(No Model.) 2 Sheets—Sheet 1.

F. H. MARSH.

PNEUMATIC TOOL.

No. 461,796. Patented Oct. 20, 1891.

Fig. 1.

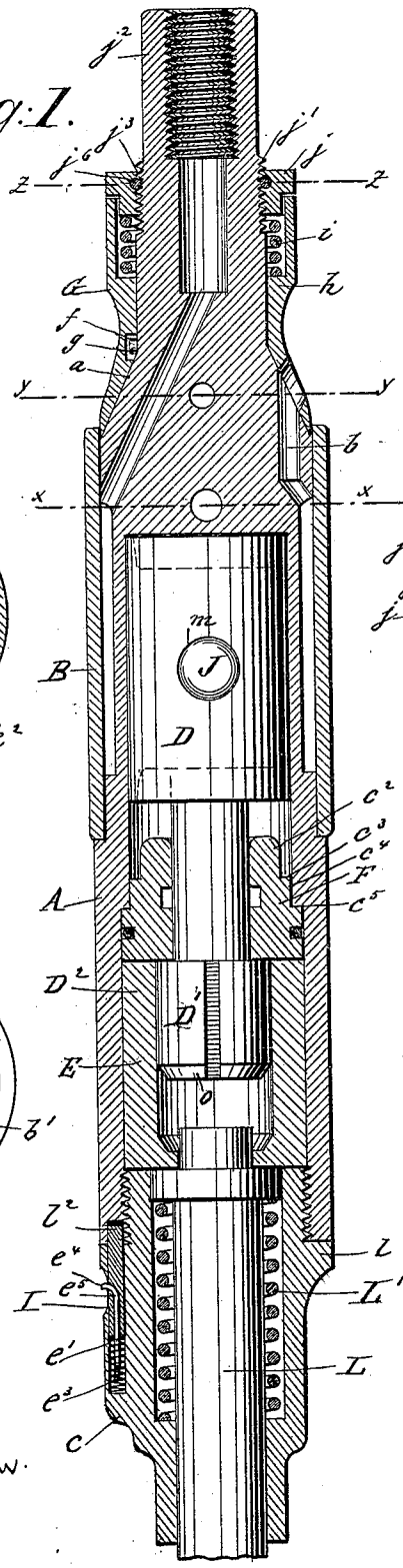


Fig. 2.

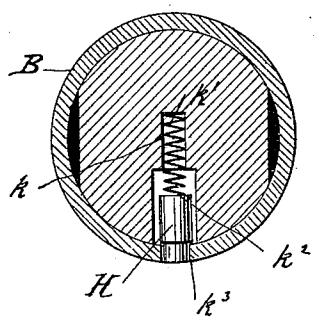


Fig. 3.

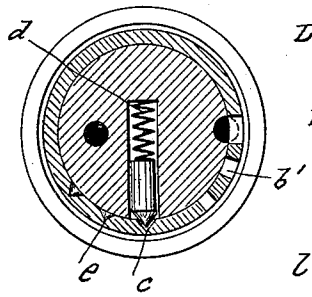


Fig. 4.

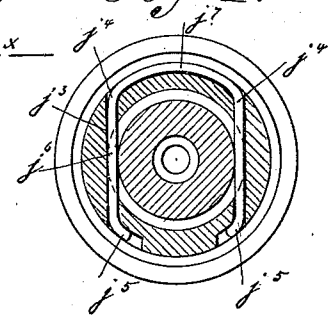
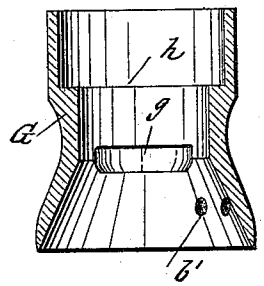


Fig. 5.



WITNESSES:

A. Schedel

C. E. Ransom

INVENTOR

Frank H. Marsh

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

F. H. MARSH.

PNEUMATIC TOOL.

No. 461,796. Patented Oct. 20, 1891.

Fig: 6.

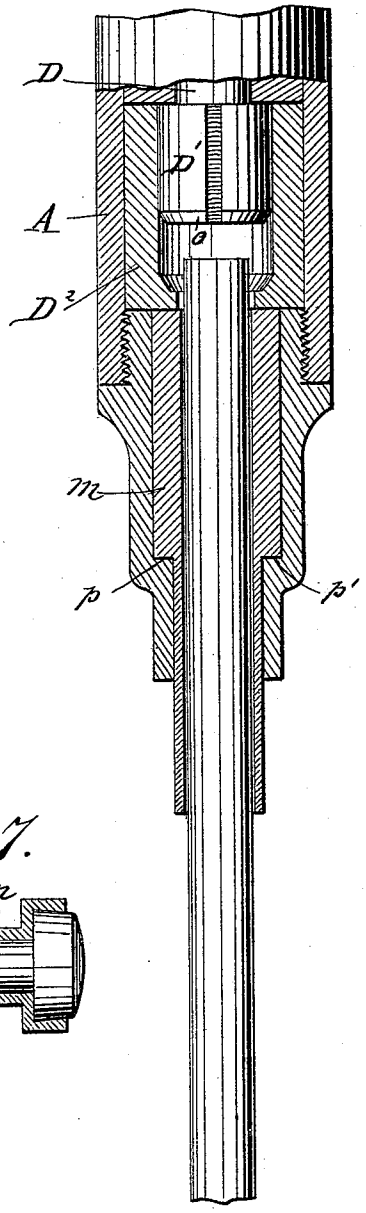


Fig: 7.

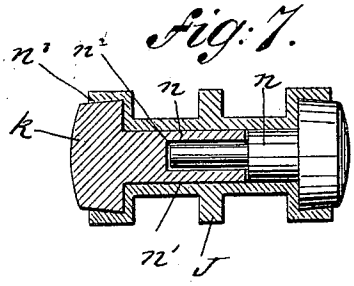
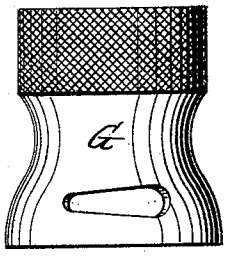


Fig: 8.



WITNESSES:

A. Schiebe

C. F. Ransom.

INVENTOR

Frank H. Marsh

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

FRANK H. MARSH, OF NEWARK, NEW JERSEY.

PNEUMATIC TOOL.

SPECIFICATION forming part of Letters Patent No. 461,796, dated October 20, 1891.

Application filed June 26, 1890. Serial No. 356,844. (No model.)

To all whom it may concern:

Be it known that I, FRANK H. MARSH, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Pneumatic Tools, of which the following is a specification.

My invention relates to an improvement in pneumatic tools, and particularly to that class shown and described in Letters Patent numbered 412,517, issued October 8, 1889, and to which reference may be had for a more complete understanding of the present improvements and the operation of the tool.

The objects of my invention are to provide an improved construction of throttle by means of which the speed of the tool may be regulated and controlled, and also to furnish a simple and secure fastening for said throttle; to provide an improved form of jacket-catch whereby the jacket may be firmly held in place upon the cylinder and yet quickly removed therefrom; to so construct and locate the spring-latch that it will securely lock the nose upon the cylinder and will not be liable to breakage under ordinary wear; to provide the valve with ends or heads so interlocked that they will not work loose and drop out, and to improve the details of construction, that the tool may be more serviceable and less liable to wear.

A still further object of my invention is to so construct the tool that it may be used with a spindle or the latter dispensed with and the striker caused to operate directly on the bit or chisel.

The invention consists in the various features of construction and arrangement of parts, as will be hereinafter more fully described, and pointed out in the claims.

In the drawings, Figure 1 is a vertical sectional elevation of a pneumatic tool embodying my improvements. Fig. 2 is a transverse section on the line $x\ x$ of Fig. 1. Fig. 3 is a section on the line $y\ y$. Fig. 4 is a section on the line $z\ z$. Fig. 5 is a detail sectional view illustrating the means employed for preventing the entire rotation of the throttle. Fig. 6 is a detail vertical sectional elevation showing the spindle and spring dispensed with and the bit or chisel in position for the striker to operate directly upon the same. Fig. 7 is a sectional view of the valve. Fig. 8 is a modification.

Similar letters of reference indicate like parts in all the views.

Referring to the drawings, A represents the cylinder; B, the jacket; C, the nose; D, the piston; E, the washer-sleeve, and F the split washer, constructed, arranged, and operating in a manner substantially similar to that described in the patent before referred to.

G designates the throttle, which is arranged upon the beveled upper end a of the cylinder A and adapted to open or close the exhaust-passage b. This throttle G is provided with a series of outlet-openings b', graduated in size, any one of which openings may be caused to register with the exhaust-passage b, and thereby regulate and control the speed of the tool, the larger opening permitting the tool to run at full speed and the others in any desired proportion thereof. The throttle is held in its adjusted position when open by means of a pin c, seated in an opening in the cylinder A and forced upwardly by means of a small spiral spring d, bearing against its inner end. The outer end of this pin is beveled and is designed to engage any one of a series of indentations e, arranged in my improved tool on the plane illustrated by inner face of the throttle G, so that when the throttle is turned the spring-actuated pin will engage one of said openings and hold the throttle locked in an open position. When the throttle is closed, the operation of the tool is stopped, and consequently there is no jarring. Therefore it is not necessary to provide any means whatever to lock the throttle in said closed position. To prevent the rotation of the throttle in either direction farther than is necessary to open and close the exhaust-passage b, the cylinder A is provided with a projection f, which works in a short groove or channel g on the inner face of the throttle, movement of the latter in either direction being limited by the stop-pin abutting against the ends of said groove g. It may be desirable to provide the exhaust-outlet in the form of an elongated tapering slot, as shown in Fig. 8. Hence I do not limit myself to the arrangement of graduated openings herein shown and described.

It will be seen that by the construction

above described I am enabled to run the tool at full speed or any proportion thereof desired without the necessity of "fingering" the exhaust or the bother of diminishing the power by partially turning off the stop-cock on the air-supply pipe, which may be located at a distance from the point where the tool is being operated.

The throttle is provided a short distance from its upper end with an interior annular shoulder h, which forms a seat for a spiral spring i. The throttle-nut j is interiorly threaded and engages the threaded portion j' of the extension j^2 of the cylinder A, and when screwed down into position forces the spiral spring within the upper end of the throttle, thus holding the latter firmly on its seat and yet allowing its ready movement. The threaded portion j' is provided on opposite sides with cuts or grooves j^3 and the nut j, formed with passages or openings j^4 j^5, and on its inner face with grooves j^6, corresponding to those on the extension j^2. The nut j is locked upon the threaded extension by means of a U-shaped bail or staple j^7, the ends of which pass through the openings j^4 j^5 and are bent down in cavities in the nut, provided for the same, to prevent its detachment. The bail or staple engages the grooves in the threaded extension and nut, thereby positively locking the latter in place. In the cylinder A, preferably just below the throttle, is provided an elongated opening k, the inner end of which is circular. A small spiral spring k' is seated in the circular portion of said opening, as shown.

H represents a catch, which fits in the opening k and has a seat k^2 in one end to receive the spring k'. The catch H is slightly reduced at its other end, thereby forming a shoulder. The jacket B is formed with a perforation k^3, through which the reduced end of the catch H projects, thus holding said jacket in position against any longitudinal movement whatever. It will be noticed by making the opening k elongated that the catch H is allowed a slight lateral movement. This construction has been found advantageous from the fact that the jacket is driven on the cylinder very tightly, and unless the opening in the jacket was brought into perfect alignment with the catch H when the jacket was first started on, the catch could not engage said opening, thus necessitating the removal of the jacket and another attempt to register the opening with the catch. By making the opening elongated a slight movement is allowed the outer end of the catch, and the latter in most cases engages the opening in the jacket at the first attempt to drive said jacket on.

The nose C is provided near its upper end with an annular ledge or shoulder l, which, when the nose is screwed in place upon the cylinder A, abuts against the lower end of the latter. A vertical passage or opening l' is provided in the nose, extending downwardly from the shoulder, and this opening l' registers with a vertical opening l^2 in the lower end of the cylinder when the nose and cylinder are screwed together.

I represents a latch-pin, which is located in the opening l' in the nose, and bearing against the lower end of said latch-pin I is a spiral spring l^3. A finger hold or piece l^4 projects outwardly from the latch-pin and works in an elongated opening l^5 in the nose. The finger-catch l^4 is secured in place as follows: The latch-pin is provided with a vertical passage l^5, extending from its lower end and out of the side of the catch-pin on an incline. The spring is introduced in the opening l', the wire finger-piece placed in position in said opening, and the opening in the latch-pin placed over said wire. The latch-pin is then forced down on the wire, causing the latter to project out through the inclined portion of the opening l' and then cut off to proper size, the other end of the wire resting on the bottom of the opening l'. In this way a convenient finger-piece is provided and the latch-pin held in place in the opening. The upper end of the latch-pin engages the opening in the cylinder and its end bears against the end of said opening, thus preventing the finger-catch l^4 from engaging the ends of the opening l^5. This is essential, since the rapid vibration of the tool would break said finger-catch off in a short time if it contacted with the end of the opening l^5 while the tool was in operation. By locating the spring-latch in the nose a latch-pin of larger size can be employed than by locating it in the cylinder and without increasing the size of stock employed in the cylinder.

J represents a valve, which is located in a passage m, extending transversely through the piston D and adapted to open and close the air induction and exhaust ports at proper intervals. The valve moves transversely in said passage, and its movement is so extremely rapid that its ends must be provided with heads K of a material sufficiently hard to stand the extremely rapid contact with the sides of the cylinder A and yet possess sufficient elasticity to prevent wear to the latter. The material found best adapted for the valve-heads is vulcanized fiber; but much difficulty has been experienced in securing these heads to withstand the rapid contact mentioned. To obviate this difficulty I provide the valve-heads with teats n, which fit in a passage n' in the valve. One of these teats is provided with an opening n^2 in its end and the end of the other teat reduced to engage the latter. The valve-heads are permanently secured at the point of connection by filling the opening n^2 with cement. The heads K are tightly fitted in chambers n^3 in the ends of the valve, as shown. The walls of the chambers n^3 are slightly beveled, so that as the fiber expands the heads will be more firmly held.

The piston D is provided with a downwardly-extended integral striker D', which is

provided with a beveled lower end *o*. The washer-sleeve D^2, in which the striker works, is provided at its lower and with tapering walls, forming a seat for said striker. By providing this tapering seat and the striker with a beveled end the liability of breaking said striker or washer-sleeve is obviated.

The split washer is provided with a beveled shoulder c^2 at its upper end to receive the cupped lower end of the piston and with a second beveled shoulder c^3, which fits the slightly-beveled portion c^4 of the cylinder, the latter having a stop-shoulder c^5, as shown. By making a tapering shoulder on the split washer and slightly tapering the bore of the cylinder the latter is not burred at the juncture of the cylinder and split-washer shoulders.

In some classes of work it is desirable to dispense with the spindle L and its spring L′, and in lieu thereof the nose C is provided with a bushing M, having a shoulder *p*, which rests upon an interior shoulder *p′* of the nose. This bushing is driven to position in the nose and its lower end projects beyond the lower end of the nose. The bit or chisel is inserted through the bushing, so that its upper end will be struck by the striker direct. The bit or chisel receives the full force of the blow, and the work is livelier in appearance than when the spindle and spring are employed. It also permits of the immediate substitution of a sharp bit for one that has become dulled in use.

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

1. In a pneumatic tool, the combination, with a cylinder provided with an exhaust-opening, of a throttle having graduated outlet provision, whereby the speed of the tool may be regulated and controlled, substantially as set forth.

2. The combination, with the cylinder provided with an exhaust-opening, of a throttle having a series of graduated openings and a throttle-catch for holding the throttle at its adjusted position, substantially as set forth.

3. The combination, with the cylinder having an exhaust-opening, of a throttle having a series of graduated openings and indentations on its inner face and a catch to engage any one of said indentations and lock the throttle in its adjusted position, substantially as set forth.

4. The combination, in a pneumatic tool, with the cylinder having an exhaust, of a throttle to open and close said exhaust, a catch for holding the throttle in an open position, and a stop-pin on the cylinder working in a groove in the throttle and thereby limiting the rotation of the latter, substantially as set forth.

5. The combination, with a cylinder having the threaded extension provided with cuts or grooves, of the throttle, the throttle-nut provided with grooves corresponding to those of the threaded extension and also having passages or openings, and a bail or staple passed through said openings and engaging the grooves in the extension and nut, substantially as set forth.

6. The combination, with the cylinder having the threaded extension provided with cuts or grooves, of the throttle, the spiral spring fitting in a seat in the latter, the throttle-nut having cuts or grooves and openings, as described, and the bail or staple adapted to engage said cuts and openings, substantially as set forth.

7. The combination, with the cylinder having an opening, of the spring-actuated catch located in said opening and the jacket provided with an opening to receive said catch, substantially as set forth.

8. The combination, with the cylinder having an opening elongated at its outer end, of a spring-actuated catch located in said opening and the jacket provided with an opening to receive said catch, substantially as set forth.

9. The combination, with the cylinder having an opening at its lower end, of the nose and the sliding spring-actuated latch located in the nose and adapted to engage the opening in the cylinder, substantially as set forth.

10. The combination, with the cylinder having an opening in its lower end, of the nose having a vertical opening, the latch-pin having a passage extending through its side wall, the spring bearing against the latch-pin, and the finger-piece located in the latch-pin and having one end working in a slot in the nose, substantially as set forth.

11. In a pneumatic tool, a valve provided with a passage and having chambered ends, and heads having interlocking teats fitting said passage, the heads engaging said chambers, as set forth.

12. In a pneumatic tool, the combination, with the cylinder and the piston having a beveled striker, of the washer-sleeve located in said cylinder and provided with a seat having tapering walls, substantially as set forth.

13. The combination, with the cylinder having an interior shoulder and slightly tapering and the piston having a cupped lower end, of a split washer provided with a shoulder to receive the cupped end of the piston and with a second tapering shoulder to engage the tapering portion of the cylinder, substantially as set forth.

14. The combination, with the nose having the interior shoulder, of the removable bushing having a shoulder to engage that of the nose and having its lower end projecting downwardly beyond said nose, substantially as set forth.

FRANK H. MARSH.

Witnesses:
HENRY G. KRAUSE,
JACOB KELLER.