

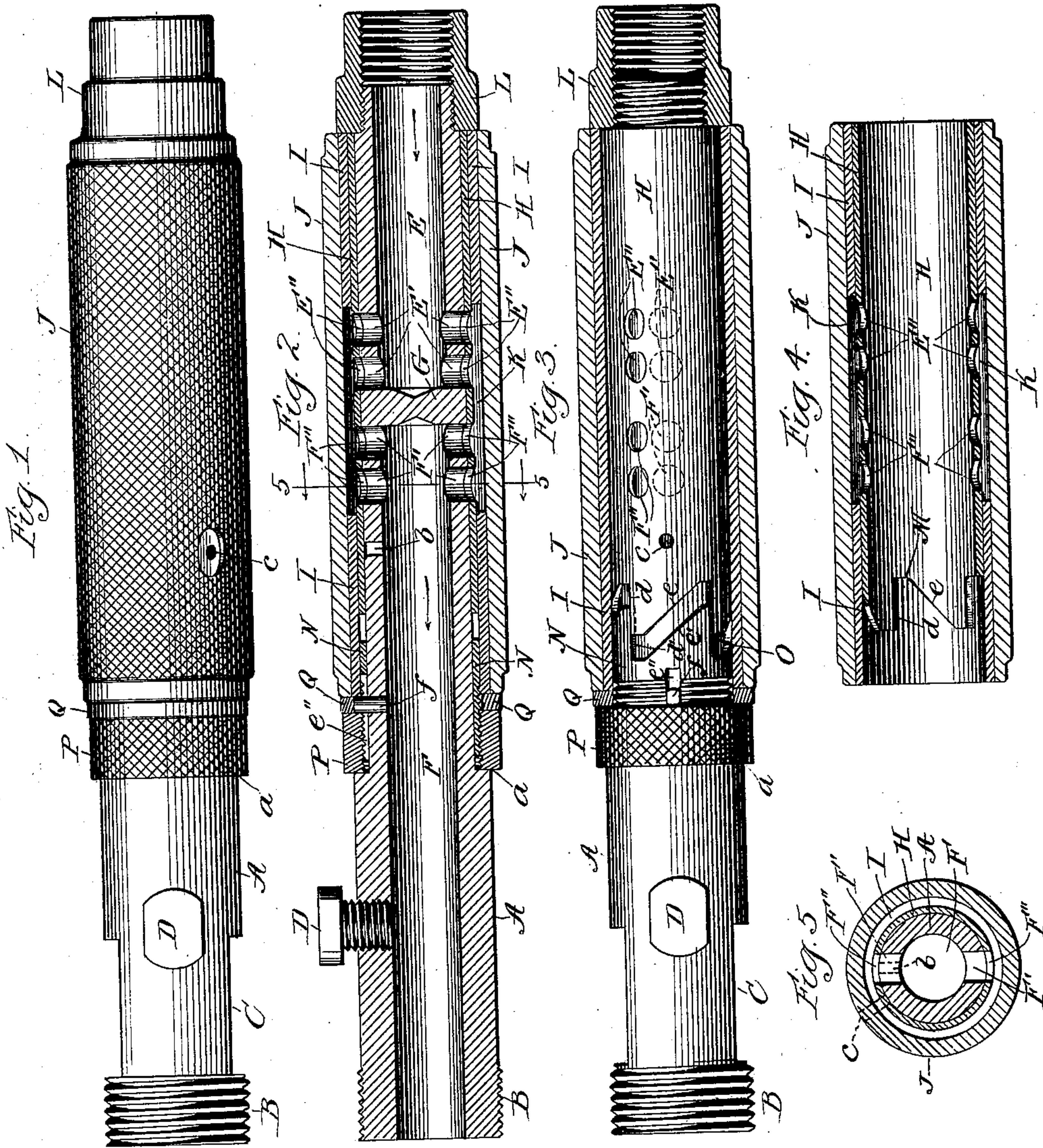
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J. BOYER.
VALVE FOR PNEUMATIC TOOLS.

(Application filed Feb. 9, 1898.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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VALVE FOR PNEUMATIC TOOLS.

SPECIFICATION forming part of Letters Patent No. 633,355, dated September 19, 1899.

Application filed February 9, 1898. Serial No. 669,653. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH BOYER, a citizen of the United States, residing at the city of St. Louis, in the State of Missouri, have invented a certain new and useful Improvement in Valves for Pneumatic Tools, of which the following is a description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates more particularly to improvements in throttle-valves for controlling the admission of the motive fluid to portable manually-handled pneumatic tools of various descriptions. It has been designed more especially for use in connection with the pneumatic drill heretofore patented to me by Letters Patent No. 590,511, of September 21, 1897, but may be used to advantage in other relations, as will be understood from the description of it hereinafter given.

In the accompanying drawings, Figure 1 may be considered a top plan view of my new valve applied to or employed in connection with one of the handles of my pneumatic drill heretofore referred to with the valve in open position; Fig. 2, a longitudinal vertical section of the same; Fig. 3, a top plan view, corresponding to Fig. 1, with the valve in closed position and with the two outer tubes or sleeves of the valve-cylinder in section and exposing a top plan view of the inner sleeve or lining of such cylinder; Fig. 4, a longitudinal vertical section of the valve-cylinder removed from the inner tube; Fig. 5, a vertical cross-section on the line 5 5 of Fig. 2.

The same letters of reference are used to indicate corresponding parts in all the views.

In the accompanying drawings, A represents one of the tubular handles of my pneumatic drill heretofore referred to, having its extreme left-hand end threaded at B to screw into the wall of the drill-casing, and in the present instance flattened at C to facilitate the application of a wrench in screwing the handle into or unscrewing it from position. A screw-plug D controls an oil-hole for supplying oil to the drill through the passage in the handle. This handle A is preferably formed from a solid rod of steel, which is bored from each end to form internal chambers or passages E F, which are separated

from each other by a diaphragm or partition G in the present instance and preferably forming an integral part of the tubular handle thus produced. Radial ports E', extending through the tube A, open into the inlet chamber or passage E thereof at one side of the diaphragm G, while corresponding ports F' open through its wall into the outlet-passage F thereof at the opposite side of the diaphragm G.

The right-hand portion of the tubular handle A is reduced in diameter by being turned off from the point a to its right-hand end, and upon this reduced portion fits what I have termed the "valve-cylinder," being a cylindrical member, composed in the present instance of three concentric sleeves or tubes firmly driven one within the other. Of these three concentric sleeves or tubes the inner one, H, which snugly fits upon the reduced portion of the tubular handle A, is preferably formed of brass, and the middle one, I, and outer one, J, of steel. The inner sleeve H is provided with holes E'', adapted when the sleeve is turned to proper position to be brought into register with the ports E', and is also provided with similar holes F'', adapted to be likewise brought into register with the ports F'.

The middle portion of the middle sleeve I is cut away to form an open chamber K, surrounding the sleeve H within the outer sleeve J, or for the same purpose and as indicated in Fig. 2 of the drawings the sleeve H may be composed of two separate pieces driven into the outer sleeve J from its opposite ends and of such length as to leave the space K between their inner ends.

As before stated, the three sleeves H I J are firmly driven into one another, so that all three of them turn as a single sleeve or cylinder upon the tube A. They are confined thereon by a nut L, screwed upon the externally-threaded reduced extremity of the tube A, and it is adapted to receive the threaded nipple upon whose opposite end is fitted the end of the flexible hose leading to the air-reservoir or other source of motive-fluid supply. When the parts are turned to the position shown in Fig. 2, the passages E and F within the tube A are in free communication with each other through the ports E', cham-

ber K, and ports F', and the valve is open so that the motive fluid admitted to the right-hand end of the passage E will pass freely through the handle and out the left-hand passage F into the chamber within the drill-casing or to such other place as its force is to be utilized. Upon turning the outer sleeve J to the right, however, and thereby bringing the parts to the position shown in Fig. 3, the holes E'' F'' in the inner sleeve H will be carried out of register with the ports E' and F' in the tube A, and communication between the passages E and F be thereby cut off and the valve closed.

It will be understood from the description thus far given that upon turning the sleeve J to the right from the position shown in Fig. 1 the valve will be closed and upon turning it back to such position it will be opened. The sleeve J has a knurled exterior to enable it to be readily turned and to facilitate the grasp upon it as a handle.

The tube A is provided with a vent-hole *b*, opening into the passage F, Fig. 2, and the sleeves H I J are provided with a cooperating hole *c*, which is brought into register with the hole *b* when the valve is in closed position, as in Fig. 3, the two holes being carried out of register with each other when the parts are turned to open the valve, as indicated by the dotted lines in Fig. 5.

The sleeves upon the tube A do not extend to the left the full length of the reduced portion of said tube, leaving an annular space between their left-hand ends and the shoulder at *a*, nor does the inner sleeve H extend to the left the full length of the middle and outer sleeves. It terminates a short distance from their left-hand ends and is provided with a series of notches M, each having one wall *d* parallel with the longitudinal axis of the sleeve and its opposite wall *e* inclined thereto, as shown in Figs. 3 and 4. Surrounding the reduced portion of the tube A immediately at the right of the shoulder *a* is a sleeve N, whose right-hand end projects within the middle sleeve I and is provided with notches O, having opposite walls *d'* *e'*, corresponding to the walls *d* *e* of the notches M in the end of the sleeve H, Figs. 3 and 4. The sleeve N is provided upon its upper side with a longitudinal slot *e''*, in which fits a stud or pin *f*, projecting upward from the tube A. The sleeve N is thus prevented from turning on the tube A, and it cooperates as a stop with the sleeve H to limit the movement of the latter and the outer sleeves when turned in one direction or the other upon the tube A. When the sleeves H I J are turned to the right to close the valve, the contact of the abrupt walls or shoulders *d* *d'* of the notches in the adjacent sleeves H and N serve to limit the movement of the parts, while when they are turned in the opposite direction to open the valve the contact of the inclined walls *e* *e'* thereof serves to limit the movement of the parts in that direction. Now it will be understood that by

adjusting the stop-sleeve N toward the right or toward the left the limit of movement of the sleeves H I J may be correspondingly decreased or increased, their limit of movement toward the right to close the valve being always the same by contact of the abrupt shoulders *d* and *d'* of the notches in the sleeves H and N, but their movement in the opposite direction varying as the inclined walls *e* *e'* of the notches are brought toward or separated from each other. For the purpose of adjusting the sleeve N toward the right or toward the left to decrease or increase the limit of movement of the parts the left hand of said sleeve is exteriorly threaded and has fitted upon it an annular nut P, having a knurled exterior and confined between the shoulder *a* on the tube A and the pin *f*, projecting outward from said tube through the slot in the sleeve N. A washer Q surrounds the sleeve N between the nut P and the left-hand ends of the sleeves I J and is provided with a notch fitting over the pin *f*, which holds the washer from turning, and thereby prevents the movements of the sleeves H I J back and forth from being communicated to the nut P. By turning the nut in one direction or the other the sleeve N will be forced to the right or drawn to the left and the inclined walls *e'* of its notches advanced toward or withdrawn from the corresponding walls *e* of the notches M in the end of the sleeve H and the limit of opening movement of the valve thus regulated as desired.

It will be understood from the foregoing description that I have produced a very simple and convenient valve applicable to the handles of portable tools of various kinds, although capable of use elsewhere, and one provided with simple and ready means of adjustment by which its opening movement may be limited, as desired, to regulate the quantity of motive fluid passing through it.

While the particular construction and arrangement of parts which I have shown and described have been found advantageous, particularly from a constructive point of view, it will be understood that the novelty of my invention in its broader scope does not consist in the details of construction illustrated in the drawings. It is not essential that the cylinder or sleeve of the valve which turns upon the inner tube or handle shall be composed of three distinct and separate sleeves or tubes, so long as it is suitably formed to control communication between the passages E and F through the handle. I consider it advantageous, however, to employ the three separate sleeves, although the middle and outer sleeves I J may be formed integral with each other and have the chamber or passage K, formed upon their interior, while still employing the separate sleeve H, provided with notches at its left-hand end, if desired.

Having thus fully described my invention, I claim—

1. The combination of a tubular handle having an inlet-passage and an outlet-passage separated from each other, with a sleeve mounted to turn upon said handle and control communication between said passages, substantially as described.
2. The combination of the tube A having the inlet-passage E and outlet-passage F separated from each other and provided respectively with the ports E' and F', with a sleeve or cylinder mounted to turn upon the tube A and cooperate with the ports E' F' to control communication between the passages E and F, substantially as described.
3. The combination, with the tube A having the passages E F separated by the diaphragm G, and provided with the ports E' F', of a sleeve or cylinder fitting upon the tube A and provided with the chamber K and with the holes E'' F'' adapted to cooperate with the ports E' F' in the manner and for the purpose described.
4. The combination, with the tube A having the passages E and F separated by the diaphragm G, and provided with the ports E' F', of the sleeve H fitting upon the tube A and provided with the holes E'' F'' adapted to cooperate with the ports E' F', and an outer sleeve I J fast upon the sleeve H and provided with the chamber K, for the purpose described.
5. The combination, with the tube A having the passages E F separated by the diaphragm G, of the sleeve or cylinder fitting upon the tube A and composed of the three distinct tubes or sleeves H I J tightly driven into one another, the inner sleeve H being provided with the holes E'' F'' adapted to cooperate with the ports E' F', and the middle sleeve I being provided with the chamber K, as and for the purpose described.
6. The combination of a tubular handle having an inlet-passage and an outlet-passage separated from each other, with a sleeve or cylinder mounted to turn upon said tubular handle and controlling communication between said passages, and suitable stops for limiting the movement of the sleeve in opposite directions, substantially as described.
7. The combination of a tubular handle having an inlet-passage and an outlet-passage separated from each other, with a sleeve or cylinder mounted to turn upon said tubular handle and control communication between said passages, a stop for limiting the movement of the sleeve in one direction, to cut off communication between the passages, and an adjustable stop for limiting the movement of the sleeve in the opposite direction, to open communication between the passages, whereby the limit of opening movement of the valve may be regulated as desired.
8. The combination, with the tube A having the passages E F separated from each other and provided with the ports E' F', of a sleeve mounted to turn upon the tube A and provided with ports and passages cooperating with the ports E' F' to establish communication between the passages E and F when the sleeve is turned to one position, and to cut off such communication when the sleeve is turned to another position, and suitable stops for limiting the movement of the sleeve in opposite directions around the tube A, for the purpose described.
9. The combination, with the tube A having the passages E F separated from each other and provided with the ports E' F', of a sleeve mounted to turn upon the tube A and provided with ports and passages cooperating with the ports E' F' to establish communication between the passages E and F when the sleeve is turned to one position, and to cut off such communication when the sleeve is turned to another position, a suitable stop for limiting the movement of the sleeve in one direction around the tube A, to close the valve, and an adjustable stop for limiting its movement in the opposite direction, to open the valve, whereby the limit of opening movement of the valve may be regulated as desired.
10. The combination, with the tube A having the passages E and F separated from each other, of a sleeve or cylinder mounted to turn upon the tube A and provided with ports and passages adapted to establish communication between the passages E F when the sleeve is turned in one direction and to cut off such communication when the sleeve is turned in the opposite direction, a stop for limiting the closing movement of the sleeve around the tube, an adjustable stop for limiting the opening movement of the sleeve in the opposite direction, and an adjusting-nut surrounding and turning upon the tube A and controlling the position of the adjustable stop, whereby said stop may be adjusted to regulate the opening movement of the valve as desired.
11. The combination, with the tube A having the passages E and F separated from each other and the sleeve or cylinder mounted to turn upon the tube A and controlling communication between the passages E and F, of the stop-sleeve N movable longitudinally upon the tube A but held from turning thereon, and the adjusting-nut P engaging the threaded portion of the sleeve N and cooperating therewith in the manner and for the purpose described.
12. The combination, with the tube A having the passages E and F separated from each other, and the sleeve or cylinder fitting upon the tube A and controlling communication between the passages E and F, of the stop-sleeve N fitting upon the tube A and provided with the slot e'' through which passes the projection f upon the tube A, and the adjusting-nut P engaging the threaded portion of the sleeve N and confined between the projection f and the shoulder a on the tube A, for the purpose described.
13. The combination, with the tube A having the passages E and F separated from each other, and the sleeve or cylinder fitting upon

the tube A and controlling the communication between such passages, of the stop-sleeve N, also fitting upon the tube A and having the slot *e''* engaging the projection *f* upon the tube A, the adjusting-nut P fitting upon the threaded portion of the sleeve N and confined between the projection *f* and the shoulder *a* on the tube A, and the washer Q surrounding the sleeve N adjacent the nut P and having a notch engaging the projection *f* to hold the washer from turning, for the purpose described.

14. The combination, with the tube A having the passages E and F separated from each other, and the sleeve or cylinder fitting upon the tube A and controlling communication between the passages E and F and provided upon its inner surface near one end with the stop-surfaces *d e*, of the stop-sleeve N fitting upon the tube A and extending within the end of the first-mentioned sleeve or cylinder and provided with the stop-surfaces *d' e'* adapted to cooperate with the stop-surfaces *d e*, and means for holding the stop-sleeve N from turning upon the tube A and for effecting longitudinal adjustment of the sleeves relatively to each other, for the purpose described.

15. The combination, with the tube A having the passages E and F separated from each other, and the sleeve or cylinder mounted to turn upon the tube A and controlling communication between the passages E and F, said sleeve or cylinder being composed of the inner sleeve H provided at one end with the notches M and the outer sleeves I J projecting at said end beyond the end of the sleeve H, of the stop-sleeve N fitting upon the tube A and extending within the sleeves I J adjacent the end of the sleeve H, and provided with the notches O whose walls are adapted to cooperate with the walls of the notches M in the end of the sleeve H, said sleeve N being also exteriorly threaded at one end and provided with the longitudinal slot *e''* engaging the projection *f* upon the tube A, the adjusting-nut P fitting upon the threaded portion of the sleeve N and confined between the projection *f* and the shoulder *a* on the tube A, and the washer Q surrounding the sleeve N between the nut P and ends of the sleeves I J and provided with a notch fitting the projection *f*, for the purpose described.

16. The combination, with the tube A having the passages E and F separated from each other, and the sleeve or cylinder mounted to turn upon the tube A and controlling the communication between the passages E and F, said sleeve or cylinder being composed of the inner sleeve H provided at one end with the notches M and the outer sleeves I J projecting at said end beyond the end of the sleeve H, of the stop-sleeve N fitting upon the tube A and extending within the sleeves I J adjacent the end of the sleeve H; and provided with the notches O whose walls are adapted to cooperate with the walls of the notches M in the end of the sleeve H, said sleeve N being also exteriorly threaded at one end and provided with the longitudinal slot *e''* engaging the projection *f* upon the tube A, the adjusting-nut P fitting upon the threaded portion of the sleeve N and confined between the projection *f* and the shoulder *a* on the tube A, and the washer Q surrounding the sleeve N between the nut P and ends of the sleeves I J and provided with a notch fitting the projection *f*, for the purpose described.

16. The combination, with the tube A having the passages E and F separated from each other, and the sleeve or cylinder mounted to turn upon the tube A and controlling the communication between the passages E and F, said sleeve or cylinder being composed of the inner sleeve H provided at one end with the notches M and the outer sleeves I J projecting at said end beyond the end of the sleeve H, of the stop-sleeve N fitting upon the tube A and extending within the sleeves I J adjacent the end of the sleeve H; and provided with the notches O whose walls are adapted to cooperate with the walls of the notches M in the end of the sleeve H, said sleeve N being also exteriorly threaded at one end and provided with the longitudinal slot *e''* engaging the projection *f* upon the tube A, the adjusting-nut P fitting upon the threaded portion of the sleeve N and confined between the projection *f* and the shoulder *a* on the tube A, and the washer Q surrounding the sleeve N between the nut P and ends of the sleeves I J and provided with a notch fitting the projection *f*, for the purpose described.

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