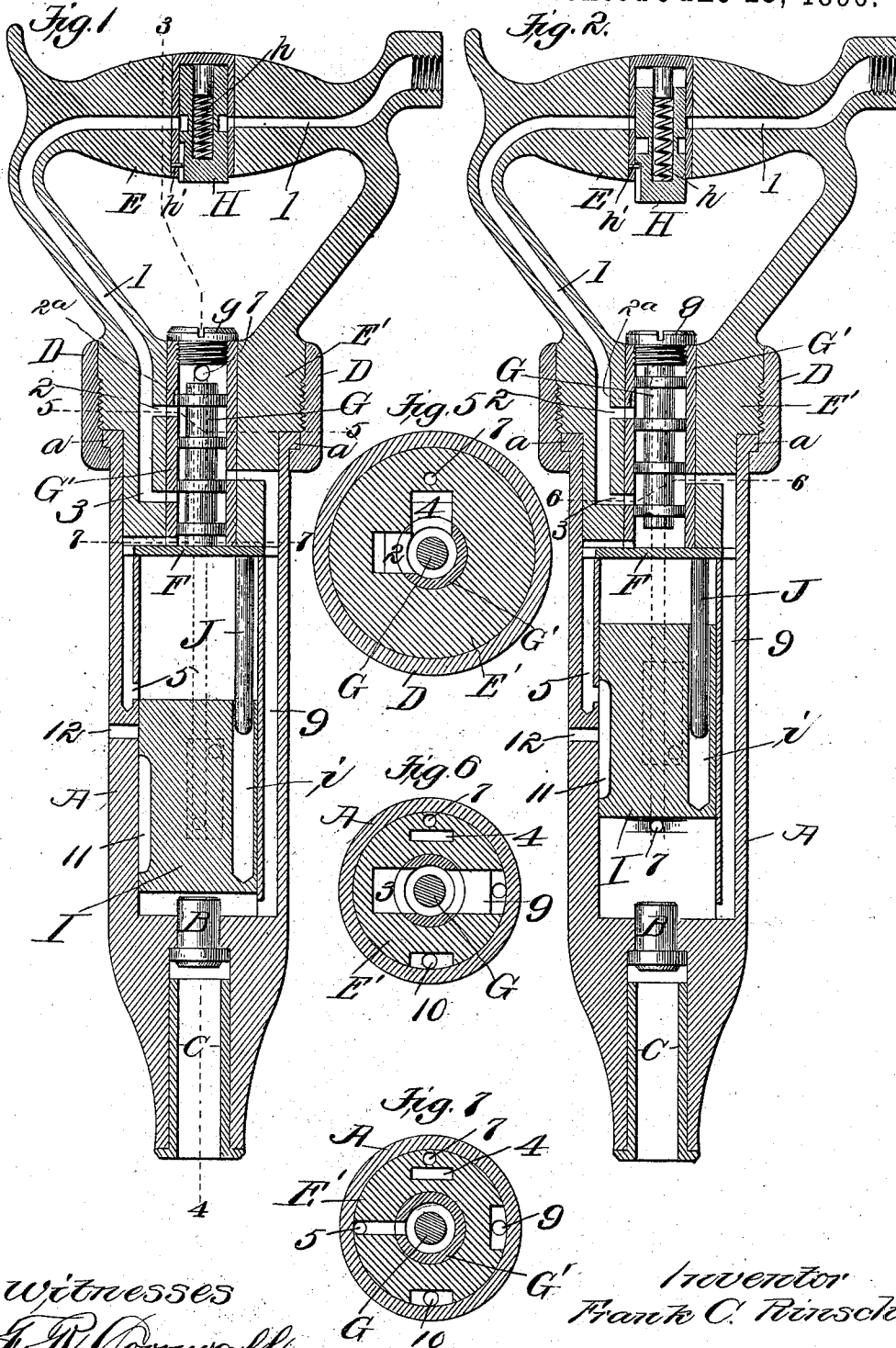


F. C. RINSCHÉ.
ENGINE.

No. 562,423.

Patented June 23, 1896.



Witnesses
J. R. Cornwall
Hugh N. Wagner

Inventor
Frank C. Rinsché
by Paul Bakewell
his atty

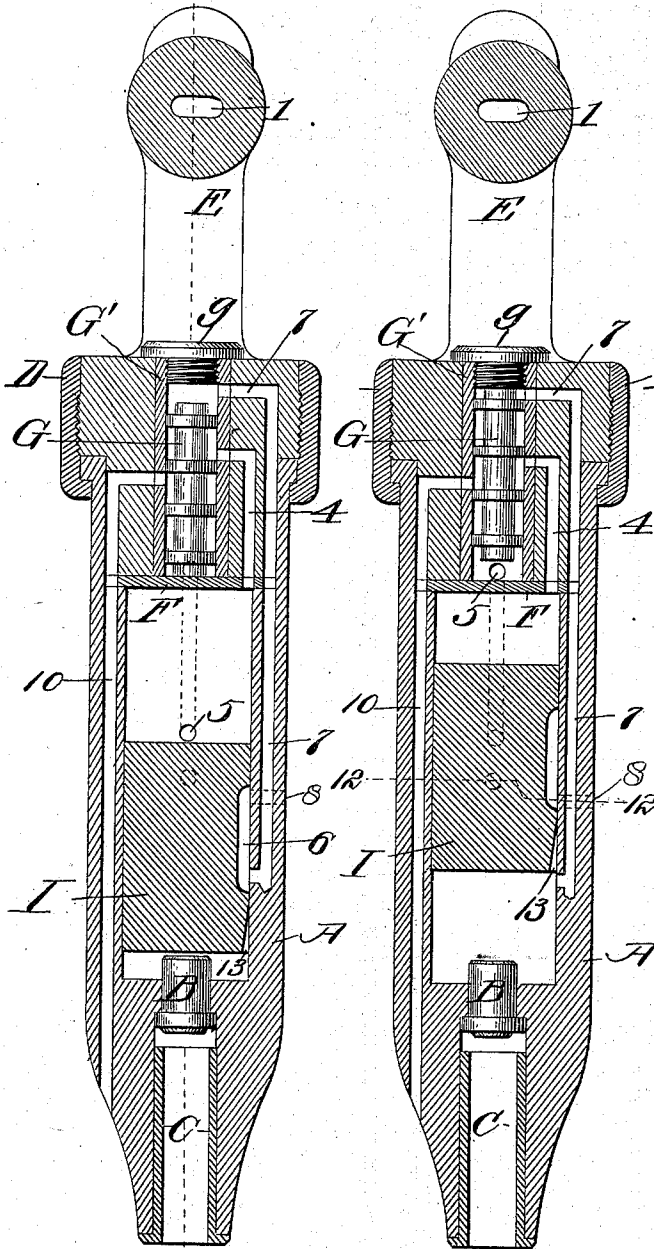
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Fig. 3.

Fig. 4.



Witnesses
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Fig. 8.

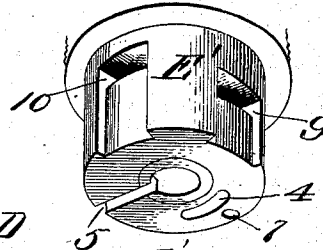


Fig. 9.

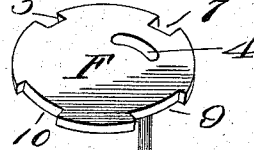


Fig. 10.

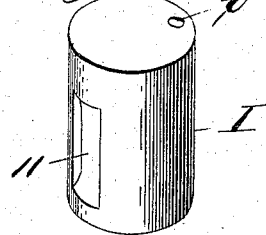
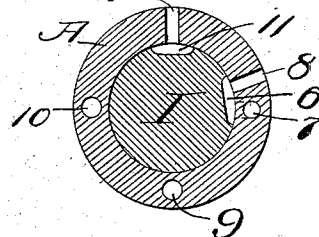


Fig. 11.



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UNITED STATES PATENT OFFICE.

FRANK C. RINSCHÉ, OF ST. LOUIS, MISSOURI, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE CHOUTEAU MANUFACTURING COMPANY, OF MISSOURI.

ENGINE.

SPECIFICATION forming part of Letters Patent No. 562,423, dated June 23, 1896.

Application filed September 10, 1894. Serial No. 522,590. (No model.)

To all whom it may concern:

Be it known that I, FRANK C. RINSCHÉ, a citizen of the United States, residing at the city of St. Louis, State of Missouri, have invented a certain new and useful Improvement in Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, wherein—

Figure 1 is a longitudinal vertical section taken on the line *u u*, Fig. 3. Fig. 2 is a similar view showing the parts in a different position. Fig. 3 is a vertical section taken on line *v v*, Fig. 1. Fig. 4 is a similar view showing the parts in a different position. Fig. 5 is a cross-sectional view on line *w w*, Fig. 1. Fig. 6 is a cross-sectional view on line *x x*, Fig. 2. Fig. 7 is a cross-sectional view on line *y y*, Fig. 1. Fig. 8 is a detailed view of the valve-casing or lower end of the handle. Fig. 9 is a detailed view of the piston-guide. Fig. 10 is a detailed view of the piston, and Fig. 11 is a cross-sectional view on line *z z*, Fig. 4.

This invention relates to a new and useful improvement in engines which are adapted to be run by compressed air as a motive fluid, said engines being sometimes known as "pneumatic tools" of that class in which a tool in the form of a chisel, or other implement of like nature, is introduced into the end to be acted upon by a piston which delivers an impacting blow thereupon.

The essential features of this invention reside in the construction and location of the controlling-valve, and the arrangement of the ports which are controlled by said valve.

Other features reside in the construction of the piston and the interposed hammer-head upon which it delivers its blow, which transmits the force of the blow to the tool; and, finally, the construction, arrangement, and combination of the several parts comprising my improved engine, all as will hereinafter be described and afterward pointed out in the claims.

In the drawings, A indicates a cylinder, the lower end of which is formed with a tool-opening of different diameters, in the smaller of which operates a transmitting hammer-head B, projecting up into the bore. The lower end of this hammer-head is formed with an

enlargement or head which fits into the larger bore of the tool-opening, and in the end of the larger bore of the tool-opening is fitted a sleeve or bushing C, which serves as a wear-surface for the reciprocating tool, at the same time holding the hammer-head in position, thereby preventing a displacement.

The upper end of the cylinder is formed with a peripheral flange *a*, under which fits an inturned flange of a sleeve or collar D, said collar being interiorly screw-threaded to receive the base of the handle or head-block, which it holds in position.

E indicates the handle, which is formed with a head-block, or head E', which fits against the outer or rear face of a plate or block F, the inner or front face of said block forming one end of the piston-chamber. This block also forms a wall for the valve-chamber in which valve G operates, and said block is formed with passages registering with the inlet and exhaust ports of the head-block E'. Mounted in the head E' is a valve G, which fits within a suitable casing in the form of a bushing G', the valve-opening being closed at its bottom by the plate F and at its top by a suitable plug *g*. This bushing is made so as to closely fit in the head E, but, at the same time, is susceptible of being forced out, should it become worn, thus causing the valve to leak, and a new bushing substituted. The handle E is formed with a threaded boss, by which connection may be made with a supply-pipe leading from some suitable source of supply to the inlet-port 1, which is formed through the handle.

Located in the handle, so as to be convenient to the operator in the manipulation of the tool, is a throttle-valve H, which is seated in an inverted thimble-like shell or casing into which the port, or pressure-supply duct, 1 leads. This throttle-valve is preferably of spool form, and has a projection extending outside the recess, at one end, and in position to be pressed by the hand of the operator. A spring *h* exerts a tendency to always force the valve outwardly and close port 1. A pin *h'*, operating in a groove in the periphery of the spool, serves to limit its downward or outward movement. To open the inlet-port 1, it is only necessary to force the throttle-valve in-

wardly, when its annular recess will register with said port, as shown in Fig. 1. To close port 1, it is only necessary to relieve the valve from its outer pressure, when the spring *h* will cause it to assume the position shown in Fig. 2. Port 1 leads into the valve-opening at points 2 and 3, and, when the valve is in its lowest position, as shown in Figs. 1 and 3, will pass from port 2 beneath the upper head of the valve into port 4, thence down on top of the piston I. After forcing the piston down until it has nearly reached the limit of its stroke, the piston will unclose a port 5, which leads into the valve-opening beneath its lowest head, which will cause said valve to be thrown up to a position as shown in Figs. 2 and 4. At the same time, the space above the upper head of the valve is being exhausted by the connection made by a port 6 in the form of a longitudinal groove, connecting a port 7, leading from the top of the valve and opening into the cylinder-bore, with the port 8 leading to the exterior. When the valve is in this elevated position, port 2 is closed, and port 3 is open to permit the motive fluid to pass between the third and fourth heads on the valve into port 9, which leads to the bottom of the bore of the cylinder beneath the piston, causing said piston to rise. The space above the piston is now exhausted by the fluid contained therein passing back through port 4 between the second and third heads on the valve, and into port 10, which leads to the exterior.

When the piston is nearing the completion of its upward stroke, a longitudinal connecting-port 11 connects the port 5 with a cross-port 12, leading to the exterior, and causes the pressure to be exhausted from beneath the valve. At the same time the piston will unclose port 7, leading to the space above the valve, which will cause said valve to be thrown to its lowest position. In line with the opening of port 7 into the bore of the cylinder, I preferably form on the lower edge of the piston a way 13, which gradually uncloses the opening port 7 on the upstroke of the piston, so that the pressure introduced on top of the valve through said port will be gradual and will throw the valve without shock or jar. This throwing of the valve to its lowest position, when the piston is nearing the completion of its upstroke, causes the direction of travel of the piston to be reversed and it now commences its downward stroke. To exhaust the pressure from the space below the piston, when the piston begins its downward stroke, port 9, leading from the lower end of the bore into the valve-chamber between the second and third head, will communicate with exhaust-port 10.

In order to insure registration between the longitudinal grooves 6 and 12 and their respective ports, I extend from the plate or block F a guide J, which is received into an opening *i* in the piston, thus causing the

piston to travel its stroke without rotary movement.

In the valve-bushing G', I form at 2^a a lead-passage from the port 2, which extends above the upper head of the valve, when the valve is in its lowest position, as shown in Fig. 1. The function of this passage is to permit the live fluid to pass above the valve when the same is in its lowest position, and blow through port 7, which is an exhaust-port in this instance. Live fluid in blowing through above the valve will prevent the same from floating, and also prevent the valve from throbbling when it is forced down.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an engine, the combination with the cylinder having a tool-opening in its end of different diameters, of a hammer-head loosely operating in said opening, and a bushing or sleeve fitting in said opening to prevent displacement of the hammer-head, substantially as described.

2. In an engine, the combination with a cylinder, of a handle secured thereto, a head formed on the base of the handle, a controlling-valve for the piston located in the head, and a throttle-valve located in the handle for controlling the passage of the inflowing motive fluid, substantially as described.

3. In an engine, the combination with a handle formed with an inlet-port for the engine running lengthwise the handle, of a throttle-valve located in said handle and across the inlet-port, said throttle-valve comprising a thimble-shaped casing or shell, a spool-valve operating within said shell, a spring for forcing the spool-valve outwardly, and means for limiting the outward movement of the spool-valve, substantially as described.

4. In an engine, the combination with a cylinder, of a handle which is formed with a head fitting into said cylinder, a bushing or sleeve fitted in said head, a controlling-valve for the piston, formed with four heads, fitting in said bushing, ports leading to and from the valve-opening in the bushing, and a throttle-valve which is located in the handle across the inlet-port, which inlet-port passes through the handle, substantially as described.

5. In an engine, the combination with a cylinder, of a piston therein, a handle for said cylinder, a head on said handle which projects into the cylinder-bore, a controlling-valve for the piston located in said head, and a plate or block which is clamped in position by the head, said plate or block forming an end wall for the valve-chamber in the head, substantially as described.

6. In an engine, the combination with the cylinder having a shoulder in its bore, of a piston in said cylinder, a plate or block, forming a cylinder-head, which abuts against said shoulder, a handle which is formed with a

head contacting with the plate or block to hold the same in position, means for securing the handle to the cylinder, and a controlling-valve for the piston which is located in the handle-head, substantially as described.

7. In an engine, the combination with the cylinder and piston having suitable ports arranged therein, of a handle which is secured to the cylinder, a head on the handle which projects into the cylinder-bore, said head being provided with suitable ports which register with ports in the cylinder, and a controlling-valve which operates in said head, said controlling-valve controlling the movement of the piston, and said piston in turn controlling the movement of said valve, substantially as described.

8. In an engine, the combination with a controlling-valve of spool form having four heads, inlet-ports 2 and 3, which are located between the points of travel of the first and fourth heads, a port 4, which is controlled by the first three heads, an exhaust-port 10, which is controlled by the second and third heads, port 9, leading to the space below the piston, controlled by the second, third, and fourth heads, and ports 5 and 7, which are controlled by the piston to admit and exhaust the motive fluid which throws the valve, substantially as described.

9. In an engine, the combination with the controlling-valve, of an inlet-port for the piston, and a lead-passage extending from said inlet-port to a point above the valve, which passage permits the live fluid to blow through the space above the valve to prevent the same from floating or throbbing, substantially as described.

10. In an engine, the combination with the controlling-valve, of an inlet-port which is controlled by said valve, a lead-passage extending from said inlet-port to a point above the valve, and an admission and exhaust port for the valve through which the live fluid blows when the valve is in certain of its positions, substantially as described.

11. In an engine, the combination with the cylinder, of a valve for controlling the movement of the piston, said valve being mounted in the upper end of the cylinder, ports 5 and 7 which lead from the bore of the cylinder to the ends of the valve, for operating said valve, exhaust-ports 8 and 12 which lead from the cylinder to exhaust the pressure from the ends of the valve, a piston formed with ways 6 and 11 for controlling said valve-ports, and means for guiding said piston to maintain alinement of the ways 6 and 11 with the ports which they respectively control, substantially as described.

12. In an engine, the combination with the cylinder formed with inlet and exhaust ports for the motive fluid, of a piston operatively mounted therein, said piston being formed with ports which coöperate with some of the ports in the cylinder, and a guide-opening, a plate mounted in the bore of the cylinder

forming a cylinder-head, and a guide-pin, which projects from said plate into the guide-way in the piston, for guiding the same in its stroke to prevent rotary movement, substantially as described.

13. In an engine, the combination with the cylinder, of a piston mounted therein, a controlling-valve for said piston, a port which extends from the bore of the cylinder to the end of the valve for throwing the same, said port being controlled by the piston, which piston is provided with a way which gradually opens said port, admitting a gradually-increasing pressure to throw said valve, when the piston is moving in one direction, whereby the valve is actuated without shock or jar, substantially as described.

14. In an engine, the combination with the cylinder, of a piston mounted therein, a valve for controlling inlet-ports 2 and 3, whereby the movement of the piston is controlled through inlet-ports 4 and 9 which lead from the valve-chamber to each end of the cylinder, and exhaust-ports 4 and 10 and 9 and 10, leading from each end of the cylinder to the exterior; ports 5 and 7 which lead from the bore of the cylinder to each end of the valve for throwing the same, exhaust-ports 8 and 12 which lead from the bore of the cylinder to the exterior, which exhaust the pressure from above and below the valve by the movement of the piston; a way 13 on the piston which gradually admits pressure to one end of the valve through port 7, and a lead 2^a which extends from inlet-port 2 to one end of the valve, which lead permits the live fluid to blow through the space above the valve when the pressure is being exhausted back through port 7, substantially as described.

15. In an engine, the combination with a handle which is formed with an inlet-port, of a throttle-valve for controlling said inlet-port, said throttle-valve being located in the hand-grasp of the handle and projecting from the inside of the hand-grasp, substantially as described.

16. In an engine, the combination with a handle which is formed with an inlet-port for the motive fluid running its entire length, of a throttle-valve located in the length of said inlet-port, said throttle-valve being adapted to move across the inlet-port to control the passage of the motive fluid through the handle, and a spring for normally holding the throttle-valve in such position, across the inlet-port, that the motive fluid is choked off; substantially as described.

17. In an engine, the combination with the handle through which the motive fluid passes under pressure, and a throttle-valve located in the hand-grasp of the handle for choking the passage of the motive fluid, said throttle-valve being arranged across the inlet-port, and projecting from the inside of the hand-grasp; substantially as described.

18. In an engine, the combination with a handle, through which the motive fluid passes

under pressure, and a throttle-valve which projects inwardly from the hand-grasp, for controlling the passage of the motive fluid through the handle, substantially as described.

19. In an engine, the combination with the cylinder formed with a piston-chamber, a plate or block forming the end of the chamber, a head fitting against the plate and containing the valve-chamber, of which the plate forms one side, and a coupling collar or sleeve for connecting the head to the engine-cylinder; substantially as described.

20. In an engine, the combination with the cylinder formed with a piston-chamber, of a plate or block forming the end of the piston-chamber, a head formed with a valve-chamber and inlet and exhaust ports, said head fitting against the plate, which plate forms a wall for the valve-chamber, and a separate coupling sleeve or collar which connects the head to the cylinder; substantially as described.

21. In an engine, the combination with the cylinder formed with a piston-chamber, and having a peripheral flange at its rear end, of a plate or block forming the rear end of the chamber, an externally-threaded head fitting against the rear face of the block or plate, and the coupling sleeve or collar which is screwed upon the head, and which has at its front end an internal flange engaging the flange upon the rear end of the cylinder, thus causing the head to bind the block or plate against which it fits therebetween and the cylinder; substantially as described.

22. In an engine, the combination with the cylinder which is formed with a piston-chamber, and which has a flange at its rear end, of a block or plate which forms one end of the piston-chamber, said block having inlet and exhaust ports communicating with the piston-chamber, a head fitting against the rear side of the block, which head is formed with a valve-chamber, the block forming one of the walls of said chamber, said head being also formed with inlet and exhaust passages which register with similar passages in the block, a reciprocating valve in the valve-chamber operating to intermittently open and close the inlet and exhaust ports, and a coupling sleeve or collar which engages the flange on the cylinder at its front end, and is screwed at its rear end upon the head; substantially as described.

23. In a pneumatic tool, the combination with the tool proper, of a grasping-handle secured thereto and having the pressure-supply duct extending through it, a throttle-valve arranged in a recess for controlling said duct, a spring arranged in the handle for normally closing the valve, and a projection extending from the valve outside the recess at one end and in position to be pressed by the hand of the operator; substantially as described.

24. In a pneumatic tool, the combination

with the cylinder formed with a piston-chamber, a plate or block which forms one end of the chamber, a head fitting against the rear face of the block, a handle formed integral with the head and formed of the body and neck portions, and the coupling sleeve or collar which connects the head to the cylinder; substantially as described.

25. In a pneumatic tool, the combination with the cylinder formed with a piston-chamber, and having a peripheral flange at its rear end, a plate or block which forms the rear wall of the piston-chamber, an externally-threaded head fitting against the rear face of the block, the grasping-handle formed integral with the head and composed of the body and neck portions, and a coupling-sleeve which is screwed upon the head and provided with an internal flange which engages the flange on the cylinder; substantially as described.

26. In an engine, the combination with a cylinder, of a head secured to its rear end, a handle composed of a grasping portion and a neck portion formed integral with said head, a controlling-valve for the piston located within the limit of said head, and a throttle-valve located in the handle for controlling the passage of the inflowing motive fluid; substantially as described.

27. In an engine, the combination with a cylinder, of a head arranged at the rear end thereof, a collar or coupling-sleeve for attaching the head to the cylinder, a controlling-valve for the piston located within the limits of the head, a handle composed of a grasping portion and a neck portion formed integral with the head, said handle having an inlet-port for the motive fluid formed through it, and a throttle-valve for controlling the passage of the motive fluid through the handle, said valve being located within the grasping portion of the handle; substantially as described.

28. In an engine, the combination with the cylinder, of a handle attached to said cylinder, which handle is formed with an inlet-port for the motive fluid, and a throttle-valve arranged in said handle so as to control the passage of the motive fluid therethrough, said valve being mounted in a sleeve arranged in a recess in the handle which sleeve is provided with openings registering with the inlet-port, said valve having a solid surface adapted to close said registering opening, and a recessed portion adapted to align with said opening to permit the motive fluid to pass, and a spring for normally forcing the valve to a closed position; substantially as described.

29. In an engine, the combination with the cylinder, of a head arranged at the rear end thereof, a handle composed of a grasping portion and a neck portion formed integral with said head, an inlet-port for the motive fluid formed through both portions of the handle,

and a throttle-valve arranged in the grasping
portion of said handle for controlling the pas-
sage of the motive fluid therethrough, said
throttle-valve comprising a spool-shaped body
5 which is spring-pressed to normally close the
inlet-port; substantially as described.

In testimony whereof I hereunto affix my

signature, in presence of two witnesses, this
4th day of September, 1894.

FRANK C. RINSCHÉ.

Witnesses:

F. R. CORNWALL,
HUGH K. WAGNER.

It is hereby certified that in Letters Patent No. 562,423, granted June 23, 1896, upon the application of Frank C. Rinsche, of St. Louis, Missouri, for an improvement in "Engines," errors appear requiring correction as follows: In the drawings, in Fig. 1 the section line "3-4" should be *v v*, section line "5-5" should be *w w*, and section line "7-7" should be *y y*; in Fig. 2 section line "6-6" should be *x x*; in Fig. 3 section line "1-2" should be *u u*, and in Fig. 4 section line "12-12" should be *z z*; and that the drawings and the patent should be read as herein set forth that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 14th day of July, A. D. 1896.

[SEAL.]

WM. H. SIMS,

First Assistant Secretary of the Interior.

Countersigned:

S. T. FISHER,

Acting Commissioner of Patents.