No. 653,703. Patented July 17, 1900.

J. T. SCOTT & C. G. HIGHTOWER.

TUBE GRINDER AND FACER.

(Application filed Dec. 21, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

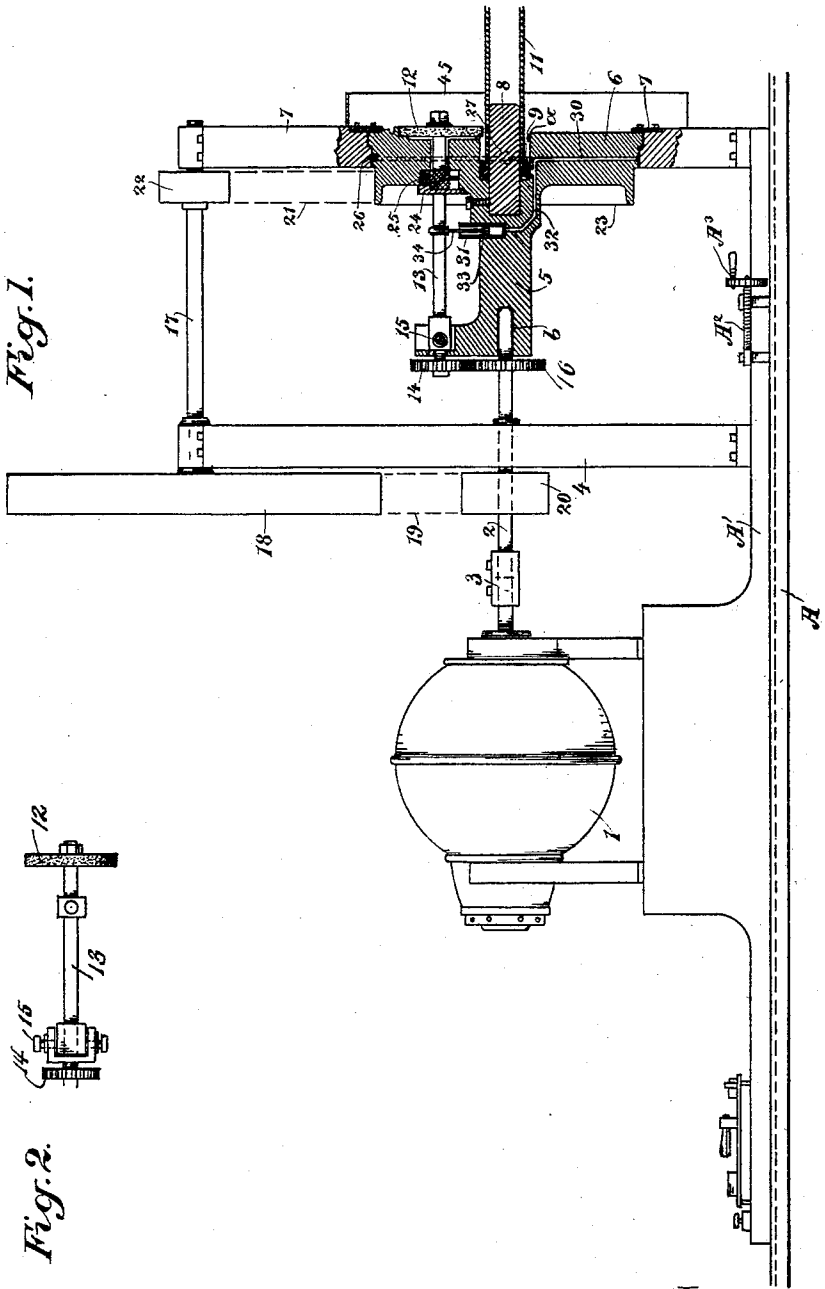


Fig. 2.

Witnesses
Walter F. Sanders
J. C. Sullivan

Inventors
Jno. T. Scott
and
Chas. G. Hightower
by M. A. Acker
their atty.

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

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(No Model.) 2 Sheets—Sheet 2.

Fig. 3.

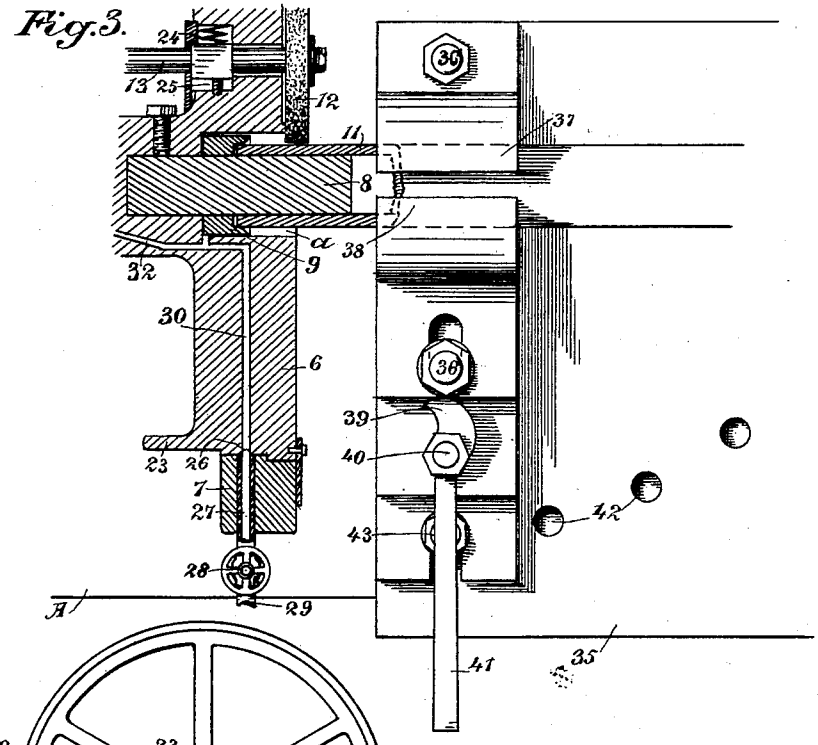
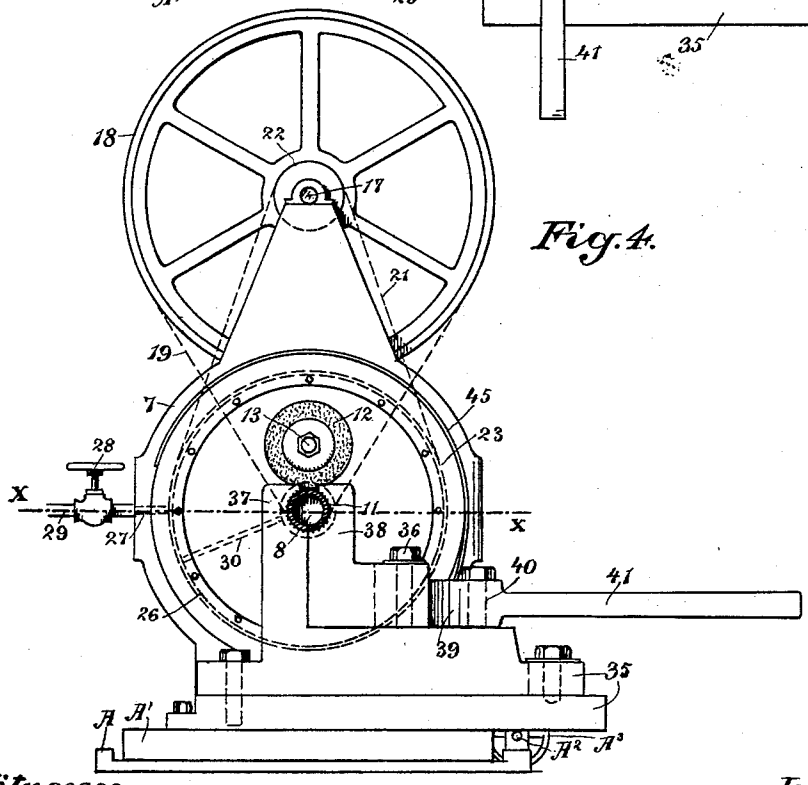


Fig. 4.



Witnesses
Walter H. Vane
J. B. Sullivan

Inventors
Jno. T. Scott
and
Chas. G. Hightower
by M. A. Acker
their atty.

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

UNITED STATES PATENT OFFICE.

JOHN T. SCOTT AND CHARLES G. HIGHTOWER, OF SAN FRANCISCO, CALIFORNIA.

TUBE GRINDER AND FACER.

SPECIFICATION forming part of Letters Patent No. 653,703, dated July 17, 1900.

Application filed December 21, 1899. Serial No. 741,150. (No model.)

To all whom it may concern:

Be it known that we, JOHN T. SCOTT and CHARLES G. HIGHTOWER, citizens of the United States, and residents of the city and county of San Francisco, in the State of California, have invented certain new and useful Improvements in Tube Grinders and Facers; and we do hereby declare the following to be a full, clear, and exact description of the same.

This invention relates to that class of tube-grinders wherein is employed an emery or buffer wheel for grinding and polishing the ends of tubes to be fitted within the cylinders of water-tube boilers; and it consists in the arrangement of parts and details of construction, as will be hereinafter fully set forth in the drawings and described and pointed out in the specification.

The object of our invention is to provide a simple and inexpensive machine by means of which ends of tubes may be quickly ground, smoothed, and polished, and the burs removed therefrom.

To comprehend the invention, reference should be had to the accompanying sheet of drawings, wherein—

Figure 1 is a side view in elevation of the machine, partly in section. Fig. 2 is a detail plan view of the emery or buffer wheel and its driving parts. Fig. 3 is a horizontal sectional top plan view on line $x\,x$, Fig. 4; and Fig. 4 is an end view in elevation from the feed end of the machine.

In the drawings the letter A is used to indicate the bed or base plate, upon which works the slide-plate A′, the same being moved inward and outward by means of the screw A^2, actuated by hand-wheel A^3. Upon this slide-plate, at one end, is carried the dynamo or motor 1, which is connected to drive-shaft 2 by coupling 3. This drive-shaft extends through bearing of frame-plate 4, secured to and extending upward from slide-plate, and its outer or free end rests loosely with bearing-socket *b* of the L-shaped extension 5. Said extension is preferably formed integral with the circular head 6, which head is supported or held in place by collar 7, fitted therearound. Collar 7 serves as a frame-plate, and, like frame-plate 4, is secured to and carried by slide 4. Within a seat or socket *a*, formed in the circular head, is fitted the mandrel 8, around which is fitted the cutter or cutting-tool 9. It will be understood that the mandrel and cutter revolve with the drive-head 6.

The seat or socket *a* is sufficiently large to permit end of pipe or tube 11 being inserted therein upon the mandrel 8. Upon the face of the circular drive-head 6 revolves the buffer or emery wheel 12, the same being attached to end of shaft 13, extending through shaft-opening formed in said head. This shaft is connected at its inner end to axle of pinion 14 by swivel-coupling 15, which permits of shaft 13 moving up and down in order to permit of vertical movement being imparted to the buffer or emery wheel for the purpose hereinafter described. Pinion 14 intermeshes with and is driven by gear 16, secured to drive-shaft 2. By means of this connection an opposite rotation is imparted to pinion 14, shaft 13, and buffer-wheel 12 than is transmitted to head 6, and said buffer-wheel is caused to revolve at a higher speed.

Within bearings of the frame-plates 4 7 works the cross-shaft 17, to one end of which is attached belt-wheel 18. By means of belt 19, working over belt-wheel 18, and pulley 20, secured to drive-shaft 2, motion of drive-shaft is transmitted to cross-shaft 17, which shaft in turn has its motion transmitted to the circular head 6 through the medium of belt 21, working over pulley 22, secured to shaft 17 and flanged rim 23 of the circular head.

The emery or buffer wheel 12 is held pressed downward, so as to bear upon end of tube 11, by means of spring 24, located within seat 25, which spring bears upon outer end portion of swiveled shaft 13.

In the periphery of the circular head there is cut an air groove or channel 26, which communicates with an air-passage 27, bored through collar or frame-plate 7. Within this air-passage is inserted a valved connection 28, to which is connected an air-supply pipe 29, leading from a compressor. (Not shown.) Through the circular head is drilled an air passage-way 30, which establishes communication between the socket *a* and groove or channel 26. This passage-way also communicates with cylinder 31 in the L-shaped extension 5 by means of connecting-passage 32,

Fig. 2 of the drawings. Within the cylinder 31 works piston 33, the stem 34 of which is attached to shaft 13. This piston is actuated by the pressure of air admitted into the cylinder 31 through passage-way 32, and the purpose thereof is to raise the shaft 13, so as to hold the emery or buffer wheel clear of the end of tube to prevent recess being ground therein while the cutter 9 faces the end of the tube or removes the burs therefrom.

The operator is protected against the dirt, rust, or scale flying from end of tube being ground and polished by means of the circular guard 45, attached to the frame-plate or supporting-collar 7.

In order to hold the tubes to be ground absolutely true during the operation of facing, grinding, and polishing, there is attached to the bed or base plate A a holding device comprising a block 35, hinged to the base or bed plate by bolt 36. This plate at one end carries a rigid jaw 37, against which works the movable jaw 38. This jaw works or slides upon the bolt 36 and is thrown or moved toward and from the fixed jaw by means of the eccentric 39, swinging upon the post 40, upwardly projecting from the plate or block 35. The eccentric is operated by handle 41. In the face bed-plate is formed a series of openings 42, within which fits a pin 43, passing through one end of the swinging or hinged block 35. By this means we are enabled to swing the block in accordance with the curve or shape of the pipe or tube to be acted upon by the grinding mechanism.

In operation the end of the pipe to be faced and ground is inserted within the holder, which is closed thereon by turning handle 41 so as to cause eccentric 39 to force the movable jaw 38 against or toward the fixed jaw 37. The tube or pipe will be then held within the groove-seat cut in the jaws, its end to be faced and ground projecting therebeyond a slight distance. Screw A^2 is then turned to feed the slide A′, carrying the grinding mechanism toward the tube-holder. As the grinding mechanism approaches end of tube 11 gradually enters socket *a* and slips upon mandrel 8. The pressure of spring 24 serves to hold the emery or buffer wheel down upon the surface of the tube. As this wheel is driven at a high speed, it grinds or cuts from the end of the tube the scale or rust thereon and at the same time smooths and rounds same as it enters socket *a* of the head 6. The rotating emery or buffer wheel is carried around the tube by the rotation of head 6, the two moving parts rotating in opposite directions, although, as stated, the buffer-wheel is driven at a higher speed than the head 6. As the work of grinding and polishing progresses the grinding mechanism is gradually moved inward by the worm mechanism, so as to place the buffer-wheel in contact with the length of pipe end to be ground and polished. Inasmuch as the buffer-wheel is held down by a spring, it may give to irregularities in the surface acted upon. This inward movement continues until end of pipe moves into the cutter 9, when valved connection 28 is then turned to admit air under pressure into the cylinder 31 through described connections in order to operate piston 33 to raise shaft 13 and slightly elevate the emery or buffer wheel 12, so as to clear end of tube 11, fitted over mandrel 8. As the cutter 9 is carried by rotating head 6 it faces or removes all burs from end of tube. The air under pressure admitted by opening the valved connection also enters socket *a* through passage-way 30 and serves to blow out any scale, dust, or dirt which accumulates in said socket. The grinding mechanism is removed from end of tube by reversing the movement of the worm mechanism and the emery or buffer wheel lowered by cutting off of the air-supply.

It will be readily understood that the tube-holder may be dispensed with, if desired, and the end of tube inserted within the grinding-head by hand. However, where the tubes are curved ones we prefer to make use of the holder and feed the grinding mechanism toward and from same.

Having thus described our invention, what we claim as new, and desire to secure protection in by Letters Patent, is—

1. In a tube grinder and polisher, the combination with the rotating head, a socket therein for reception of the end of the tube, an end cutter in said socket, a buffer-wheel carried by said head, and of means for imparting rotary motion to the head and driving the buffer-wheel at a higher speed than its carrying-head.

2. In a tube grinder and polisher, the combination with the head, of means for rotating the same, an end cutter, a spring-pressed vertically-movable buffer-wheel carried by the head, means for holding the buffer out of operative position while the end cutter is operating, and of means for rotating the buffer-wheel in an opposite direction and at a higher speed than that at which the head is rotated.

3. In a tube grinding and polishing machine, the combination with the rotatable head having a tube-receiving socket therein, a mandrel within said socket, means for imparting rotary motion to the head, a vertically-movable buffer-wheel carried by the head, and of means by which the said buffer-wheel is driven in an opposite direction and at a higher speed than the carrying-head.

4. In a tube grinding and polishing machine, the combination with the circular head having a tube-receiving socket therein, a cutter secured therein, means for imparting rotation to the head, a vertically-movable buffer-wheel carried by the head, means for driving said buffer-wheel at a higher speed than the head, and of devices for automatically raising and lowering the buffer-wheel.

5. In a tube grinding and polishing machine, the combination with a circular head having a tube-receiving socket therein, of a

cutter secured within the socket, means for imparting rotation to the head, of a vertically-movable buffer-wheel, means for driving the buffer-wheel at a higher speed than the head, of a tension-spring for holding said wheel down, and of air-actuated devices by means of which the buffer-wheel is raised.

6. In a tube grinding and polishing machine, the combination with the bed-plate, of a slide mounted thereon, a head supported upon said slide, a tube-receiving socket in said head, means for imparting rotation to the head, a vertically-movable buffer-wheel carried by the head, means for driving the buffer-wheel at a higher speed than the head, spring by means of which the buffer-wheel is held pressed down, air-actuated devices for raising the said wheel, a pipe-holder, and of means for moving the slide toward and from the holder.

7. In a tube grinding and polishing machine, the combination with the rotating head having a tube-socket therein, a cutter secured within said socket, means for imparting rotary motion to the head, a buffer-wheel carried by said head, of a swiveled shaft upon which the buffer-wheel is secured, devices by which motion is imparted to said shaft for rotating the buffer-wheel at a higher speed than the head, a spring by means of which the buffer-wheel is held downward, air-actuated devices for raising the buffer-wheel, and of air connection through the head to said devices.

8. In a tube grinding and polishing machine, the combination with the rotating head, having a tube-receiving socket therein, a cutter secured within said socket, means for imparting rotation to the head, a spring-pressed buffer-wheel carried by the head, means for driving the buffer-wheel at a higher speed than the head, an air-groove in the periphery of the head, a passage-way forming communication between said groove and the tube-receiving socket, means for supplying air under pressure to the peripheral groove of the head, air-actuated devices for raising the buffer-wheel, and of connection between said devices and the passage-way through the head.

In witness whereof we have hereunto set our hands.

JOHN T. SCOTT.
CHARLES G. HIGHTOWER.

Witnesses:
JNO. C. H. FERGUSON,
A. C. LEWIS.