(No Model.)

W. B. MURRAY.

STONE CUTTING ENGINE.

No. 551,687. Patented Dec. 17, 1895.

Fig. 1.

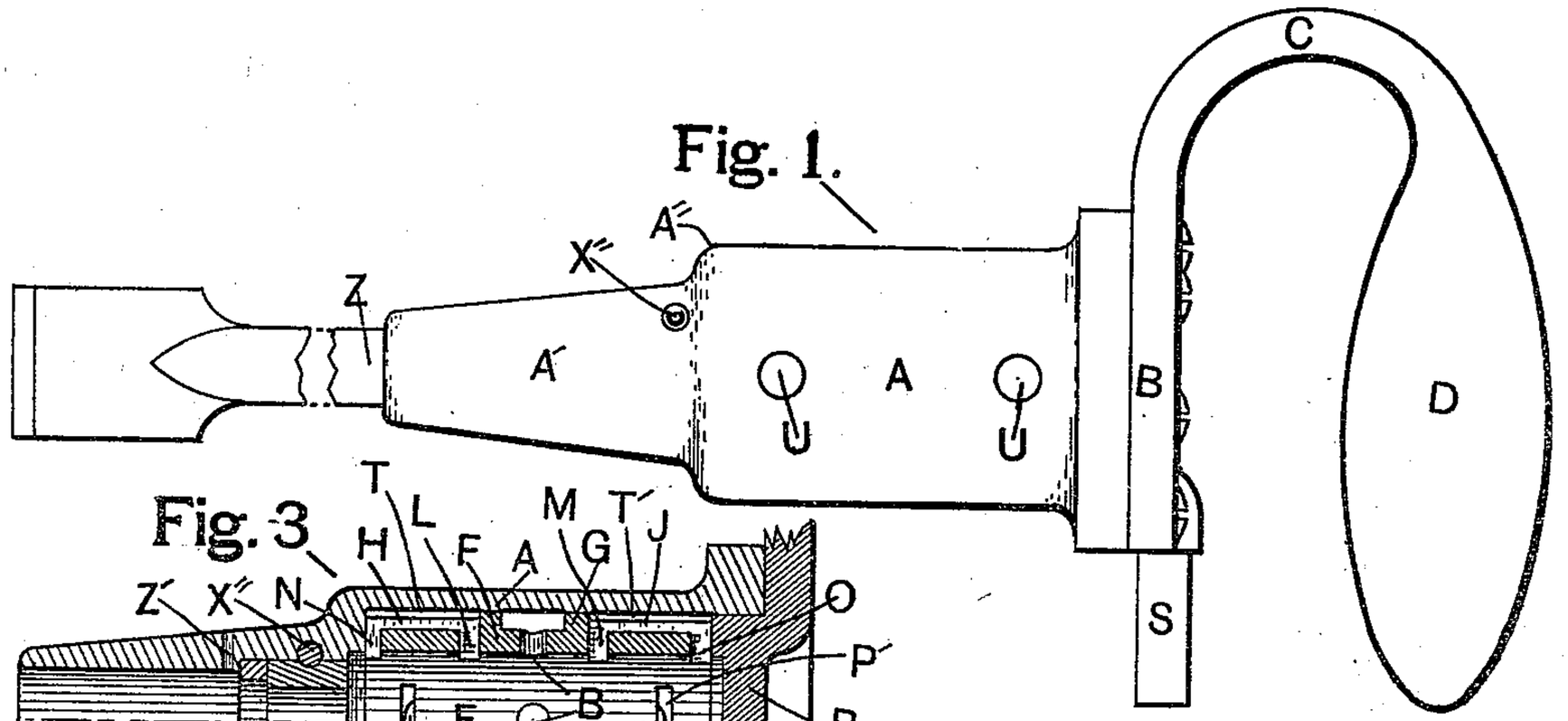

Fig. 3

Fig. 2

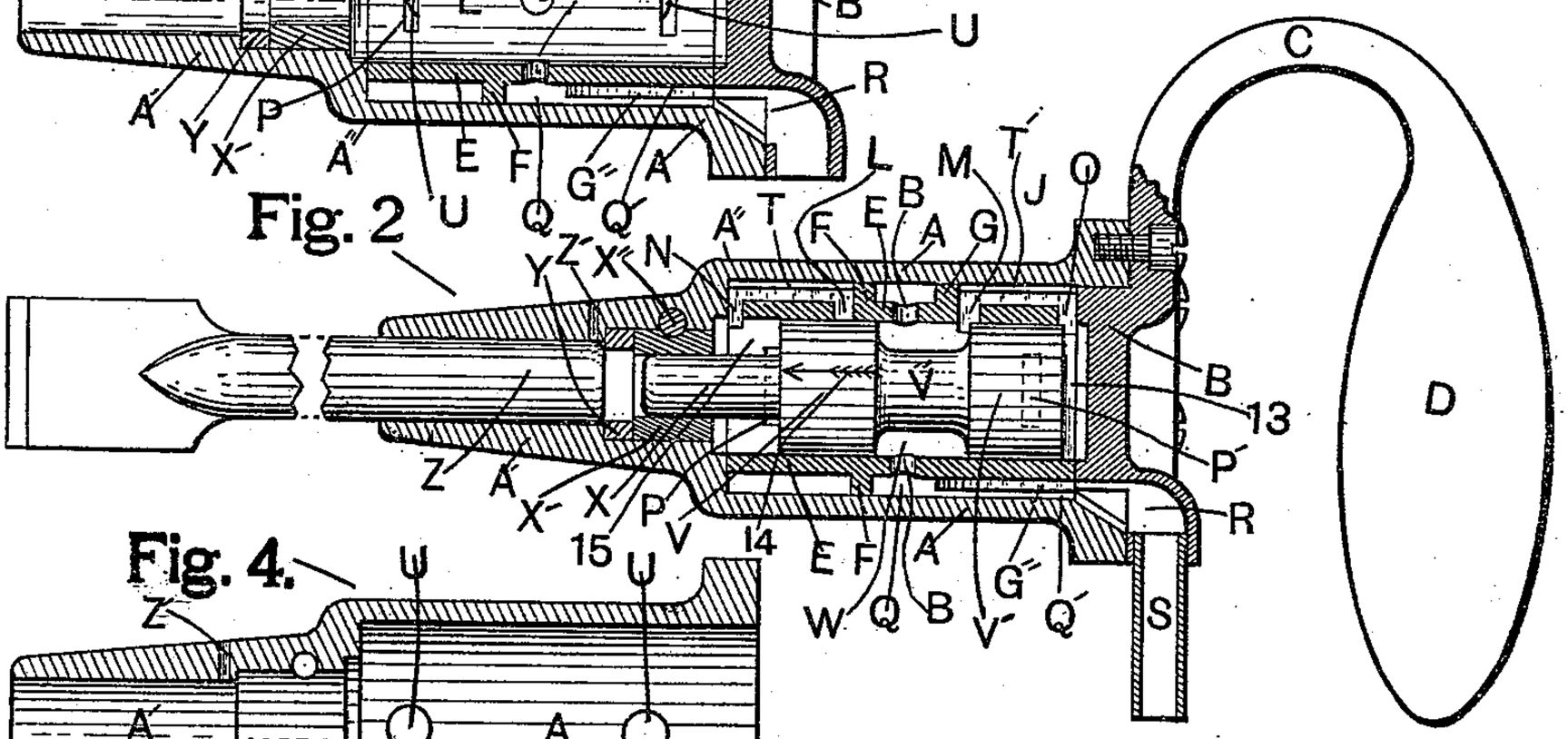

Fig. 4.

Fig. 10.

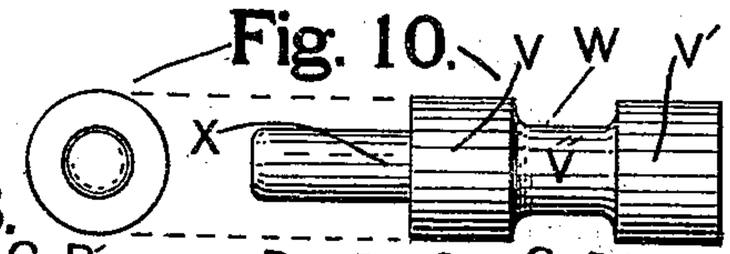

Fig. 5.

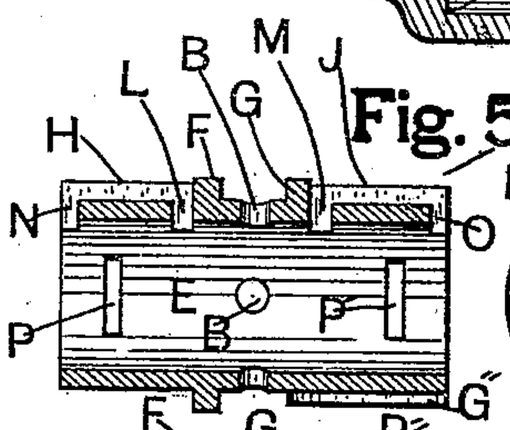

Fig. 6.

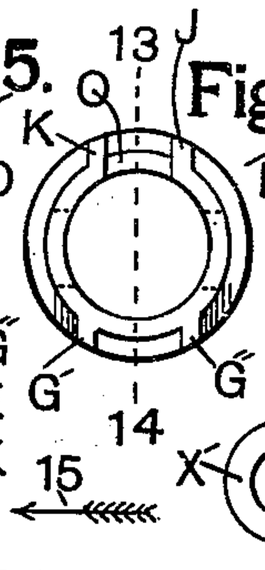

Fig. 8.

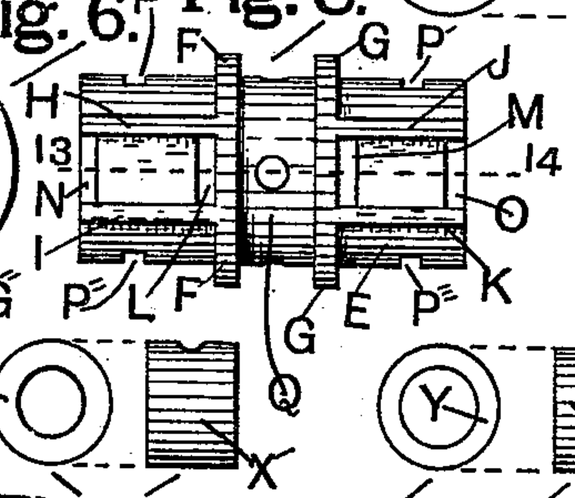

Fig. 9.

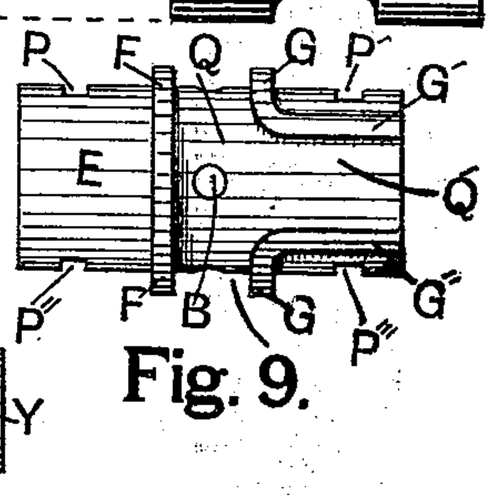

Fig. 7.

Fig. 11.

Fig. 12.

INVENTOR:

William B. Murray.

By his atty.

Oscar Snell

WITNESSES:

W. H. Hale.

William Handy.

UNITED STATES PATENT OFFICE.

WILLIAM B. MURRAY, OF CHICAGO, ILLINOIS.

STONE-CUTTING ENGINE.

SPECIFICATION forming part of Letters Patent No. 551,687, dated December 17, 1895.

Application filed February 25, 1895. Serial No. 539,573. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM B. MURRAY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Stone-Cutting Engine, of which the following is a specification.

My invention relates particularly to machines which are adapted to operate tools for cutting stone, and my object is to provide a construction which is better adapted to the purpose than the machines of this kind in ordinary use, my invention being more fully described hereinafter, and illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation, and Fig. 2 a partial side elevation with one-half of the casing and cover therefor, and the cylinder, together with several minor parts broken away to show a longitudinal vertical section, and the double piston in position within the cylinder in elevation. Fig. 3 is same as Fig. 2, except that the double piston and chisel-shank are removed and the handle-arm broken away. Fig. 4 is a separate view of the casing in section, same as shown in Figs. 2 and 3. Fig. 5 is a separate view of the cylinder in section, same as shown in Figs. 2 and 3 or on line 13 14, Figs. 6 and 8. Fig. 6 is an end elevation of the cylinder, looking in the direction of Fig. 7, as indicated by arrow 15. Fig. 7 is a side elevation of the cylinder, and Fig. 8 is a plan view thereof. Fig. 9 is a plan of the bottom of the cylinder, which view is diametrically opposite that shown in Fig. 8. Fig. 10 shows, respectively, an end and a side elevation of the double piston and the plunger which is integral therewith. Fig. 11 shows, respectively, an end and a side elevation of a removable bushing for packing and guiding the piston-ram. Fig. 12 shows, respectively, an end and a side elevation of a detachable bushing which serves as an abutment between the plunger and the bushing shown in Fig. 11, the same serving as a stop to limit the inward movement of the tool-shank, and which is more particularly described hereinafter.

Similar letters and figures indicate like parts throughout the several views.

A is the case, which is shown with all the detachable parts removed, in section, in Fig. 4. This case is particularly adapted to the purpose in that it includes the guide-nozzle A′ and front cylinder-cover, and being forged in one piece insures great strength and lightness, and avoids the usual clumsy joint at the junction of the guide-nozzle and front cylinder-cover with the body of the case at A″.

B is the rear cylinder-cover, which is secured to the case A by any well-known means. The cover B has forged integral therewith the bent arm C, which terminates in the handle D. The bent arm C springs from the cover B from one side only, and is made of a size to insure a small amount of resiliency, thus providing against the hand being injured by the rapidly-repeated shocks incident to the use of machines of this class.

The cylinder E consists of a case-hardened forging, open at both ends when detached from casing A, but the ends are closed when within the casing by means of cover B and the bottom of the casing and the ram of the double piston. The cylinder is provided with induction and eduction orifices for admitting and expelling the air which is the source of power. Passage-ways are formed between the outside of cylinder E and the inside of casing A by means of the peculiar construction of the cylinder. Figs. 6, 7, 8 and 9 show one band F completely encircling the outside of the cylinder and projecting therefrom a short distance, and at G is another band which encircles the greater part of the circumference of the cylinder and then the ends thereof bend to a right angle and run along the outside bottom of the cylinder to the end thereof, and form parallel longitudinal walls, as shown in Fig. 9 at G′ G″. Fig. 8 is a view of the top of the cylinder, showing longitudinal walls H, I, J and K, which connect at one end with and project outwardly from the cylinder the same distance as the bands F and G, and close to these bands and between the walls H, I, J and K are induction-orifices L and M, and at the ends of the cylinder, also between these walls, are induction-orifices N and O. There are four eduction-orifices P, P′, P″ and P‴, which are cut through the walls of the cylinder and are plainly shown in Figs. 5, 7 and 8.

The peripheral surfaces of bands F and G, and of the walls G′ G″ and H, I, J and K, are

ground so as to fit the inside surface of the bore of case A air or gas tight after the cylinder is forced down into the casing A to the position shown in Figs. 2 and 3, so that the space Q around the cylinder, between bands F and G and the cylinder and the casing, forms a circular passage-way which connects with the space Q′ between walls G′ and G″ and the cylinder and casing. This latter passage-way registering with a small chamber R in the cylinder-cover forms a communication with the air-supply pipe S. There is a series of orifices B′ which admit air into cylinder E from the circular passage-way Q. There are two other passage-ways T and T′ which are situated at the top of the cylinder between the longitudinal walls H, I, J and K and the cylinder and casing, which serve as means of communication between orifices L and M and N and O.

Almost directly opposite eduction-orifices P P′ P″ P‴ are eduction-orifices U through the outer casing A, which permit the air after having been used to escape from the engine.

The piston, Fig. 10, comprises two heads V and V′ which are connected by means of a neck V″ which is of smaller diameter than the heads, so as to form an annular space W entirely around the piston and inside of the cylinder E. The piston has a plunger X at one end which passes gas-tight through a bushing X′ which is removable, being secured in position by means of a pin X″.

At Y is a narrow bushing which is held in position against a shoulder of the casing A by the contact of bushing X′. The hole through bushing Y is larger than the diameter of plunger X and smaller in diameter than the shank Z of the chisel, so that the chisel-shank may be pressed inwardly against this bushing, which serves as a stop, and should the hammering of the chisel-shank end cause the metal around the hole thereof to be forced inwardly the bushing so constructed is adapted to withstand long use without permitting the end of the plunger to become jammed therein, which would not be the case should the shank of the chisel directly contact the bushing X′. A relief-hole Z′ permits the air to pass in and out of the space between the end of the chisel-shank and that of the plunger.

In operation, the air or other gas under pressure is admitted through pipe S into chamber R, thence by passage-way Q′ to annular passage Q, thence through orifices B′ into annular space W, and should the piston-heads V and V′ be at the position shown in Fig. 2 the compressed air will flow from annular space W through orifice M, passage-way T′, orifice O and down into space 13 between the piston-head V′ and the cylinder-cover B, and force the piston in the direction indicated by the arrow 14 thereon, part of the air in the opposite end space 15 of the cylinder passing out of the machine through orifices P and P″ and U and U at each side of the cylinder E and casing A. As soon as the piston-head V has passed the orifices P and P″ the exit of air from that end of the cylinder is cut off, the remaining air being compressed and serving as a cushion to prevent the piston from contacting the end of the cylinder. Piston-head V′ in the movement described cuts off the supply of air under pressure to space 13 through orifice M at the same time or a little time before the piston-head V cuts off the exit of air through the side orifices P P″ and U U, so that the piston is driven nearly to the end of the cylinder by virtue of the expansion of the air in space 13 and the passage-ways leading thereto from annular chamber W, until the end of piston-head V′ passes the margin of orifices P′ and P‴, when the air in space 13 is discharged through these orifices and thence out of the machine through two of the orifices U in the sides of case A, but the momentum of the piston carries it far enough to cause piston-head V to fully open orifice L to space W when space 15 at the front end of the cylinder is filled with air under pressure through the passage-way T and N, which will drive the piston in the contrary direction to that described until the orifices P and P″ are opened, when the air last admitted will escape out through orifices U and U at each side of the front end of the case A.

It is obvious that with air under a high pressure the piston and plunger may be given a very rapid reciprocating motion, and the action of the plunger X being directed upon the end of the chisel-shank Z it may be rapidly operated for the purpose of cutting stone or any other similar duty to which it may be applied.

I claim as my invention—

In a stone cutting engine having a solid double reciprocating piston within a cylinder, the piston serving also as a valve, the cylinder consisting of a lining within an outer casing which forms covers for the ends of the cylinder, orifices through the cylinder for the admission and discharge of air under pressure which is controlled by the movements of the piston, passageways leading to and from the orifices formed by the space between longitudinal and annular ribs integral with and on the outside of the cylinder and whose peripheral surfaces contact the inside cylindrical surface of the casing, one of such ribs G being annular and joined by two longitudinal and separated ribs, G′ and G″, which, in combination with an annular rib F, separated from rib G, form an annular chamber Q at the center of length and outside of the cylinder, which chamber communicates with the passageway Q′ between ribs G′ and G″, and forms a passageway from the air supply to space Q, from which space orifices B′ lead into space W within the cylinder, between the heads V and V′ of the double piston, the passageways at both ends of the cylinder

leading from annular space W through orifices L and M to orifices N and O, at the end of the cylinder, being formed by longitudinal ribs H and I and J and K, which have one end integral with ribs F and G, as shown and described.

In testimony that I claim the foregoing I have hereunto set my hand, this 16th day of February, 1895, in the presence of witnesses.

WILLIAM B. MURRAY.

Witnesses:
F. J. BARNETT.
OSCAR SNELL.