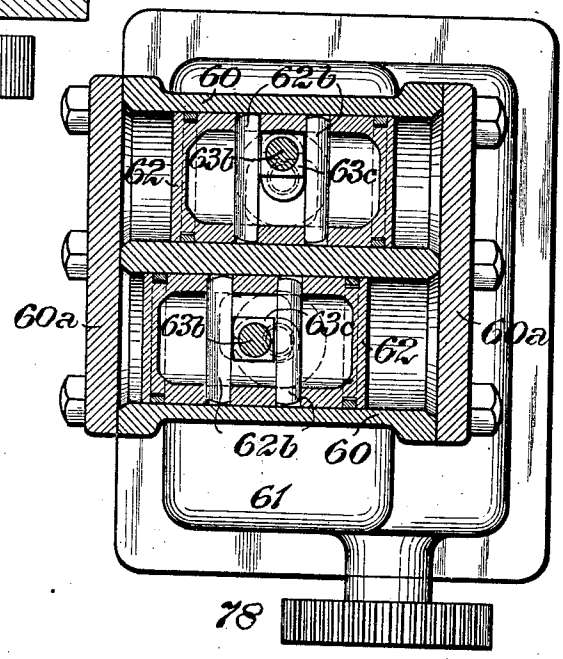


Fig. 5.



-FIG. 4.-



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UNITED STATES PATENT OFFICE.

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FLUID-PRESSURE MOTOR.

1,050,528. Specification of Letters Patent. Patented Jan. 14, 1913.

Application filed July 24, 1912. Serial No. 711,256.

To all whom it may concern:

Be it known that I, ALBERT G. ELVIN, of Somerville, in the county of Somerset and State of New Jersey, have invented a certain new and useful Improvement in Fluid-Pressure Motors, of which improvement the following is a specification.

My invention relates to fluid pressure motors of the reciprocating double acting and direct action class or type, and its object is to provide a motor of such type which shall present the advantages of simplicity, compactness, and economy of construction, and the absence of stuffing boxes and other packed joints, my improvement being more particularly designed for application in connection with locomotive stokers, grate shakers and fire door operating appliances, in which applications the advantages stated are specially desirable.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings: Figure 1 is a vetrical, longitudinal, central section through a motor illustrating an embodiment of my invention; Fig. 2, a vertical transverse section, on the line *a a* of Fig. 1; Figs. 3 and 4, horizontal sections, on the lines *b b* and *c c*, respectively, of Fig. 1; and, Fig. 5, a section through the casing, on the line *a a* of Fig. 1, illustrating a structural modification.

My invention is herein exemplified as applied in a double cylinder motor, this construction being adopted for the purpose of avoiding dead centers and enabling the motor to be started from any position of rest. It will, however, be obvious to those familiar with the construction and operation of steam and other engines, that a single set of motor elements may, if desired, be used, instead of the duplicate sets shown and hereinafter described.

In the practice of my invention, two motor cylinders, 60, located side by side, and as closely together as possible, are cast integral with, and on one side of, a supporting casing, 61, of substantially rectangular transverse section, the side of which farther from the cylinders constitutes the bed plate or base of the motor. The casing, 61, may either be entirely inclosed so as to protect the bearings and gearing therein hereinafter described from the access of dust and other foreign matter, or may be of skeleton form, as preferred. The cylinders, 60, are closed at their ends by removable heads, 60^a, and each of them is fitted with a piston, 62, in which opposite longitudinal slots, 62^a, are formed, through which slots a crank shaft, 63, passes freely. Pairs of transverse pins, 62^b, which are flattened on their adjacent sides, are fitted in the pistons, 62, between the slots, 62^a, each pair being adapted to engage brasses or bearings, 63^c, fitting the crank pin, 63^b, of a double crank, 63^a, on the crank shaft which passes through said slots. The crank shafts, 63, which, through such connection, are rotated directly by the pistons, are mounted in upper bearings, 64^b, in the valve casing hereinafter described, and lower bearings, 61^a, in the casing, 61, and they are also supported on roller bearings, 61^b, in the casing, 61.

The side of the casing, 61, nearer to the cylinders, is finished truly, and a valve casing, 64, is secured thereto by bolts, 64^c. The valve casing is bored out parallel with, and in the axial planes of, the cylinders, to form two valve chests, in each of which a distribution valve, 65, of the inside admission piston type, is fitted to reciprocate, and said chests are closed, at their ends, by removable heads, 64^a. A longitudinal slot, 65^a, through which the adjacent crank shaft, 63, passes freely, is formed in each of the distribution valves, and each of said valves is also centrally recessed, opposite said slot, to engage an actuating cam, 63^b, fixed on the crank shaft.

A supply pipe, 66, leads from any suitable source of fluid pressure supply, to a supply port, 66^a, which opens into each of the valve chests at the middle thereof, and induction ports, 68, lead from the middle portions of the valve chests to the opposite ends of the adjoining cylinders. Exhaust ports, 69, lead from the induction ports, near their outer ends, to the corresponding ends of the valve chests, and supplemental exhaust ports, 69^a, are formed in the heads, 64^a, of the valve chests, said ports communicating one with the other, by a longitudinal port, 70, in the valve casing, and one of the ports, 69^a, communicating with an exhaust pipe, 71, through which, by the reciprocation of the distribution valves, motive fluid is exhausted, in proper relation to the movements of the pistons, from the ends of the valve chests.

Coincident rotation of the two crank shafts, 63, is effected and insured by inter-

meshing spur gears, 72, fixed thereon, and the crank, 63ª, of one of the shafts, is set at right angles to that of the other, thereby preventing dead centers and enabling the motor to be started regardless of the positions of the pistons. A worm, 73, fixed on one of the crank shafts, 63, engages a worm wheel, 74, fixed on a driving shaft, 75, journaled in a bearing, 75ª, in the casing, 61, the shaft, 75, projecting through the casing, and carrying a gear, 78, a driving pulley, or any other suitable known appliance through which a desired driven mechanism may be actuated. The shaft, 75, worm, 73, and worm wheel, 74, may, if preferred, be dispensed with, and driving power be transmitted to the driven mechanism from a gear or pulley, 79, fixed on an extension of one of the crank shafts, 63, as shown in Fig. 5.

In the operation of the motor, the pistons, 62, are reciprocated by fluid under pressure, as steam or compressed air, which is admitted to the cylinders, 60, through the ports, 68, and through their direct connections with the crank shafts, 63, and the gearing together thereof, the crank shafts are simultaneously rotated. The distribution valves, 65, are reciprocated by the cams, 63ᵇ, each of which is set substantially at a right angle to the crank of the shaft on which it is fixed, and in their movements, admit motive fluid to, and exhaust it from, the opposite ends of the cylinders, in proper sequence to effect the rotation of the crank shafts.

The leading and characteristic features of the improvement herein set forth are described and shown, but not claimed, in a separate application Ser. No. 711,255, filed by me of even date herewith, in which it is exemplified as applied in connection with a door operating mechanism.

It will be observed that the motor is of extremely simple and compact construction; that piston and valve rods are wholly dispensed with, and that no stuffing boxes or other packing joints in the cylinders, valve chests, or motor casing, are used or are required.

I claim as my invention and desire to secure by Letters Patent:

1. In a fluid pressure motor, the combination of a supporting casing having a bed plate on one side, a motor cylinder integral therewith and disposed substantially parallel with the bed plate, a valve casing connected to said cylinder and communicating by ports therewith, a crank shaft passing through the cylinder and valve chest, an integral piston fitting the cylinder and slotted longitudinally to traverse clear of the crank shaft, coupling means connecting said piston with a crank pin on said shaft, a distribution valve fitted to reciprocate in the valve casing and control the cylinder ports, a cam on the crank shaft engaging said distribution valve, a driving shaft journaled in the casing between the bed plate and cylinder, and gearing inclosed within the casing and connecting said driving shaft with the crank shaft.

2. In a fluid pressure motor, the combination of a supporting casing, a pair of cylinders located side by side on said casing, a valve casing fixed to the supporting casing and constituting a pair of valve chests, each located parallel with one of the cylinders and in an axial plane thereof and communicating by ports therewith, two crank shafts, each passing through a cylinder and its valve chest, the cranks of said shafts being set at a right angle one to the other, gearing connecting said crank shafts, pistons fitting the cylinders and slotted longitudinally to traverse clear of the crank shafts, coupling means connecting said pistons with crank pins on the crank shafts, distribution valves fitted to reciprocate in the valve casings and control the cylinder ports, and slotted longitudinally to traverse clear of the crank shafts, and cams on the crank shafts engaging said distribution valves.

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Witnesses:
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