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PNEUMATIC DEVICE FOR CLEANING BOILER TUBES

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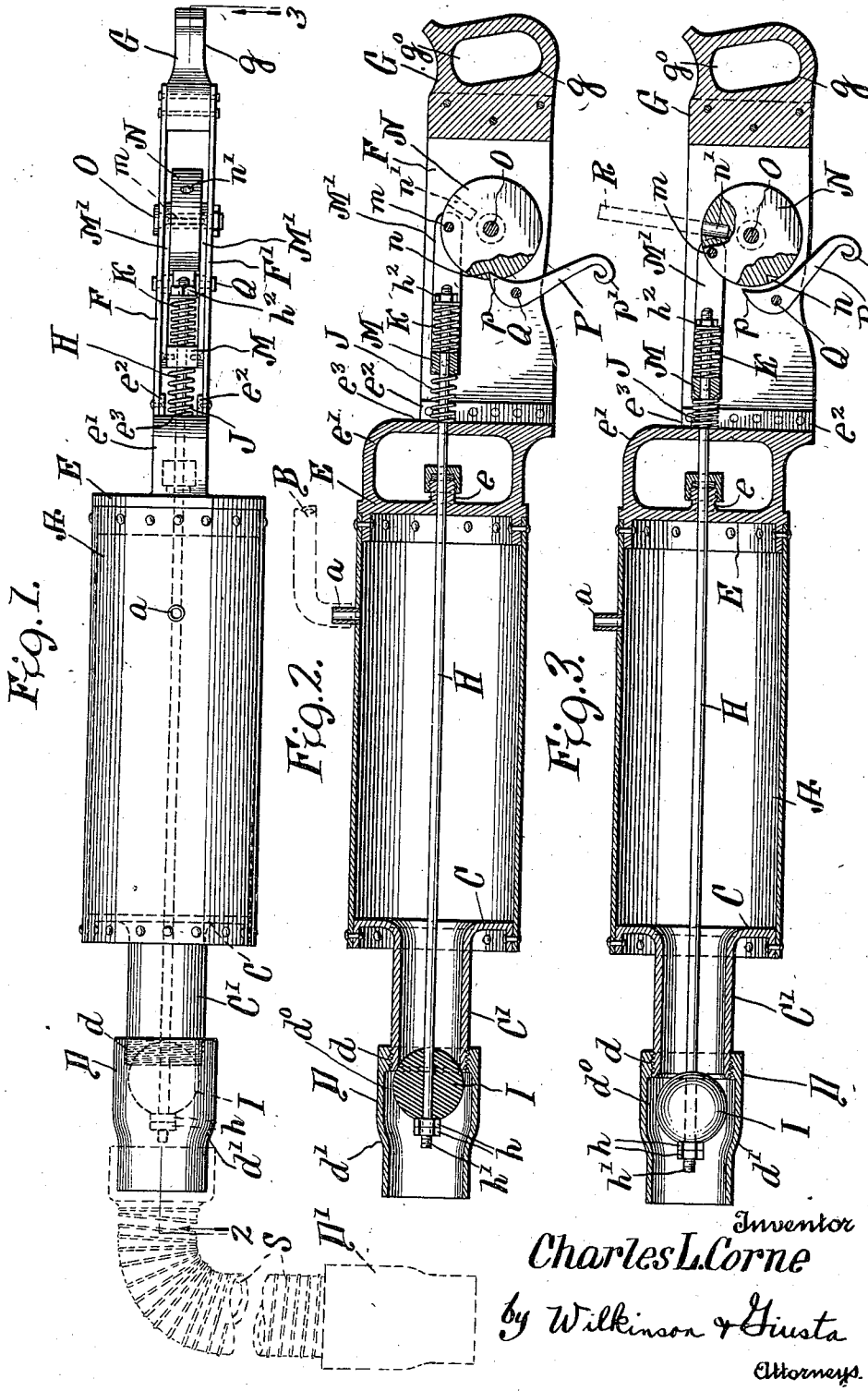


Fig. 1.

Fig. 2.

Fig. 3.

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PNEUMATIC DEVICE FOR CLEANING BOILER TUBES.

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To all whom it may concern:

Be it known that I, CHARLES LOUIS CORNE, a citizen of the United States, residing at Broussard, in the parish of Lafayette and State of Louisiana, have invented certain new and useful Improvements in Pneumatic Devices for Cleaning Boiler Tubes, of which the following is a specification.

My present invention relates to improvements in a pneumatic device for cleaning out fire tube boilers, smoke stacks, chimneys, or the like, by subjecting the passage to be cleaned to a sudden blast of air or other gas under high pressure. While steam or other gas under high pressure may be used, compressed air is preferred because it can be easily secured and can be handled without any danger of injury to the user or bystanders.

The invention consists in providing an appliance, as will be hereinafter described, in which a sufficient volume of compressed air may be stored and suddenly released through a contracted orifice, creating a very strong draft in the passageway to be cleaned out, and causing the soot and other solid particles to form in effect a piston which will scour out the passage when pressure is suddenly applied.

For brevity of description I have called the device a "pneumatic gun," since it operates on the same general principle as a gun, but without any projectile other than the imprisoned gas.

My invention will be more fully understood after reference to the accompanying drawings, in which like parts are indicated by similar reference symbols throughout the several views, and in which:—

Figure 1 is a plan view showing the complete apparatus in full lines, with the delivery hose shown in dotted lines.

Figure 2 shows a central vertical section through Fig. 1 along the line 2—2 of said figure, with the valve closed and parts of the gun in the cocked position: and

Figure 3 is a similar view to Fig. 1, but shows the valve in the open position, and parts of the gun in the corresponding or released position.

A represents a cylindrical barrel adapted to sustain a suitable pneumatic pressure, which is supplied through any suitable nozzle opening a and hose B indicated in dotted lines in Fig. 2. Suitable means (not shown) for turning on and cutting off the source of supply of fluid pressure will, of course, be provided.

The barrel A is closed at its forward end by the annular head C' terminating in the cylindrical projection C', which serves as a passage for the escaping air and to which the nozzle D is attached, as by screwing on as at d. The bore of this nozzle is preferably enlarged, as at d^0, to permit clearance around the valve when it is released, and is tapered inwards as at d'.

The other end of the cylinder A is closed by the head E which is provided with a gland e for the valve rod, and with a grip piece e', preferably provided with flanges e^2, to which the side plates F and F' of the stock are connected. These side plates are connected at their rear ends to the shoulder piece or butt of the stock G, which is provided with the opening g^0 to form a convenient hand grip g.

H represents the valve rod which slides through the gland e and carrries near its forward end the valve I, which is preferably made of rubber or the like, in the form of a ball, and is held in place by means of the nuts h on the screw-threaded portion h' of said rod. Any suitable form of valve may be adopted, but a rubber ball may be conveniently seated and does not require nice adjustment.

Mounted on the valve rod H, near its forward end, are the compression spring J and the safety spring K. The cushion spring J bears at one end on the rear face e^3 of the grip piece e', and at its other end on the cross bar M of the cocking yoke whose sides M' are pivoted, as at m, to the sear block N. The safety spring K is held under the desired degree of compression between the cross bar M and the nut h^2 screwed on the rear end of the valve rod H. By setting up on this nut h^2 the compression of the spring K may be varied within limits as desired.

The sear block N may be of any convenient shape, but is shown in the form of a disk journaled on the pivot pin O extending across the stock. This sear block is notched as at n to engage the nose p of the trigger P, and is also notched as at n' to receive the cocking bar R, as shown most clearly in Fig. 3. The trigger P is pivoted on the pin Q extending transversely of the stock, and this trigger is so arranged that the arm p' will cause the trigger to normally swing by gravity into engagement with the trigger

notch *n;* but if desired a trigger spring (not shown) may be introduced to cause the trigger to positively engage the sear block.

The nozzle D may be directly inserted in the tube or passageway to be cleaned out, and for convenience of operation I preferably attach to the nozzle end of the gun a hose S having a small nozzle D′ which may be forced tight into the boiler tube.

The operation of the device is as follows: Suppose the barrel A to be supplied with air or other fluid under pressure, and the parts to be in the position shown in Fig. 2, the valve being closed by the compression of the safety spring K which overcomes the pressure of the fluid on the valve, to fire the gun, insert the nozzle D or D′, as the case may be, in the tube or passageway to be cleaned and pull the trigger P. This will release the sear block and the cocking yoke, and will permit the cocking yoke to fly forwards under the pressure exerted by the compressed air on the valve. The valve will quickly open and the cushion spring J will be compressed, lessening the shock which would normally occur when the valve is suddenly opened. The parts will now assume the position shown in Fig. 3, and will remain in that position as long as the fluid pressure is supplied to the cylinder A.

When the operation is completed, turn off the fluid pressure and insert the cocking bar R in the socket *n′* and restore the parts to the initial position shown in Fig. 2, when the nose *p* of the trigger will engage in the notch *n* in the sear block N, and the gun will become cocked with the valve closed again. It will be obvious that the cocking bar R may be permanently connected to the sear block, but for convenience of use I prefer to have this bar a separate member which may be attached to the gun as by a chain, or carried entirely separate from the gun. Any metal bar of proper dimensions will be suitable for this purpose.

It will be seen that the device is protected against excessive pressures occurring in the barrel A by means of the safety spring K which is set to the desired degree of compression as before described. When the pressure in the barrel exceeds a predetermined limit, the pressure on the valve I will exceed the retractive force of the safety spring K and the valve will open partly, relieving the pressure in the barrel A. It will thus be noted that this valve I is held on its seat by an arrangement which will yield and permit the valve to open when the pressure in the barrel becomes excessive.

The gun may be applied to cleaning out smoke stacks of various kinds, chimneys or the like where a sudden rush of air will blow loose the soot and solid matter accumulating on the walls of the passageway; but the invention is especially effective for cleaning out the fire tubes of boilers, and while it may be used without the hose connection S by simply inserting the nozzle D in the tube, it will be much more convenient to have a flexible hose connection S and a separate nozzle D′ therefor, as shown in Fig. 1. This arrangement will permit the convenient operation of the device, one operator placing the nozzle D′ tightly in the end of the boiler tube, and the other operator firing the gun.

It will be obvious that nozzles D′ of various kinds may be attached to the hose S for making a tight fit with fire tubes of various kinds which may be found in fire tube boilers. Where the device is used in a smoke stack or chimney it is not essential to make a tight joint, as a rush of air occasioned by firing the gun will accomplish the desired result in a satisfactory way.

It will be obvious that various changes might be made in the construction, combination and arrangement of parts which could be used without departing from the spirit of my invention; and I do not mean to limit the invention to such details except as particularly pointed out in the claims.

Having thus described my invention what I claim and desire to secure by Letters Patent of the United States is:

1. A pneumatic gun for cleaning out tubes of boilers, comprising a cylindrical barrel with means for supplying compressed air to same, a head mounted in one end of said barrel and provided with a nozzle, a second head closing the opposite end of said barrel and provided with a packing gland, a stock connected to said second head, a valve rod passing through said barrel and said gland, a valve mounted on said rod near one end thereof and adapted to close said nozzle, a yoke having a cross bar slidably mounted on said rod near the other end thereof, a notched sear block journalled in said stock and pivotally connected to the arms of said yoke, a trigger pivoted to said stock and normally engaging said sear block to hold the valve rod in the retracted position, and a safety spring normally pressing said valve rod rearward in said yoke to keep the valve closed, but yielding to open said valve when the pressure in the barrel becomes excessive.

2. A pneumatic gun for cleaning out tubes of boilers, comprising a cylindrical barrel with means for supplying compressed air to same, a head mounted in one end of said barrel and provided with a nozzle, a second head closing the opposite end of said barrel and provided with a packing gland, a stock connected to said second head, a valve rod passing through said barrel and said gland, a valve mounted on said rod near one end thereof and adapted to close said nozzle, a yoke having a cross bar slidably mounted on said rod near the other end thereof, a notched sear block journalled in said stock

and pivotally connected to the arms of said yoke, a trigger pivoted to said stock and normally engaging said sear block to hold the valve rod in the retracted position, and a safety spring normally pressing said valve rod rearward in said yoke to keep the valve closed, but yielding to open said valve when the pressure in the barrel becomes excessive, the said safety spring pressing forwards on said cross bar, with a cushion spring engaging the opposite side of said cross bar, to lessen the shock when said trigger is released and said valve flies forward under pneumatic pressure.

3. A pneumatic gun for cleaning out tubes of boilers, comprising a cylindrical barrel with means for supplying compressed air to same, a head mounted in one end of said barrel and provided with a nozzle, a second head closing the opposite end of said barrel and provided with a packing gland, a stock connected to said second head, a valve rod passing through said barrel and said gland, a valve mounted on said rod near one end thereof and adapted to close said nozzle, a yoke having a cross bar slidably mounted on said rod near the other end thereof, a notched sear block journaled in said stock and pivotally connected to the arms of said yoke, a trigger pivoted to said stock and normally engaging said sear block to hold the valve rod in the retracted position, a cocking bar adapted to rock said sear block to the cocked position, and a safety spring normally pressing said valve rod rearward in said yoke to keep the valve closed, but yielding to open said valve when the pressure in the barrel becomes excessive.

4. A pneumatic gun for cleaning out tubes of boilers, comprising a cylindrical barrel with means for supplying compressed air to same, a head mounted in one end of said barrel and provided with a nozzle, a second head closing the opposite end of said barrel and provided with a packing gland, a stock connected to said second head, a valve rod passing through said barrel and said gland, a valve mounted on said rod near one end thereof and adapted to close said nozzle, a yoke having a cross bar slidably mounted on said rod near the other end thereof, a notched sear block journaled in said stock and pivotally connected to the arms of said yoke, a trigger pivoted to said stock and normally engaging said sear block to hold the valve rod in the retracted position, a cocking bar adapted to rock said sear block to the cocked position, and a safety spring normally pressing said valve rod rearward in said yoke to keep the valve closed, but yielding to open said valve when the pressure in the barrel becomes excessive, the said safety spring pressing forwards on said cross bar, with a cushion spring engaging the opposite side of said cross bar, to lessen the shock when said trigger is released and said valve flies forward under pneumatic pressure.

5. A pneumatic gun for cleaning out tubes of boilers, comprising a cylindrical barrel with means for supplying compressed air to same, a head mounted in one end of said barrel and provided with a nozzle, a flexible hose connected to said nozzle and provided at its outer end with a tapered nozzle adapted to fit in the tube to be cleaned, a second head closing the opposite end of said barrel and provided with a packing gland, a stock connected to said second head, a valve rod passing through said barrel and said gland, a valve mounted on said rod near one end thereof and adapted to close said nozzle, a yoke having a cross bar slidably mounted on said rod near the other end thereof, a notched sear block journaled in said stock and pivotally connected to the arms of said yoke, a trigger pivoted to said stock and normally engaging said sear block to hold the valve rod in the retracted position, and a safety spring normally pressing said valve rod rearward in said yoke to keep the valve closed, but yielding to open said valve when the pressure in the barrel becomes excessive.

6. A pneumatic gun for cleaning out tubes of boilers, comprising a cylindrical barrel with means for supplying compressed air to same, a head mounted in one end of said barrel and provided with a nozzle, a flexible hose connected to said nozzle and provided at its outer end with a tapered nozzle adapted to fit in the tube to be cleaned, a second head closing the opposite end of said barrel and provided with a packing gland, a stock connected to said second head, a valve rod passing through said barrel and said gland, a valve mounted on said rod near one end thereof and adapted to close said nozzle, a yoke having a cross bar slidably mounted on said rod near the other end thereof, a notched sear block journaled in said stock and pivotally connected to the arms of said yoke, a trigger pivoted to said stock and normally engaging said sear block to hold the valve rod in the retracted position, and a safety spring normally pressing said valve rod rearward in said yoke to keep the valve closed, but yielding to open said valve when the pressure in the barrel becomes excessive, the said safety spring pressing forwards on said cross bar, with a cushion spring engaging the opposite side of said cross bar, to lessen the shock when said trigger is released and said valve flies forward under pneumatic pressure.

7. A pneumatic gun for cleaning out tubes of boilers, comprising a cylindrical barrel with means for supplying compressed air to same, a head mounted in one end of said barrel and provided with a nozzle, a flexible

hose connected to said nozzle and provided at its outer end with a tapered nozzle adapted to fit in the tube to be cleaned, a second head closing the opposite end of said barrel and provided with a packing gland, a stock connected to said second head, a valve rod passing through said barrel and said gland, a valve mounted on said rod near one end thereof and adapted to close said nozzle, a yoke having a cross bar slidably mounted on said rod near the other end thereof, a notched sear block journaled in said stock and pivotally connected to the arms of said yoke, a trigger pivoted to said stock and normally engaging said sear block to hold the valve rod in the retracted position, a cocking bar adapted to rock said sear block to the cocked position, and a safety spring normally pressing said valve rod rearward in said yoke to keep the valve closed, but yielding to open said valve when the pressure in the barrel becomes excessive.

8. A pneumatic gun for cleaning out tubes of boilers, comprising a cylindrical barrel with means for supplying compressed air to same, a head mounted in one end of said barrel and provided with a nozzle, a flexible hose connected to said nozzle and provided at its outer end with a tapered nozzle adapted to fit in the tube to be cleaned, a second head closing the opposite end of said barrel and provided with a packing gland, a stock connected to said second head, a valve rod passing through said barrel and said gland, a valve mounted on said rod near one end thereof and adapted to close said nozzle, a yoke having a cross bar slidably mounted on said rod near the other end thereof, a notched sear block journaled in said stock and pivotally connected to the arms of said yoke, a trigger pivoted to said stock and normally engaging said sear block to hold the valve rod in the retracted position, a cocking bar adapted to rock said sear block to the cocked position, and a safety spring normally pressing said valve rod rearward in said yoke to keep the valve closed, but yielding to open said valve when the pressure in the barrel becomes excessive, the said safety spring pressing forwards on said cross bar, with a cushion spring engaging the opposite side of said cross bar, to lessen the shock when said trigger is released and said valve flies forward under pneumatic pressure.

CHAS. LOUIS CORNE.