No. 765,100. PATENTED JULY 12, 1904.

W. H. ROES.

TOOL MOTOR.

APPLICATION FILED OCT. 12, 1903.

NO MODEL. 2 SHEETS—SHEET 1

Fig. 1.

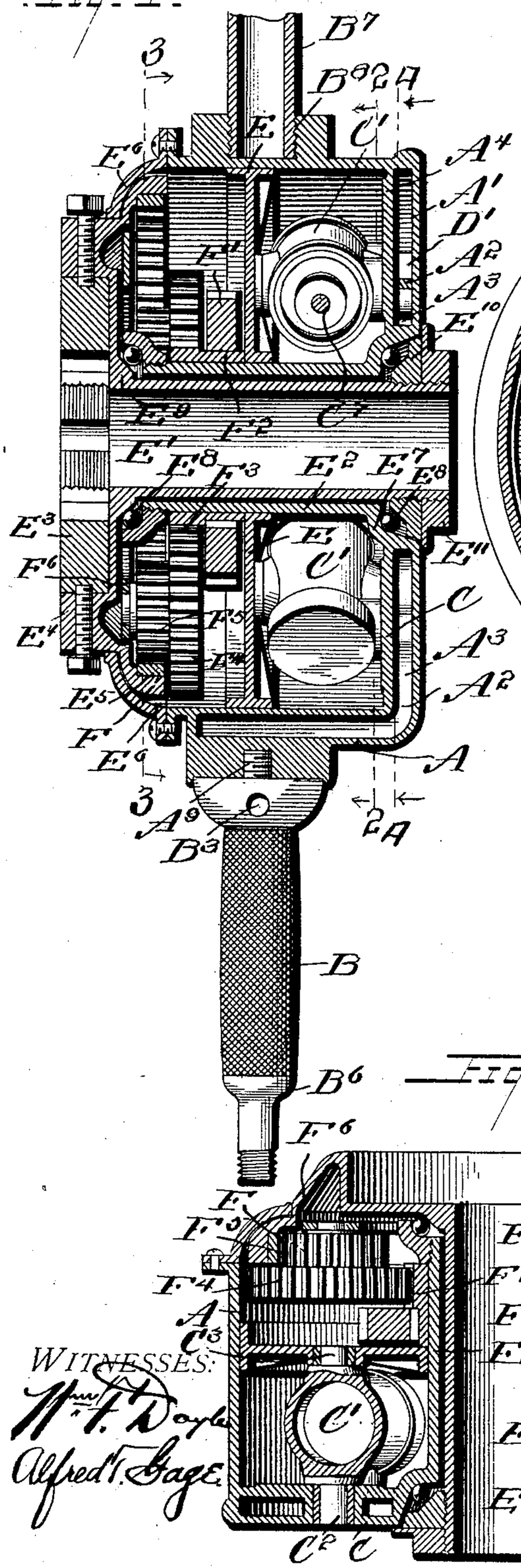

Fig. 2.

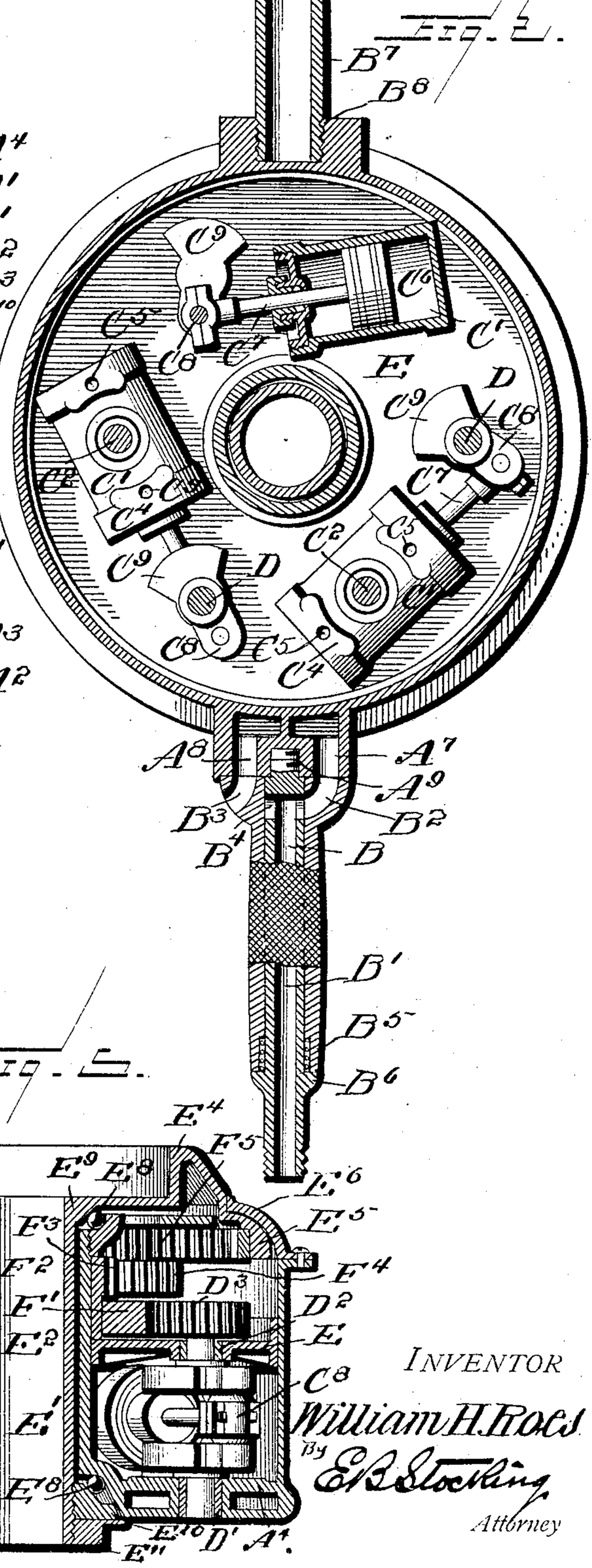

Fig. 5.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 4.

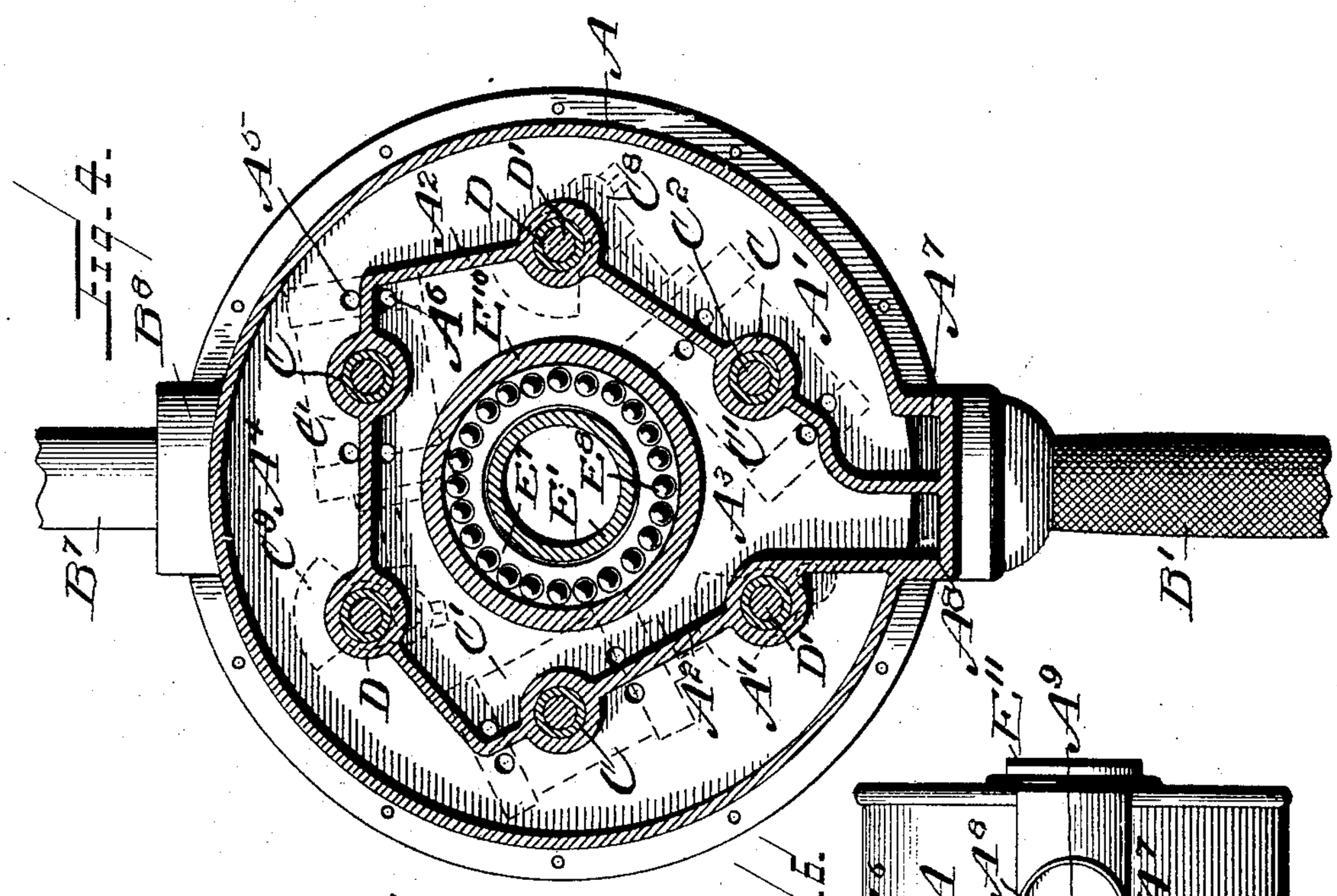

Fig. 5.

Fig. 7.

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No. 765,100. Patented July 12, 1904.

UNITED STATES PATENT OFFICE.

WILLIAM H. ROES, OF PHILADELPHIA, PENNSYLVANIA.

TOOL-MOTOR.

SPECIFICATION forming part of Letters Patent No. 765,100, dated July 12, 1904.

Application filed October 12, 1903. Serial No. 176,717. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. ROES, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Tool-Motors, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to a tool-motor, and particularly to a portable device adapted to operate a rotatable tool-holder by compressed air, steam, or other suitable motive agent.

The invention has for an object to provide a casing containing a motor and rotatable tool-holder geared to said motor to be driven thereby through the medium of the motive agent introduced into the casing through suitable conducting-pipes.

A further object of the invention is to provide an improved form of gearing to properly convey the power from the motor or engine to the tool-holder and adapted to effect the proper reduction of speed and increase of power in the movement of the parts.

A further object of the invention is to provide an improved form of oscillating motor adapted to coöperate with inlet and exhaust chambers in the casing and mounted with ports adapted to coöperate with said chambers in the oscillation of the cylinder of the motor.

Other and further objects and advantages of the invention will be hereinafter set forth, and the novel features thereof defined by the appended claims.

In the drawings, Figure 1 is a central longitudinal section through the invention. Fig. 2 is a section on the line 2 2 of Fig. 1. Fig. 3 is a section on the line 3 3 of Fig. 1. Fig. 4 is a section on the line 4 4 of Fig. 1, showing the cylinders by dotted lines. Fig. 5 is a central cross-section at a right angle to Fig. 1, and Fig. 6 is a side elevation of the casing.

Like letters of reference refer to like parts in the several figures of the drawings.

The letter A designates the casing, which may be of any desired construction, but is preferably formed, as herein shown, with an outer chamber A' at one side thereof divided by a transverse partition A^2 to form an inner chamber A^3 at the opposite side of the partition. (See Fig. 4.) These chambers are separated from the remainder of the casing by a partition-plate A^4, through which ports or apertures A^5 extend from the outer chamber and A^6 from the inner chamber. The air, steam, or other motive agent used is introduced through either of the connections A^7 or A^8, while the exhaust escapes from the opposite connection. Proper pipe connections may be made at these points by any desired means—for instance, as herein shown, a feed-pipe B may be used having a handhold B' pivoted thereon—this pipe being connected by a threaded socket A^9 intermediate of the connections A^7 and A^8 and provided with an inlet-port B^2 and exhaust-port B^3, adapted to be turned upon the feed-pipe B as a pivot and thus register with either of the connections A^7 or A^8. The feed-pipe is provided with a discharge-port B^4 at its inner end, while the handhold B' is provided at its outer end with a socket containing a spring B^5, bearing against a shoulder B^6 on the inlet-pipe and adapted to hold the ports B^2 and B^3 in contact with the casing. At the opposite sides of the casing from the inlet-pipe a suitable handle B^7 may be provided and secured by threading it into a lug B^8.

The partition A^2, Fig. 4, is provided with a series of bearings B, disposed at proper points and extending through the partition A^4 to support the cylinders C', disposed between the partition A^4 and the partition E. These cylinders are provided intermediate of their ends with a journal or pivot-pin C^2, disposed at one end in the bearing C and at its opposite end in a similar bearing C^3, carried by the partition E, thus mounting the cylinders of the motors for oscillation. The opposite ends of each of these cylinders are provided with a bearing-face C^4, adapted to travel in contact with the face of the partition A^4 and provided with a port C^5 to alternately register with the ports A^5 and A^6 upon opposite sides of the partition A^2 in the oscillation of the cylinder, so that the piston C^6 within the cylinder will be thus alternately driven by direct pressure in opposite directions. These pistons are provided with any ordinary construction of piston-rods C^7, operatively con-

nected to the crank-arm C^8, secured upon the shaft or bearing-point D, said arm being provided with a counterbalance-weight C^9, as usual in this art. The shafts or bearing-points D are suitably mounted at one end in bearing-boxes D′, carried in the partition A^4, and at their opposite ends in similar boxes D^2, carried by the partition E, one end of said shafts being provided beyond the partition with a driving-pinion D^3.

Any preferred form of tool-holder may be used in connection with this invention; but as illustrating a desirable construction thereof a tubular holder E′ is herein shown adapted to fit within the sleeve or collar E^2, forming part of the casing and which is supported and braced by the partition E, surrounding the same, and which partition separates the motors from the driving-gear for the tool-holder. This holder is provided at its outer end with any character of tool—for instance, cutting-dies E^3, as shown, which may be supported within the carrying-frame E^4. This frame is also provided with an annular portion E^5, extending within the casing and there provided with a driving-gear or rack-teeth F, while the portion E^5 is retained in position by means of an annular plate E^6, suitably secured to the face of the casing. At the opposite ends of the sleeve or collar E^2 bearing seats or faces E^7 are provided, upon which bearing-balls E^8 are located and adapted at one end to contact with a cone E^9, carried by the tubular tool-holder, and at the opposite end with an adjustable cone E^{10}, threaded upon the free end of the holder and adapted to be secured in its adjusted position by a lock-nut E^{11}, thus providing a ball-bearing for the rotation of the holder to prevent friction thereof.

For the purpose of communicating power from the motor to the tool-holder any desired construction of gearing may be provided, and a preferable form thereof is herein illustrated, which comprises a pinion F′, mounted upon a rotatable sleeve F^2, which is fitted to the exterior of the casing sleeve or collar E^2 and moves freely thereon. The pinion F′ is keyed to the lower portion of this rotatable sleeve, while the upper portion thereof is provided with gear-teeth F^3, adapted to mesh with a gear F^4, which is mounted in the annular frame F^6 to rotate therein. Secured to the gear F^4, or to the shaft thereof, is a pinion F^5, meshing with the rack-teeth F, carried by the tool-holder. By reference to Fig. 3 it will be seen that the series of gears D^3, F^4, and F^5 are provided one for each of the motors and suitably disposed at an angle to each other.

In the operation of the invention the air, steam, or other motive agent entering one of the chambers A′ or A^3 passes through the ports therein into each of the motor-cylinders, thereby actuating the piston thereof, which in the movement of the crank-shaft oscillates the cylinder upon its pivot, so as to bring the inlet-port at the previously-charged end opposite the exhaust-chamber and the former exhaust-port into communication with the pressure-chamber. The structure whereby a single port at each end of the cylinder coöperates with the ports for each of the chambers permits this automatic reversal of the inlet and exhaust to the cylinders without the use of any further valve mechanism, as the throw of the crank-shaft oscillates the cylinder sufficiently for this purpose. The power derived from the shaft of each of the cylinders is transmitted through the gear carried thereby to the gear and pinion carried upon the rotatable collar or sleeve mounted on the fixed portion of the casing, and from this the power is again transmitted to the series of gears meshing with the rotatable collar and through the pinions carried thereby to the annular rack or gear secured to the inner face of the tool-holder, which is thus rotatable in either direction. When it is desired to change the direction of movement, it is only necessary to reverse the inlet and exhaust ports of the handhold, which can be accomplished by rotating the same upon its pivotal support.

It will thus be seen that the devices necessary for producing a tool-motor adapted to rotate any character of tool may all be contained within a casing of comparatively small size and adapted for operation by any desired motive agent, while the power being applied from a series of points at an angle to each other secures a smooth and even rotation of the holder, which cannot be secured in the application of the power at a single point.

It will be obvious that the character of the motor, the gear used therewith, and the tool-holder driven thereby may be altered, as well as other changes made in the details of construction and configuration without departing from the spirit of the invention as defined by the appended claims.

Having described my invention and set forth its merits, what I claim, and desire to secure by Letters Patent, is—

1. In a tool-motor, a casing, a centrally-disposed rotatable tool-holder mounted therein, a plurality of motor-cylinders contained within said casing concentric to the axis of said holder, and gearing from each of said motors to said holder.

2. In a tool-motor, a rotatable tool-holder, a motor-cylinder contained within a casing supporting the holder, a gearing from said motor to said holder, inlet and exhaust chambers carried by the casing parallel to the cylinder to communicate with the motor, and separated by a partition surrounding the holder and means for oscillating the motor-cylinder relative to the ports in said casing.

3. In a tool-motor, a casing having supply and exhaust chambers and a motor-chamber disposed parallel to each other and separated

by a ported wall, a rotatable tool-holder extending through said casing and provided with a driving-rack, a plurality of motor-cylinders disposed within the motor-chamber concentric to the axis of said holder, independent gears from each of said motors geared to drive said rack, and means actuated by the motor-cylinders for controlling the supply and exhaust thereto.

4. In a tool-motor, a casing, a cylinder pivotally mounted therein and provided with ports at opposite ends, inlet and exhaust chambers adapted to communicate with said ports, a piston disposed in said cylinder, a shaft communicating with said piston by a crank-arm, a driving-gear carried by said shaft, a tool-holder mounted to be driven from said gear, an annular rack carried by said tool-holder, a rotatable sleeve mounted on the casing and provided with a gear meshing with the gear upon the crank-shaft, and an intermediate gear meshing with a gear upon the rotatable sleeve and annular rack.

5. In a tool-motor, a casing, a cylinder pivotally mounted therein and provided with ports at opposite ends, inlet and exhaust chambers adapted to communicate with said ports, a piston disposed in said cylinder, a shaft communicating with said piston by a crank-arm, a driving-gear carried by said shaft, a tool-holder mounted to be driven from said gear, an annular rack carried by said tool-holder, a rotatable sleeve mounted on the casing and provided with a gear meshing with the gear upon the crank-shaft, an intermediate gear meshing with a gear upon the rotatable sleeve and annular rack, and an annular frame within which said last-mentioned gears are pivotally supported.

6. In a tool-motor, a tool-holder, a casing provided at one side with inlet and exhaust chambers separated from each other by a lateral partition surrounding said holder and provided with ports upon opposite sides of said partition, a motor-cylinder pivotally mounted between its ends in contact with the ported wall of said chambers and provided with ports at its opposite ends, a piston within said cylinder, gearing from said piston to the tool-holder, and means for oscillating said cylinder.

7. In a tool-motor, a tool-holder, a casing provided at one side with inlet and exhaust chambers separated from each other by a lateral partition surrounding said holder and provided with ports upon opposite sides of said partition, a motor-cylinder pivotally mounted between its ends in contact with the ported wall of said chambers and provided with ports at its opposite ends, a piston within said cylinder, a driven shaft provided with a crank-arm and counterbalance, a partition at the opposite side of said cylinder from the inlet and exhaust chambers, a bearing for said cylinder and driven shaft in said partition, a driving-gear upon said driven shaft at the opposite side of the partition from the cylinder and gearing from said driven shaft to the tool-holder.

8. In a tool-motor, a casing provided at one side with inlet and exhaust chambers separated from each other by a lateral partition and provided with ports upon opposite sides of said partition, a motor-cylinder pivotally mounted between its ends in contact with the ported walls of said chambers and provided with ports at its opposite ends, a piston within said cylinder, a driven shaft provided with a crank-arm and counterbalance, a partition at the opposite side of said cylinder from the inlet and exhaust chambers, a bearing for said cylinder and driven shaft in said partition, a driving-gear upon said driven shaft at the opposite side of the partition from the cylinder, a central sleeve or collar carried by said casing, a rotatable sleeve mounted upon the casing-sleeve and provided with a gear meshing with the motor-gear, and a tool-holder adapted to be driven from said gears.

9. In a tool-motor, a casing provided at one side with inlet and exhaust chambers separated from each other by a lateral partition and provided with ports upon opposite sides of said partition, a motor-cylinder pivotally mounted between its ends in contact with the ported walls of said chambers and provided with ports at its opposite ends, a piston within said cylinder, a driven shaft provided with a crank-arm and counterbalance, a partition at the opposite side of said cylinder from the inlet and exhaust chambers, a bearing for said cylinder and driven shaft in said partition, a driving-gear upon said driven shaft at the opposite side of the partition from the cylinder, a central sleeve or collar carried by said casing, a rotatable sleeve mounted upon the casing-sleeve and provided with a gear meshing with the motor-gear, a tool-holder adapted to be driven from said gears, a tubular shaft from said tool-holder, and ball-bearings for said shaft provided at the opposite ends of the casing.

10. In a tool-motor, a casing provided at one side with inlet and exhaust chambers separated from each other by a lateral partition, a motor-cylinder pivotally mounted between its ends in contact with the ported walls of said chambers and provided with ports at its opposite ends, a piston within said cylinder, a driven shaft provided with a crank-arm and counterbalance, a partition at the opposite side of said cylinder from the inlet and exhaust chambers, a bearing for said cylinder and driven shaft in said partition, a driving-gear upon said shaft at the opposite side of the partition from the cylinder, a central sleeve or collar carried by said casing, a rotatable sleeve mounted upon the casing-sleeve and provided with a gear meshing with the motor-gear, a tool-holder adapted to be driven from

said gears, a tubular shaft from said tool-holder, ball-bearings for said shaft provided at the opposite ends of the casing, a depending flange upon said tool-holder provided with an annular driving-gear, and a plate secured to the casing and overlapping said flange to protect and retain the holder in position.

11. In a tool-motor, a casing having a central sleeve or collar and open at one side, inlet and exhaust chambers at the opposite side of said casing, a tool-holder provided with a driving-rack disposed at the open side of the casing and provided with a tubular stem extending through the casing-sleeve, a series of motors disposed within said casing, and gearing between said motors and the rack upon said tool-holder.

12. In a tool-motor, a casing having a central sleeve or collar and open at one side, inlet and exhaust chambers at the opposite side of said casing, a tool-holder provided with a driving-rack disposed at the open side of the casing and provided with a tubular stem extending through the casing-sleeve, a series of motors disposed within said casing, gearing between said motors and the rack upon said tool-holder, an inlet-pipe provided with a rotatable port having inlet and exhaust ports therein adapted to be rotated relative to the fixed passages leading to the inlet and exhaust chambers of the casing.

13. In a tool-motor, a casing provided with a substantially central partition to form a motor-chamber and a central sleeve extending therethrough, a tool-holder mounted to close one side of the casing and provided with a tubular portion extending through said sleeve, a motor having communicating supply and exhaust chambers within said casing, and a train of gearing disposed between the motor and the tool-holder.

14. In a tool-motor, a casing provided with a substantially central partition to form a motor-chamber and a central sleeve extending therethrough, a tool-holder mounted to close one side of the casing and provided with a tubular portion extending through said sleeve, a motor having communicating supply and exhaust chambers within said casing, a train of gearing disposed between the motor and the tool-holder, and a tool-retaining device carried by one face of said holder.

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

WILLIAM H. ROES.

Witnesses:

FRANKLIN B. BROWN,

JOHN R. WEAVER.