

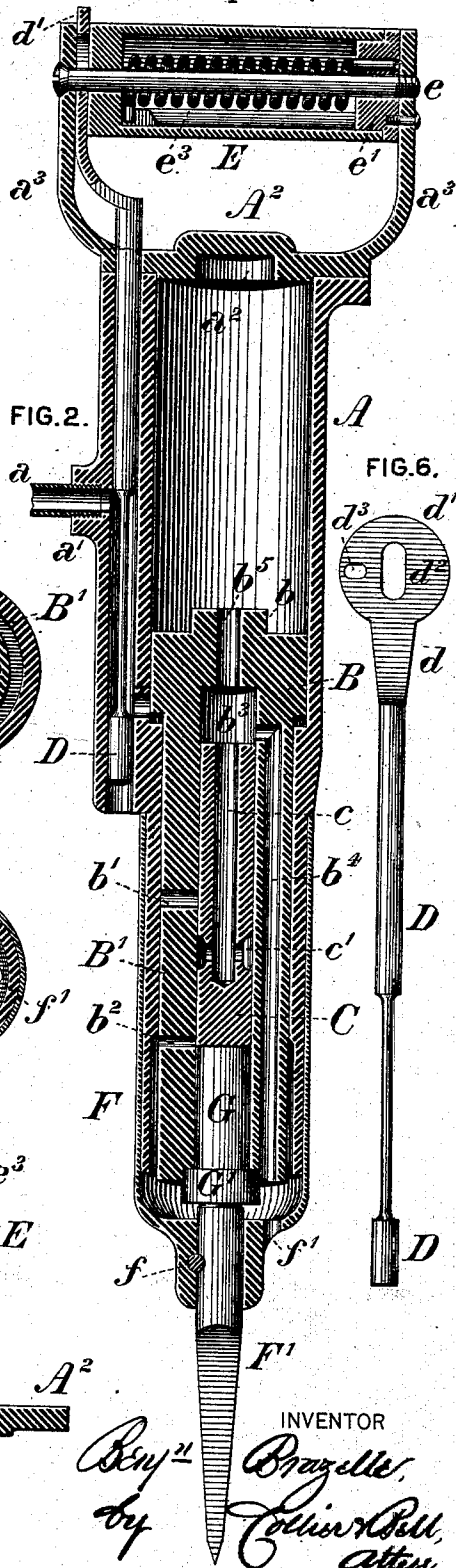
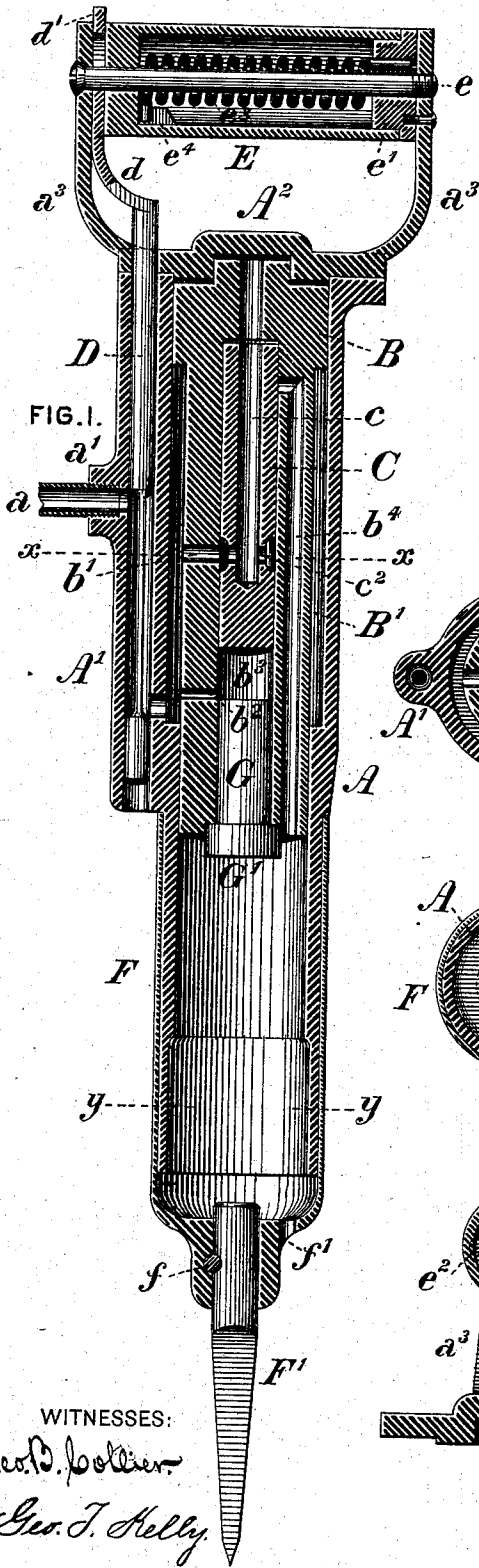
(No Model.)

B. BRAZELLE.

DIRECT ACTING ENGINE.

No. 284,173.

Patented Sept. 4, 1883.



WITNESSES:

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UNITED STATES PATENT OFFICE.

BENJAMIN BRAZELLE, OF ST. LOUIS, MISSOURI.

DIRECT-ACTING ENGINE.

SPECIFICATION forming part of Letters Patent No. 284,173, dated September 4, 1883.

Application filed June 8, 1883. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN BRAZELLE, of St. Louis, in the county of St. Louis and State of Missouri, have invented certain new and useful Improvements in Direct-Acting Steam or Pneumatic Engines, of which improvements the following is a specification.

My invention is an improvement upon that for which Letters Patent of the United States, No. 271,781, were granted and issued to me under date of February 6, 1883; and its object is to simplify and perfect the construction and operation of an engine of the character of that set forth in said Letters Patent, and to render the same more conveniently and desirably adaptable to use in the operations of chipping, calking, riveting, stone-cutting, and the like.

To these ends my improvements consist in certain novel devices and combinations embracing a tubular piston-rod provided with inlet and discharge passages, a distribution-valve adapted to reciprocate within said piston-rod, a hammer-head fitting in and connected removably to said piston-rod, a regulating or controlling valve governing the supply of operating-fluid to the piston, a cylindrical handle and internal spring for operating the regulating-valve, and a removable stock or tool casing fitting upon the cylinder and carrying a cutting, riveting, or other tool. The improvements claimed are hereinafter more fully set forth.

In the accompanying drawings, Figures 1 and 2 are vertical longitudinal central sections through a direct-acting engine embodying my invention and adapted to operate as a chipping-machine, the pistons being shown at the upper and the lower extremities of their stroke, respectively; Figs. 3 and 4, transverse sections through the same at the lines *x x* and *y y*, respectively, of Fig. 1; Fig. 5, a vertical transverse section through the cap and handle detached, and Fig. 6 a view in elevation of the regulating-valve.

The cylinder A of the machine is bored out concentrically to two different diameters, its larger and smaller bores extending in opposite directions from a point at or near the middle of its length, and corresponding, respectively, with the diameters of its piston B and of a tubular piston-rod, B', formed in one piece

with or secured to the piston. The piston-rod B' is bored out centrally to provide a cylindrical chest or cavity, *b*³, extending from its lower end to or slightly within the piston B, said cavity communicating, by an inlet-passage, *b*⁵, formed in the piston, with the cylinder A above said piston, and communicating, by one or more inlet-passages, *b*¹, formed in the piston-rod at such portion of its length as will correspond to the friction of the stroke at which it is desired to cut off the supply of steam or air which operates the piston, with the cylinder A below said piston. An inlet-passage, *b*², also extends from the cavity *b*³ to the outside of the piston-rod, below the passage *b*¹, and a longitudinal exhaust-passage, *b*⁴, (one or more,) extends from the lower end of the piston-rod to the cavity *b*³ at a point adjacent to the piston. A central hub or boss, *b*, formed upon the piston fits within a corresponding cylindrical recess, *a*², in the cap or cover A² of the cylinder, when the piston is at the upper extremity of its stroke. A cylindrical distribution-valve, C, having a central supply-passage, *c*, extending from its top for the major portion of its length, is fitted neatly within the cavity *b*³ of the piston-rod, its supply-passage *c* communicating by ports *c*² with an annular recess, *c*¹, in its periphery. The lower end of the cavity *c*¹ is closed by a removable hammer-stock, G, carrying a hammer, G', upon its outer end and fitting accurately within the cavity.

A balanced regulating or controlling valve, D, formed of two cylindrical pistons united by an intermediate stem, is fitted within a valve-casing, A', formed upon the cylinder A, and a supply-pipe, *a*, to which may be connected a flexible pipe for conveying steam or air to the machine, is secured to a nozzle, *a*¹, upon the casing, the inner opening of said nozzle being uncovered to a greater or less degree, as required, by proper movements of the regulating-valve as governed by the operator. Such movements are effected, as required, by means of a tubular cylindrical handle, E, which is fitted to rotate at one end upon a pin or bolt, *e*, passing through standards *a*³ upon the cap or cover A² of the cylinder A, and at the other upon a cylindrical block, *e*¹, attached to one of said standards. An arm, *d*, having a disk, *d*¹, at its outer end, is formed upon the controlling-

valve D, the disk d' having a longitudinal slot, d^2 , through which the bolt e passes freely, and a transverse slot, d^3 , into which enters a pin, e^1 , upon the adjacent end of the handle E. Rotation of the handle E in one or the other direction will consequently impart longitudinal movement in a corresponding degree to the controlling-valve. A helical spring, e^2 , is secured at one end to the block e' , and, surrounding the bolt e , bears at its opposite end against a stop or shoulder, e^4 , on the handle E, the action of said spring being to maintain the controlling-valve D in its lowest position, in which it completely closes the opening of the inlet-nozzle a' , except when the handle is turned by the operator in the opposite direction, and held in such position as to cause the valve D to uncover the inlet-opening to the extent required.

The cylinder A is counterbored or formed of greater internal diameter at and adjacent to its lower end, which is entirely open, and a cylindrical tool stock or handle, F, having a chisel, riveting-hammer, or other suitable tool, F', formed upon or secured to its lower end, is fitted easily around the periphery of the cylinder A. An exhaust-outlet, f' , is formed in the lower end of the tool-stock, and its upper end rests against a shoulder on the cylinder. In this instance the chisel F' is secured to the stock by a key or cotter, f , and as the stock is readily insertible on and removable from the cylinder, any desired number of stocks with their attached tools may be provided for each machine, so as to admit of grinding, repairs, or desired changes of tools to be made without interfering with the use of the remaining mechanism.

It will be obvious that in the adaptation of the engine to use as a pump or stamp, or in other applications of the reciprocating movement of its piston, the controlling-valve and its operating devices and the tool-stock will be dispensed with, and proper connections, which do not constitute part of my invention, must be made to the piston-rod.

In operation, the parts being in the positions shown in Fig. 1, the operator holds the machine in desired position upon the work, applying one hand to the tool-stock F and the other to the handle E of the controlling-valve, through which he regulates, from time to time, as required, the supply of steam or air admitted through the pipe a . The operating-fluid which enters the valve-casing A' between the heads of the regulating-valve D passes through the port a^3 into the cylinder A, and a portion of it thence passes through the passage b^2 into the cavity b^3 beneath the distribution-valve D, elevating said valve and maintaining it in such elevated position throughout the downward stroke of the piston, the passage b^2 being closed by the smaller bore of the cylinder A as the piston-rod moves downward therein. Communication being, by the elevation of the distribution-valve, opened between the cylinder A and the distribution-

valve C through the passage b' , steam or air passes through said passage and through the passages c^2 , c , and b^5 to the upper side of the piston and effects the downward stroke thereof, in the course of which the supply will be cut off as the passage b' enters the smaller bore of the cylinder, the location of said passage governing the degree of expansion. The force of the blow struck by the hammer G' upon the chisel F' is proportionate to the supply as regulated by the valve D. At the termination of the downward stroke the air or steam inclosed within the cavity b^3 below the distribution-valve C escapes therefrom through the passage b^2 , which is uncovered by entering the counterbore at the lower end of the cylinder A, and the distribution-valve C is forced downward by the pressure above it into the position shown in Fig. 2, uncovering the upper end of the exhaust-passage b^4 , and the steam or air which has effected the downward stroke escapes through the passage b^4 and exhaust-opening f' . The upward stroke is effected by the steam or air within the cylinder acting upon the lower and smaller area of the piston, pressure having been removed, as stated, from its upper side. The upward stroke will, as is desirable, be made at a slower rate of speed than the downward stroke, and the piston will be cushioned at its termination by the entrance of the boss b into the recess a^2 .

Among the special advantages of my improvements are simplicity and cheapness in the construction of the machine, and the presentation of such convenient and effective facilities for operation as enable the operator to guide and govern its movements with accuracy and dispatch, and without undue fatigue or discomfort. The readiness with which the hammer and cutting-tool may be attached and detached further contributes to its practical efficiency.

I am aware that a distribution-valve located within a piston and operated by the momentum imparted to it by the movement of the piston has been heretofore known, and such therefore I do not claim.

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

1. The combination of a cylinder, a piston fitting therein, a tubular piston-rod formed on or secured to said piston and provided with inlet and exhaust passages, and a distribution-valve fitting within said piston-rod, said valve having a longitudinal passage extending from one of its ends to a lateral port or ports adjacent to its opposite end, the passage and port being adapted to communicate alternately with the inlet and outlet passages of the piston-rod, and to thereby govern the supply and exhaust of motive fluid to and from the piston, substantially as set forth.

2. The combination, substantially as set forth, of a cylinder which is bored out to different diameters for different portions of its length, a piston fitting the larger diameter of

said cylinder and secured upon a tubular rod having inlet and exhaust passages, a distribution-valve adapted to reciprocate within said rod, and a lateral inlet-passage formed in said rod and so located as to cut off the supply of operating-fluid from the internal distribution-valve and piston in the traverse of the rod from the larger to the smaller bore of the cylinder.

3. The combination, substantially as set forth, of a cylinder bored out to different diameters at different portions of its length, and having a recess or counterbore at the outer end of its smaller bore, a piston fitting the larger bore of said cylinder and connected to a tubular rod having inlet and exhaust passages and fitting the smaller bore; a distribution-valve fitting within a longitudinal recess in said rod, and a lateral passage communicating with said recess and adapted to act as an inlet thereto when communicating with the larger bore of the cylinder, and an outlet therefrom when communicating with the counterbore.

4. The combination, substantially as set forth, of a cylinder, a piston and rod working therein, a distribution-valve, and a regulating or controlling valve governing the supply of operating-fluid to the distribution-valve, and actuated by a handle which is movable axially about a line at right angles to the traverse of the piston.

5. The combination, substantially as set forth, of a cylinder, a hollow handle movable in bearings on standards connected to the cap or cover of the cylinder a regulating-valve

coupled to said hollow handle, and a spring located within said handle and bearing at one end against a stop thereon, and at the other against an abutment fixed relatively to the bearings thereof.

6. The combination, substantially as set forth, of a cylinder, a piston and rod working therein, a hammer connected to said piston-rod, and a cutting or striking tool connected to a tool stock or casing fitting around the periphery of the cylinder, and adapted to serve as a handle for the operator.

7. The combination, substantially as set forth, of a cylinder, a piston and rod working therein, a hammer connected to said piston-rod, a handle connected at right angles to said cylinder adjacent to one of its ends, and a tool stock or casing fitting around said cylinder adjacent to its opposite end and carrying a cutting or striking tool.

8. The combination, substantially as set forth, of a cutting or striking tool and a tubular tool stock or casing connected thereto, and adapted to fit around the periphery of a direct-acting steam or pneumatic cylinder.

9. The combination, substantially as set forth, of a piston, a tubular piston-rod connected thereto, a distribution-valve fitting in a longitudinal recess in said piston-rod, and a hammer secured to a stock fitting into one end of said piston-rod.

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Witnesses:

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