J. T. McGRATH.

FLUE EXPANDER.

APPLICATION FILED AUG. 15, 1910.

1,037,789.

Patented Sept. 3, 1912.

4 SHEETS—SHEET 1.

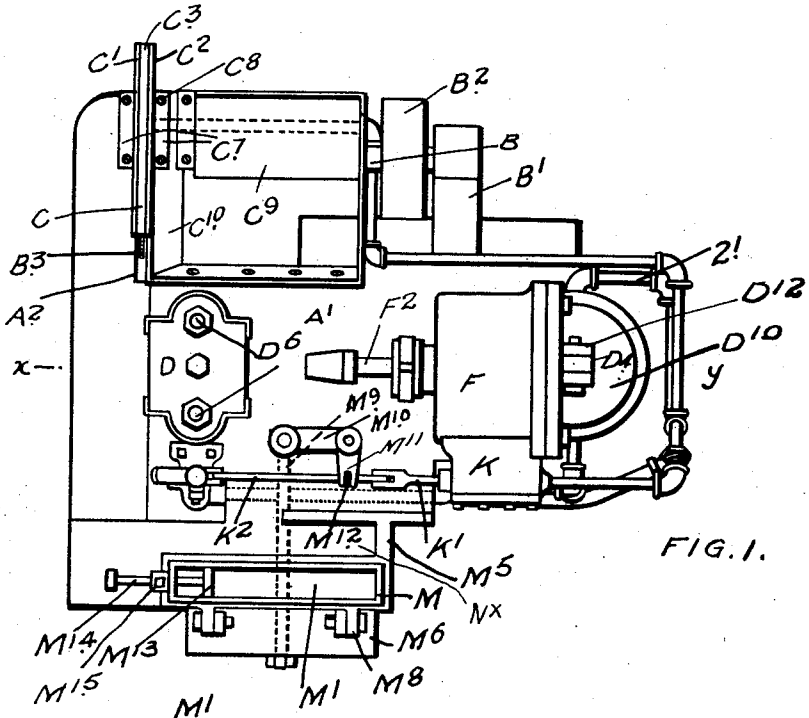


FIG. 1.

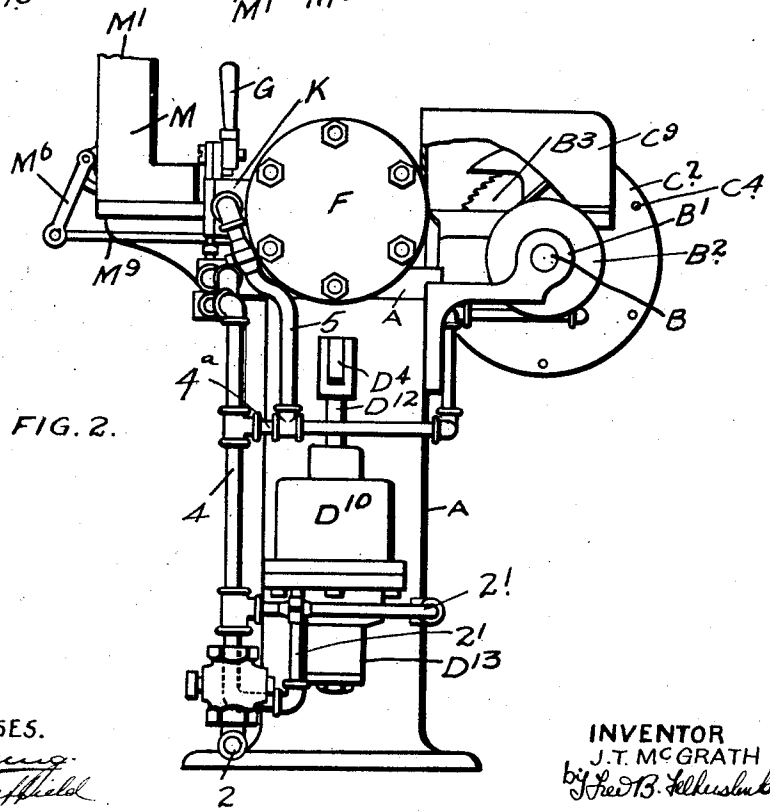


FIG. 2.

WITNESSES.

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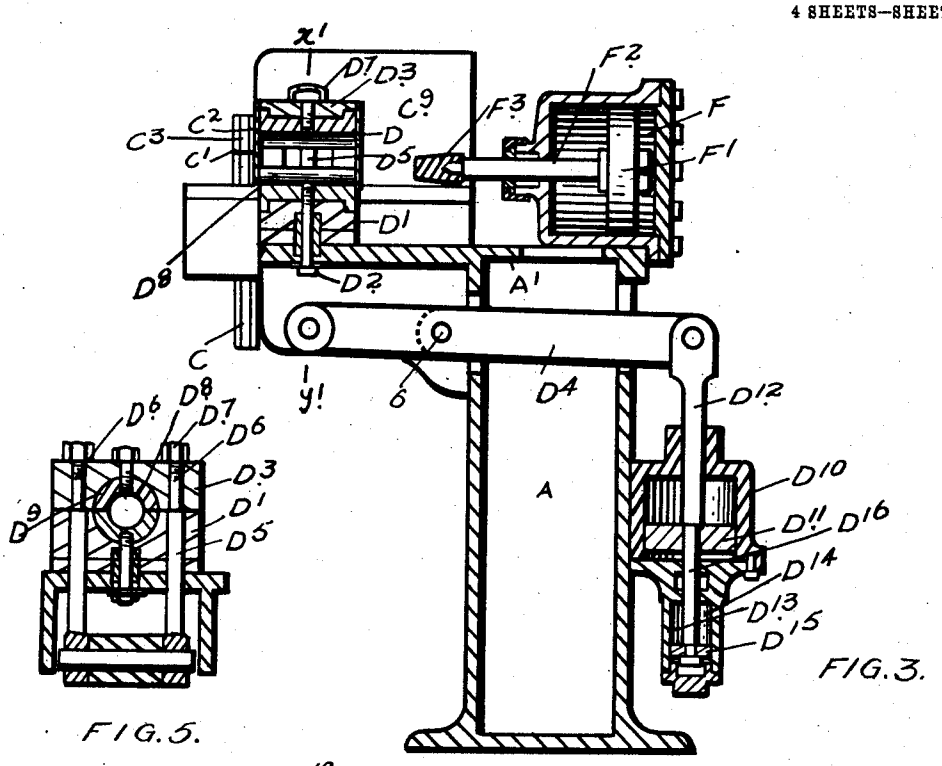


FIG. 3.

FIG. 5.

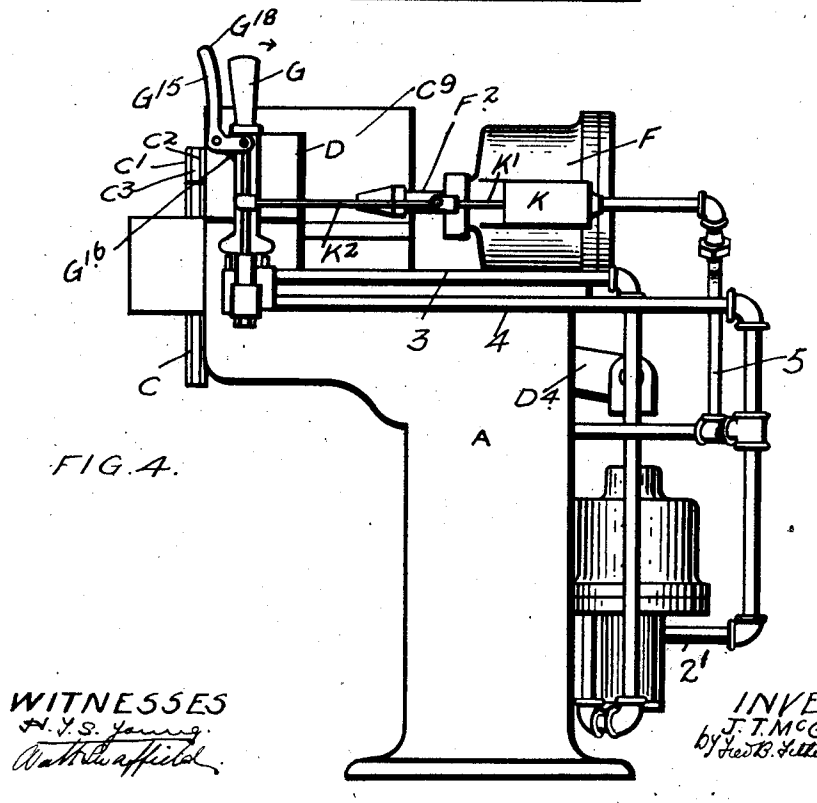


FIG. 4.

WITNESSES

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4 SHEETS—SHEET 3.

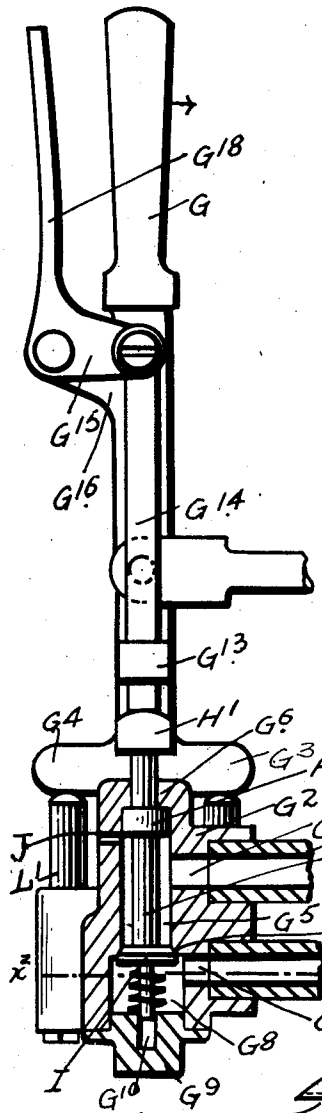


FIG. 6.

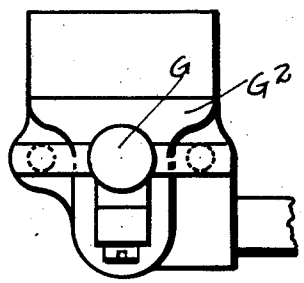


FIG. 9.

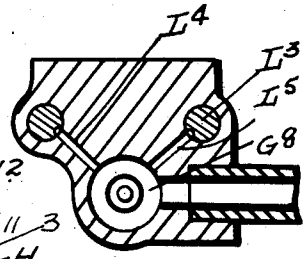


FIG. 10

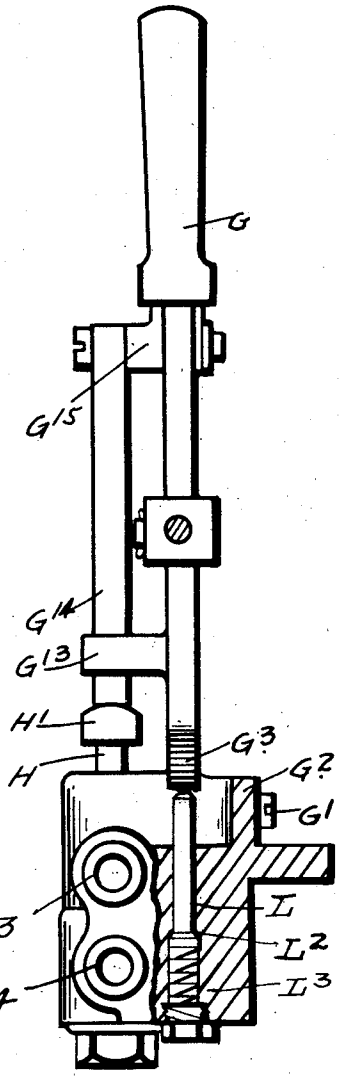


FIG. 7.

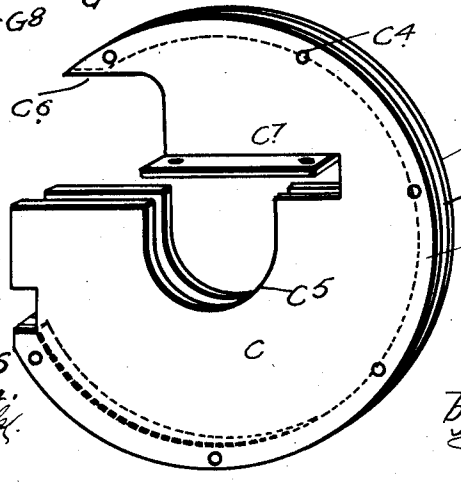


FIG. 8.

WITNESSES

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4 SHEETS—SHEET 4.

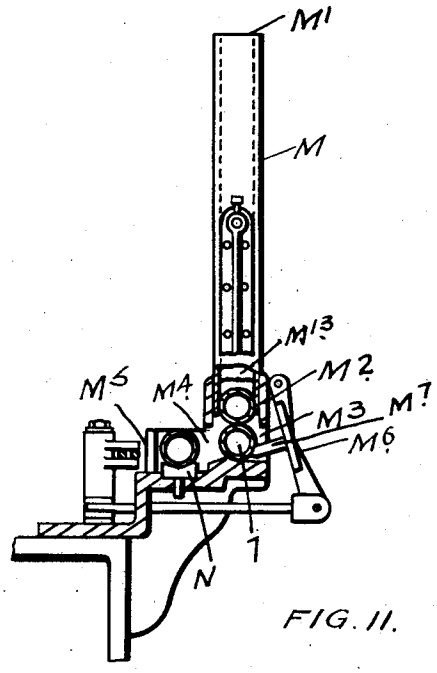


FIG. 11.

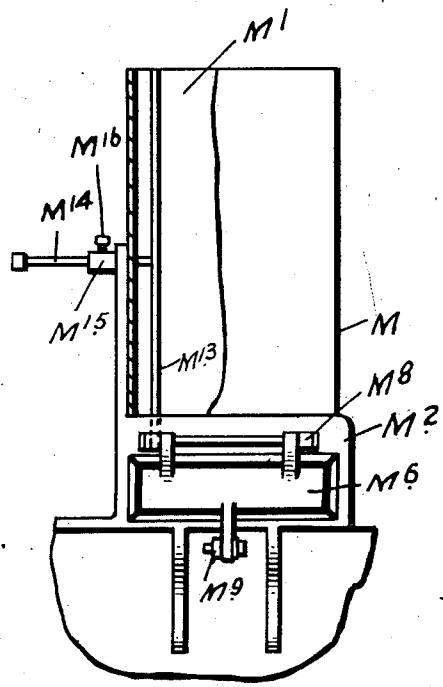


FIG. 12.

WITNESSES.

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UNITED STATES PATENT OFFICE.

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FLUE-EXPANDER.

1,037,789. Specification of Letters Patent. Patented Sept. 3, 1912.

Application filed August 15, 1910. Serial No. 577,185.

To all whom it may concern:

Be it known that I, JOHN THOMAS McGRATH, a citizen of the United States, and a resident of the city of Battle Creek, in the county of Calhoun, in the State of Michigan, one of the United States of America, have invented certain new and useful Improvements in Flue-Expanders, of which the following is the specification.

My invention relates to improvements in a machine for cutting off and expanding the ends of flues, and adjusting the safe ends thereto, and the object of the invention is to devise a simple and quick operating machine by which the fag ends may be cut from the flue, the end of the flue expanded, and the safe ends fed into position for driving into the expanded end of the flue and it consists essentially of a main base forming a table, a shaft journaled on the table, a saw mounted on the shaft operating in a slot in the table, a suitable guard for the saw, a receiving hopper for the fag ends, a pneumatically operated clamping device for holding the flues, a pneumatically operated expander coöperating therewith, a safe end magazine, a means for feeding the safe ends one at a time into position for driving into the previously expanded ends of the flue as hereinafter more particularly explained.

Figure 1, is a plan view of my machine. Fig. 2, is a side elevation of my machine. Fig. 3, is a cross sectional line on *x*—*y* Fig. 1. Fig. 4, is a rear elevation of the machine with the magazine mechanism removed. Fig. 5, is a sectional view taken on line *x'*—*y'* Fig. 3. Fig. 6, is an enlarged detail sectional elevation of the main operating lever. Fig. 7, is an elevation partially in section at right angles to Fig. 6. Fig. 8, is an enlarged perspective detail of the saw guard. Fig. 9, is a plan view of the operating lever and valve casing. Fig. 10, is a sectional view taken on line x^2—y^2 Fig. 6. Fig. 11, is a side elevation partially in section of the safe and magazine. Fig. 12, is a front elevation of the magazine.

In the drawings like reference characters indicate corresponding parts in each figure.

A is the main base of my machine forming a table A'.

B is the main shaft journaled in brackets B' secured to the main base A.

B^2 is a pulley mounted on the shaft B. B^3 is a saw also mounted on the shaft B and operating in a slot A^2 formed in the table A'.

C is a saw guard comprising the plates C' and C^2, and the segmental spacing bar C^3 inserted between the plates C' and C^2 and secured therein by the rivets C^4. The plates C' and C^2 are provided with U-shaped orifices C^5 through which the main shaft B extends.

C^6 is an orifice formed in each plate C' and C^2 into which the saw projects. C^7 are securing flanges by which the plates C' and C^2 are secured to the table A' by suitable bolts or screws C^8.

C^9 is the receiving hopper for the fag ends provided with an inclined portion C^{10} next to the saw. The ends of the flues are previously heated and placed upon the table A' in front of the saw and fed into the orifice C^6. The fag end of the flue projects over the inclined portion C^{10} of the hopper. The fag end of the flue when severed drops into the hopper and the body of the flue is passed into the clamping device ready for expanding. Such device I will now describe.

D is a chuck forming a clamping device comprising the stationary member D' secured to the table A' by suitable means, such as a screw D^2 and movable member D^3.

D^4 is an operating lever pivoted at 6 and designed to raise and lower the movable member D^3 of the chuck.

D^5 are arms slidably held in the stationary member D' and pivoted at their lower end to the lever D^4. The upper ends of the arms D^5 are provided with reduced threaded portions D^6, which extend through the movable member D^3 of the chuck.

D^7 are nuts threaded on to the portions D^6, so as to connect the arms D^5 to the member D^3. The members D' and D^3 are provided with opposing concaved portions into which fit suitable bushings D^9.

D^{10} is a pneumatic cylinder provided with a piston D^{11} and piston rod D^{12}, pivotally connected at its upper end to the lever D^4. The lower end of the cylinder D^{10} is provided with an extension D^{13} in which is formed a supplemental cylinder D^{14} provided with a piston D^{15} and piston rod D^{16} forming an extension of the main piston rod D^{12}.

F is a cylinder for operating the expander

provided with a piston F′ and a piston rod F² to the outer end of which is secured the tapered expander F³.

I will now describe the means by which the air is supplied from the main 2 to the cylinders D¹⁰, D¹³, and F, so as to operate the expander F³ and the holding chuck member D³.

2′ is a pipe leading from the main 2 into the supplemental cylinder D¹³ above the piston D¹⁵. It will be noticed that the surface area of the piston D¹⁵ is much less than the surface area of the piston D¹¹ and it will be understood that the upper surface of the piston D¹⁵ is always subject to the pressure of the air from the main.

G is the main operating lever pivotally supported at its lower end on the stud G′ extending through suitable portions of the valve casing G². The lever G is provided in proximity to its lower end with laterally extending wings or lugs G³ and G⁴. The valve casing G² is provided with a vertical tubular chamber G⁵ having an orifice G⁶ of less diameter at the upper end thereof and a valve seat G⁷ at the lower end thereof.

G⁸ is a chamber located beneath the chamber G⁵ and communicating therewith. The lower end of the chamber G⁵ is provided with a suitable closing plug G⁹ having a central bore G¹⁰.

G¹¹ is a passage way connecting with the chamber G⁵, and G¹² is a passage-way connecting with the chamber G⁸.

H is a stem extending through the orifice G⁶ and chamber G⁵. The stem H is provided at its upper end with a head H′ having a convex upper face concentric to the pivot point of the operating lever. The stem H is also provided with an enlargement H² located intermediately of its ends and located normally at the top of the chamber G⁸.

I is a spring pressed valve normally resting against the seat G⁷ formed at the bottom of the chamber G⁵. The lower end of the stem H is designed to rest upon the top of the valve I.

G¹³ is a lug extending from the lever G.

G¹⁴ is a rod extending loosely through the lug G¹³.

G¹⁵ is a bell crank lever pivotally secured at the upper end of the rod G¹⁴ and to the lug G¹⁵ forming part of the operating lever. The bell crank lever G¹⁵ is provided with an operating handle G¹⁸.

3 is a pipe leading from the passage-way G¹¹ to the lower part of the cylinder D¹¹.

4 is a pipe leading from the passage-way G¹² to the main 2.

K is a slide valve chamber of any suitable construction designed to supply air to the cylinder F. K′ in an operating rod thereof and K² is a link rod connecting the rod K′ with the operating lever.

5 is a pipe leading from the pipe 4ª (which is connected to pipe 4) to the slide valve chamber K.

When it is desired to close the clamping device by lowering the member D³ toward the member D′ I press the handle G¹⁸ toward the handle of the operating lever G, thereby forcing the rod G¹⁴ downwardly against the head H′ of the stem H and thereby carrying the stem downwardly against the spring pressed valve G⁷ to open it. By this operation air is admitted from the main through the pipe 4 and passage-way G¹² through the chambers G⁸ and G⁵, passage-way G¹¹ and pipe 3 leading into the cylinder D¹⁰ beneath the piston D¹¹, thereby forcing it upwardly against the pressure exerted on the piston D¹⁵. By the above movement of the piston D¹¹ the lever D⁴ is carried upwardly, thereby lowering the opposite end of the lever and consequently the rods D⁵ and member D³ connected thereto.

J is an exhaust port extending between the atmosphere and the chamber G⁵.

It will be readily understood that when the stem H is lowered that the enlargement H² covers the exhaust port J. Immediately the handle G¹⁸ is released the pressure of the spring pressed valve I forces the stem H upwardly carrying the enlargement H² above the exhaust port J and allowing the air to exhaust from the cylinder D¹⁰ through the pipe 3 and the chamber G⁵ with which the exhaust port J communicates. As soon as the exhaust has taken place through the port J the pressure from the main on the piston D¹⁵ operates to lower such piston and the piston D¹¹ thereby carrying the member D³ upwardly to its normal position. Immediately the member D³ has been lowered as above described so as to clamp the flue between itself and the stationary member D′ I throw the operating lever G in the opposite direction indicated by the arrow, thereby forcing the valve rod K′ longitudinally, so as to carry the slide valve K longitudinally to open the ports thereof to admit air behind the piston F′ forcing the expander F³ forwardly into the flue to expand the same. To carry the piston in the reverse so as to withdraw the expander I throw the piston in the direction to that indicated by arrow so as to admit air to the opposite side of the piston F′.

To hold the operating lever G normally in a vertical position I provide the following: L are cylindrical bores formed in that portion of the valve casing G² immediately beneath the lugs G³ and G⁴. L′ and L² are stems fitting the bores. It will be seen from Fig. 7 that the stems L′ and L² are provided with shoulders which normally bear against correspondingly formed shoulders in the cylindrical bores L. A spiral spring is located beneath the stems. L³ are screw

plugs for closing the lower end of the bores. L^4 and L^5 are ducts leading from the chamber G^8 beneath the stems L′ and L^2. By this means it will be seen that an upward air pressure will always be exerted on the stems L′ and L^2, thereby serving to hold the operating lever G normally in a central position. When the flue has been expanded the safe end is then driven thereinto.

I will now describe the mechanism by which the safe ends are automatically fed into position to be driven into the expanded flue.

It will, of course, be understood that one end of the safe end is tapered, so that it can be driven into the expanded end of the flue.

M is a safe end magazine comprising a chute M′ secured in a base casting M^2 secured to the table A′ of the machine. The casting M^2 is provided with opposing slots M^3 and M^4 and a retaining wall M^5.

M^6 is a gate provided with a rib or tongue M^7 projecting through the slot M^3 against the lowermost safe end 7 contained in the magazine.

The gate M^6 is hinged on lugs M^8 extending from the base casting M^2.

M^9 is an operating link rod.

M^{10} is a bell crank lever pivotally supported on the table A′ and pivotally connected at one end to the rod M^9 and provided at its opposite end with a fork M^{11} engaging a pin M^{12} extending upwardly from the link rod K^2.

To adjust the length of the chute M′ to any length of safe end I provided a vertical plate M^{13} secured to a rod M^{14} slidably held in a bearing M^{15} in which it may be secured in any position by a set screw M^{16}.

It will be readily seen that each time the operating lever G is moved to open the valve K to withdraw the expander that the bell crank M^{10} will be operated by reason of its connection to the rod K^2. The bell crank M^{10} is connected to the gate M^6 and carries such gate toward the base casting M^2 and the projection M^7 through slot M^3 against the lowermost safe end 7 throwing it forwardly through the slot M^4 into a suitable holding chamber N^x, opposite to which is a supporting device N for the flue, so that the flue can be connected with the safe end.

From this description it will be seen that I have devised a device, whereby the fag ends may be cut from the flue, the end of the flue expanded and the safe end held in position ready to receive the expanded end of the flue.

What I claim as my invention is.

1. A machine for expanding flues comprising a clamp, an expander, means for operating the clamp and expander by compressed fluid and a lever for controlling the flow of fluid to said means so as to first operate the clamp and then the expander.

2. A machine for expanding flues comprising a clamp, a power operated piston connected therewith, an expander, a power operated piston for the same and a lever for controlling the operation of the pistons, substantially as described.

JOHN THOS. McGRATH.

Witnesses:
THOMAS J. TAYLOR,
JNO. B. LIVINGSTON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."