

(No Model.)

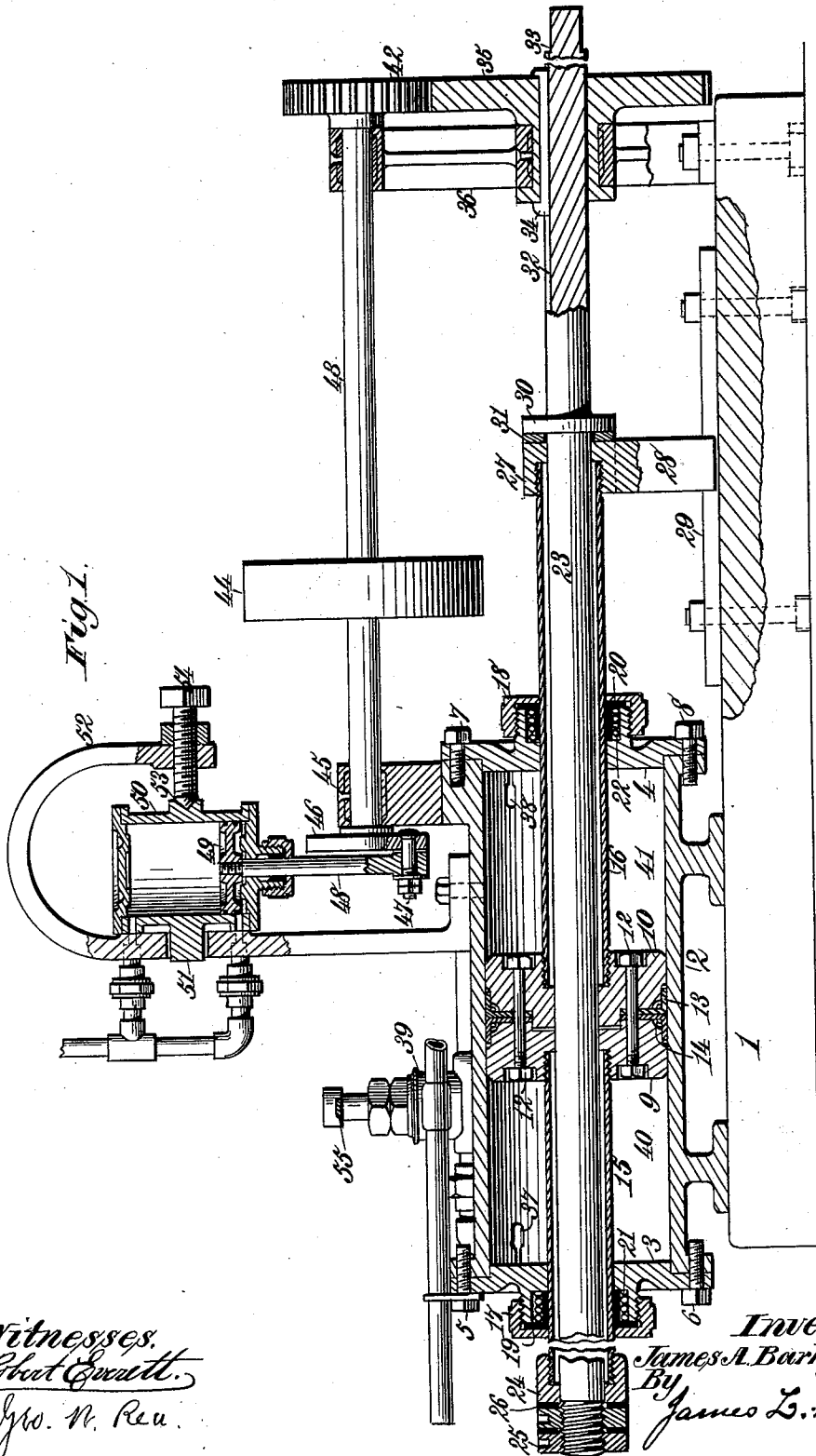
2 Sheets—Sheet 1.

J. A. BARHYDT.

MACHINE FOR OPERATING FLUE EXPANDERS.

No. 564,139.

Patented July 14, 1896.

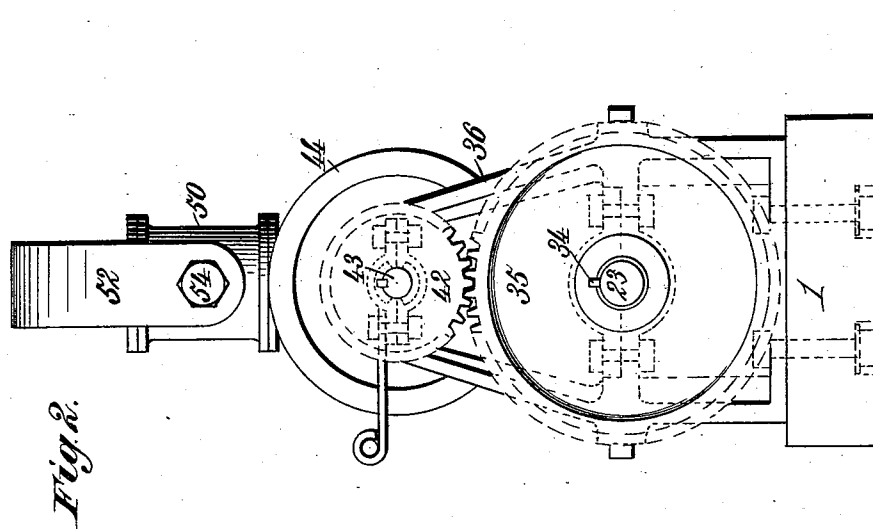
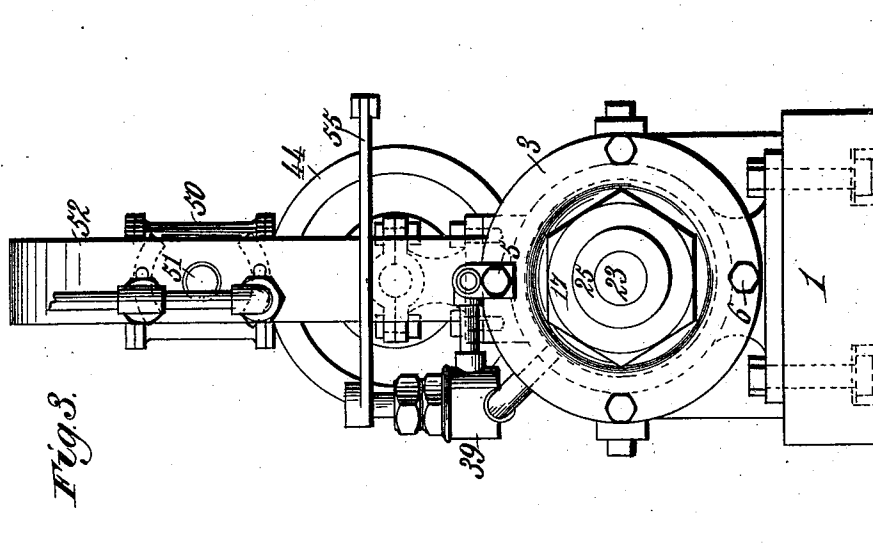


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MACHINE FOR OPERATING FLUE EXPANDERS.

No. 564,139.

Patented July 14, 1896.



Witnesses.
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Geo. W. Rea

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UNITED STATES PATENT OFFICE.

JAMES A. BARHYDT, OF ROCHESTER, NEW YORK, ASSIGNOR OF ONE-HALF
TO CHARLES E. TURNER, OF SAME PLACE.

MACHINE FOR OPERATING FLUE-EXPANDERS.

SPECIFICATION forming part of Letters Patent No. 564,139, dated July 14, 1896.

Application filed December 28, 1895. Serial No. 573,599. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. BARHYDT, a citizen of the United States, residing at Rochester, in the county of Monroe and State of New York, have invented new and useful Improvements in Machines for Operating Flue-Expanders, of which the following is a specification.

This invention relates to that class of machines for expanding the ends of flue-tubes and similar articles wherein a rotating tapering pin or mandrel is forced into a flue-expanding device for rotating and expanding the usual rollers forming a part of such device.

The chief object of my present invention is to provide new and improved means for rotating the pin or mandrel, and concurrently therewith longitudinally reciprocating or moving the same back and forth in the direction of the length of the pin or mandrel.

The invention also has for its object to provide new and improved cylinder and feed-piston mechanism for reciprocating or moving the pin or mandrel longitudinally back and forth, whereby the feed-piston is perfectly balanced and its timely movements are under absolute control of the attendant or operator.

The invention also has for its object to provide a new and improved fluid-actuated mechanism for axially rotating and longitudinally reciprocating the pin or mandrel, which expands and rotates the rollers composing the expander device to expand the ends of flue-tubes or similar articles.

To accomplish all these objects, my invention involves the features of construction, the combination or arrangement of devices, and the principles of operation hereinafter described and claimed, reference being made to the accompanying drawings, in which—

Figure 1 is a longitudinal central sectional view taken on a vertical plane through my improved apparatus for operating the shaft or stock to which the pin or mandrel (not shown) is in practice connected. Fig. 2 is a front end elevation, and Fig. 3 is a rear end elevation, of the same.

In order to enable those skilled in the art to make and use my invention, I will now de-

scribe the same in detail, referring to the drawings, wherein—

The numeral 1 indicates a bed, base-frame, or foundation-plate suitable for supporting the various parts of the apparatus and possessing sufficient strength for the purpose in hand.

The bed, base-frame, or foundation-plate, is surmounted by a main cylinder 2, bolted or otherwise suitably fixed in position thereupon and provided at its ends with cylinder-heads 3 and 4, which are firmly attached through the medium of retaining screws or bolts 5, 6, 7, and 8. The cylinder contains a sectional piston, preferably composed of two sections 9 and 10, connected together by tie-bolts 12, and clamping between them the packings 13, to which expanding-wires 14 are applied for expanding the packings against the internal surface of the cylinder. The packings are preferably composed of leather, but they may be made of any other suitable material.

The sections of the piston are respectively attached to two tubular rods 15 and 16, which extend in opposite directions through stuffing-boxes provided on the cylinder-heads 3 and 4. These stuffing-boxes are preferably composed of caps 17 and 18, screwed upon screw-threaded extensions projecting outward from the cylinder-heads 3 and 4. The stuffing-boxes are provided with leather or other packings 19 and 20, to which retaining-wires 21 and 22 are applied to make tight joints with the tubular piston-rods 15 and 16. The inner ends of the tubular piston-rods may be secured to the piston by any suitable means, but I prefer to screw the inner ends of the rods into screw-threaded sockets formed in the sections of the piston.

The shaft or stock 23, to which the pin or mandrel for expanding and rotating the usual rollers forming a part of the tube-expanding device is connected, extends longitudinally through the tubular piston-rods 15 and 16. The shaft or stock 23 passes at one end portion through a collar 24, screwed upon the outer end of the tubular rod 15, and this outer end of the tubular rod is provided with check-nuts 25, between which and the collar 24 a wear-washer 26 is placed. The outer end of

the tubular rod 16 is secured to a collar 27, having a pendent leg 28, which engages and is movable along a guide 29, secured to the bed, base-frame, or foundation-plate 1 in such manner that while the collar and leg 27 and 28 can reciprocate they hold the tubular rod 16 from axial rotation. The shaft or stock 23 extends through the collar 27, and is formed or otherwise provided with a collar 30 in close proximity to the collar 27. A wear-plate 31 is interposed between the collars 27 and 30.

The shaft or stock 23 is formed or provided with a longitudinal groove or key-seat 32, extending from a point at or near the collar 30 to a point in proximity to the front end portion 33 of the shaft or stock. The groove or key-seat 32 receives a key 34, engaging the hub of a gear-wheel 35 in such manner that the shaft or stock 23 can be axially rotated by the gear-wheel 35, while at the same time the shaft or stock can move longitudinally through the gear-wheel. The hub at the center of the gear-wheel 35 is mounted in a suitable boxing provided in an upright frame or pillow-block 36, bolted or otherwise firmly secured to the bed, base-frame, or foundation-plate 1.

The pin or mandrel which is to enter the expanding device for expanding the flue-tubes or other articles is connected in the usual manner with the outer end portion of the shaft or stock 23. I do not deem it necessary to illustrate the pin or mandrel, or the tube-expanding device, or the connecting device between the pin or mandrel and the shaft or stock 23, as these elements are well known and therefore it is believed to be unnecessary to show them in the drawings.

The cylinder 2 and sectional piston constitute the feed mechanism for feeding the shaft or stock 23 longitudinally or moving it back and forth for imparting corresponding motion to the pin or mandrel. The cylinder is provided with ports 37 and 38, which are alternately inlet and outlet ports. The admission of the working fluid to these ports is governed through the medium of any suitable valve, as at 39, whereby the supply of pressure to the interior of the cylinder is controlled. The working fluid is supplied to the cylinder from the valve 39 through the medium of any suitable system of pipes, and the valve is in practice under the control of the attendant or operator, so that the working fluid can be admitted into the cylinder. The working fluid may be air, steam, gas, or other compressed agent, and if admitted into the chambers 40 and 41 at opposite sides of the sectional piston the pressure will be the same at both sides of the piston, and therefore the latter will be perfectly balanced. If the operator adjusts the valve in one direction to relieve the chamber 41 from pressure, the piston will be advanced to make the working stroke and drive the shaft or stock 23 in the direction required to insert and force the pin

or mandrel into the tube-expanding device. If the pressure be restored in the chamber 41 and relieved in the chamber 40 by a proper manipulation of the valve, the piston will be caused to make its return stroke, and thereby move the shaft or stock 23 in the direction to draw the pin or mandrel from the expanding device.

In order to cause the pin or mandrel which enters the expanding device to rotate the rollers which ordinarily constitute a part of such expanding device, the shaft or stock 23 should be axially rotated as it makes its advance stroke. This is readily accomplished by rotating the gear-wheel 35. This gear-wheel can be rotated in any suitable manner, but I prefer to accomplish this object by causing the gear-wheel 35 to mesh into a pinion 42, fixed to one end of a horizontal driving-shaft 43, located above the cylinder 2 and provided with a balance-wheel 44. The driving-shaft 43 is journaled at one end portion in the upper part of the pillow-block 36 and at the opposite or rear end portion in a suitable bearing 45, preferably mounted on the front end of the cylinder 2. The inner or rear end of the driving-shaft 43 is provided with a crank, which, as here shown, is composed of a disk 46, having a wrist-pin 47. The wrist-pin is connected with the lower end of a piston-rod 48, which, at its upper end, is secured to a piston 49, working in a secondary cylinder 50. The cylinder 50 is of the oscillatory type, and is mounted at the center, as at 51, in a yoke-shaped frame 52, rigidly secured to and rising from the upper side of the cylinder 2. The front side of the cylinder 50 is provided with a seat 53 to receive the inner end of a screw 54, engaging a screw-threaded socket in the overhanging end portion of the yoke-frame 52, whereby a perfect joint can be maintained between the oscillatory driving-cylinder 50 and the yoke-frame.

The working fluid for the driving-cylinder may be air, steam, gas, or other compressed agent, and is admitted to the ends thereof in the usual manner, so that a reciprocatory motion can be imparted to the piston 49 for rotating the driving-shaft 43, and thereby causing the gear-wheel 35 to rotate and turn the shaft or stock 23 concurrently with its longitudinal movement.

I have indicated a lever, as 55, for operating the valve 39, but do not wish to be understood as confining myself to any particular construction of valve and valve-operating devices.

My invention provides new and improved power-driven mechanism for rotating the tapering pin or mandrel and forcing it into the expanding device which is employed to expand the ends of the flue-tubes, and for this purpose the machine will be found very efficient and satisfactory in actual operation.

Having thus described my invention, what I claim is—

1. The combination in a machine for operating a flue-expander, of an axially-rotatable and reciprocatory shaft or stock, a balanced feed-piston operated by a working fluid and having a piston-rod with which the shaft or stock is connected and in which the said shaft or stock rotates, means for controlling the working fluid to move the piston and the shaft or stock longitudinally in either direction, and power mechanism in operative connection with the shaft or stock for axially rotating the same during the time it is moved longitudinally by the piston and piston-rod, substantially as described.

2. The combination in a machine for operating a flue-expander, of a main cylinder, a fluid-operated balanced feed-piston arranged in said cylinder and having a tubular piston-rod, an axially-rotatable shaft or stock extending through the piston and its piston-rod, connected with the latter and axially rotatable therein when moving longitudinally therewith, and power-driven mechanism geared to the shaft or stock to axially rotate the same during the time it is moved longitudinally by the piston and its piston-rod, substantially as described.

3. The combination of a main cylinder containing a fluid-operated, balanced feed-piston, tubular rods connected with the piston, means for holding the piston-rods against axial rotation while permitting them to reciprocate, a shaft or stock extending through the piston-rods, and rotatable therein, and means for axially rotating the shaft or stock concurrently with the longitudinal movement imparted thereto by the piston, substantially as described.

4. The combination of a main cylinder containing a balanced feed-piston, tubular piston-rods connected with the piston and extending through the cylinder-heads, means for holding the piston-rods against axial rotation while permitting them to reciprocate longitudinally, a shaft or stock extending through the piston-rods, a driving-shaft geared to the shaft or stock, and a cylinder and piston for rotating the driving-shaft to axially rotate the shaft or stock concurrently with the longitudinal movement imparted thereto by the piston and piston-rods, substantially as described.

5. The combination of a main cylinder, a balanced feed-piston arranged therein, tubular piston-rods extending through the cylinder-heads, a shaft or stock extending through the piston-rods, a connection between one of the piston-rods and the shaft or stock, a device which prevents the piston-rods from rotating axially, a driving-shaft geared to the shaft or stock, and means for rotating said driving-shaft, substantially as described.

6. The combination of a main cylinder containing a balanced feed-piston, a shaft or stock movable longitudinally with the piston and adapted to rotate axially independent thereof, a driving-shaft geared to the shaft or

stock, and a secondary cylinder and piston for imparting rotary motion to the driving-shaft, substantially as described.

7. The combination of a main cylinder containing a balanced feed-piston, a shaft or stock movable longitudinally with the piston and adapted to rotate axially independent thereof, a gear-wheel keyed to the shaft or stock and through which the latter moves longitudinally while the gear-wheel rotates, a driving-shaft geared to said gear-wheel, and a secondary cylinder and piston for imparting motion to the driving-shaft, substantially as described.

8. The combination of a main cylinder containing a feed-piston, a shaft or stock connected with said piston and adapted to rotate independently thereof, gearing for imparting axial rotation to the shaft or stock, and a secondary piston and cylinder for operating said gearing, substantially as described.

9. The combination of a main cylinder containing a feed-piston, tubular piston-rods connected with the piston and extending through the cylinder-heads, a collar connected with one piston-rod and having a leg portion, a guide which guides the leg portion for holding the piston-rods against rotation while permitting them to reciprocate, a shaft or stock extending through the piston-rods, a gear-wheel which serves to rotate the shaft or stock while the latter moves longitudinally, a driving-shaft geared to said gear-wheel, and means for rotating the driving-shaft, substantially as described.

10. The combination with a main cylinder containing a feed-piston, tubular piston-rods engaged with the piston and extending in opposite directions through the cylinder-heads, a device for preventing axial rotation of the piston-rods while permitting them to reciprocate longitudinally, a shaft or stock extending through the piston-rods, and connected at one end with one of the latter, a gear-wheel keyed to the shaft or stock and serving to rotate the latter while it moves longitudinally through said gear-wheel, a driving-shaft geared to said gear-wheel, and a secondary cylinder and piston for rotating the driving-shaft, substantially as described.

11. The combination of a main cylinder, a feed-piston arranged therein and composed of two sections connected together by tie-bolts, tubular piston-rods secured respectively to the sections of the piston and extending in opposite directions through the piston-heads, a shaft or stock extending through the tubular piston-rods and connected at one end with one of said rods, a collar secured to the outer end of the other piston-rod and having a leg portion, a guide which guides said leg portion of the collar and prevents the piston-rods from rotating while permitting them to reciprocate longitudinally, a gear-wheel keyed to the shaft or stock and serving to rotate the latter while it moves longitudinally through said gear-wheel, a driving-shaft geared to the

gear-wheel and having a crank-pin, and an oscillatory cylinder having a piston connected with the crank-pin for rotating the driving-shaft, substantially as described.

5 12. The combination of a main cylinder containing a feed-piston, a shaft or stock movable longitudinally with said piston and adapted to rotate independently thereof, gearing by
10 which the shaft or stock is rotated axially during its longitudinal motion, a driving-shaft for operating the gearing, and an oscillatory cylinder which rotates the driving-shaft, substantially as described.

15 13. The combination in a machine for operating a flue-expander, of an axially-rotatable and reciprocatory shaft or stock, a fluid-

operated mechanism for moving the shaft or stock longitudinally, a driving-shaft geared with the rotatable and reciprocatory shaft or stock and a fluid-operated mechanism connected with and serving to rotate the driving-shaft to axially rotate the shaft or stock during the time it is moving longitudinally, substantially as described. 20

In testimony whereof I have hereunto set
my hand in presence of two subscribing witnesses. 25

JAMES A. BARHYDT.

Witnesses:

FRANK S. BLAIR,
IRVING PAINE.