(No Model.)

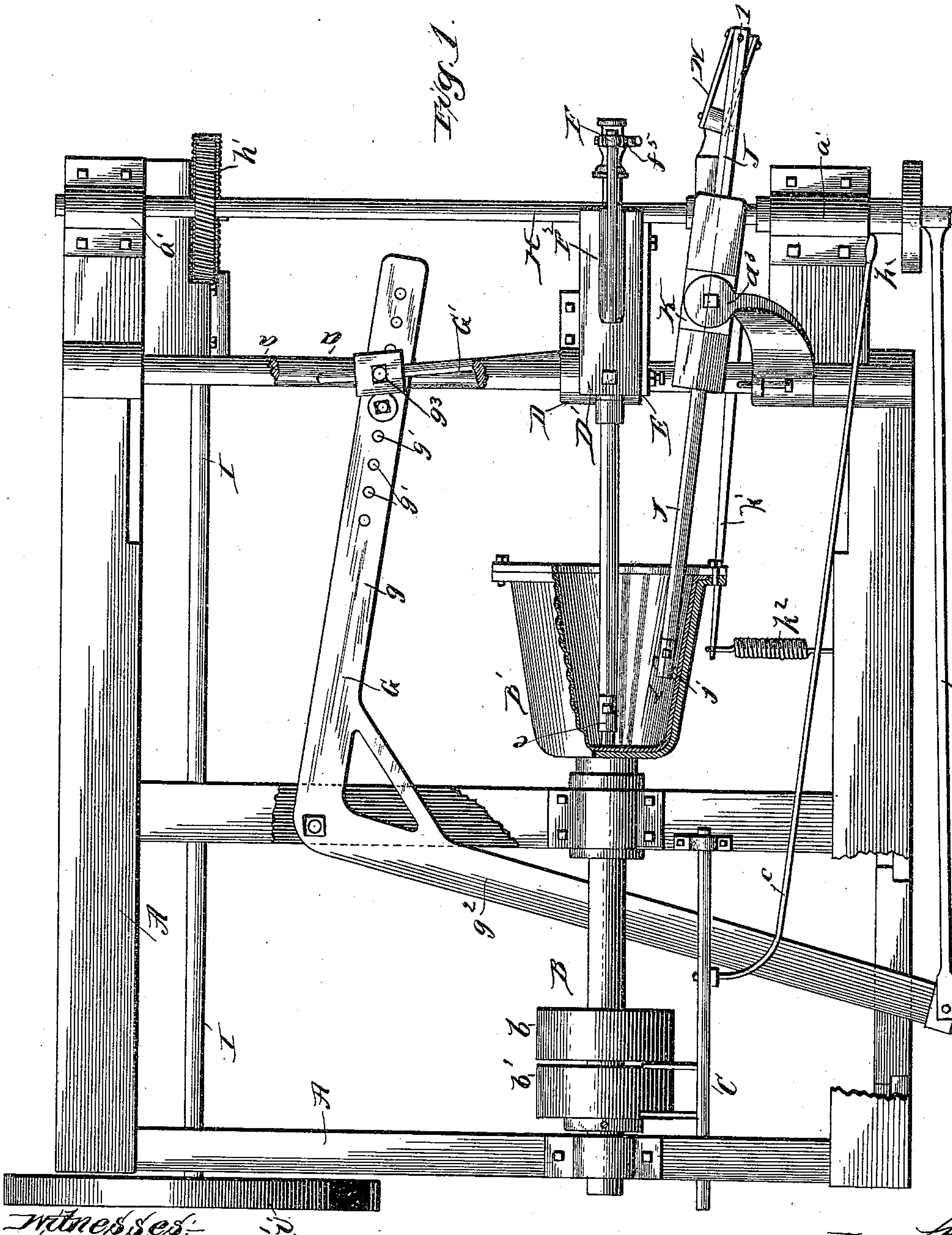
2 Sheets—Sheet 1.

B. E. SPERRY.

GRINDING AND POLISHING MACHINE.

No. 446,170. Patented Feb. 10, 1891.

Fig. 1.



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

(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

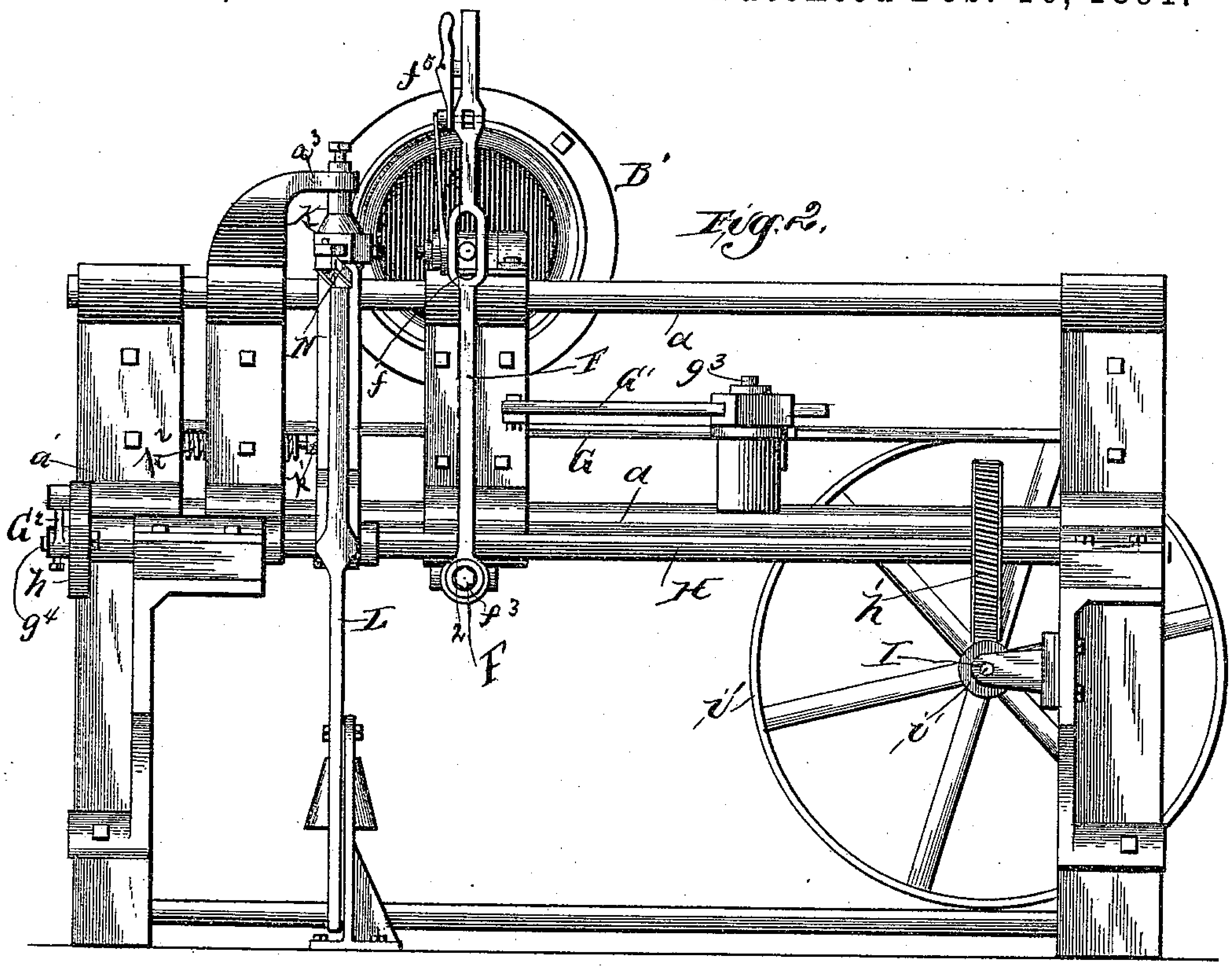

Fig. 3.

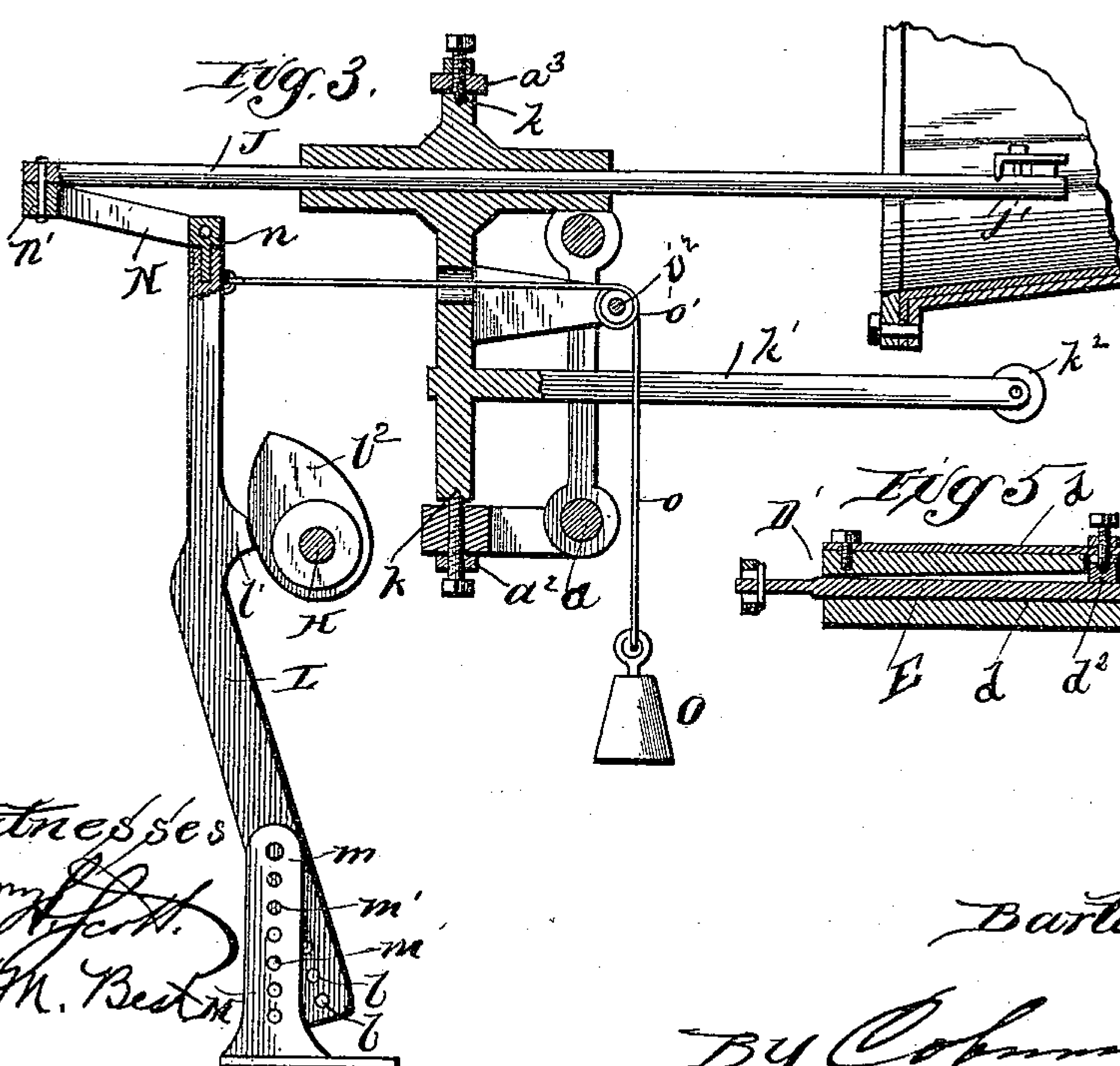

Fig. 4.

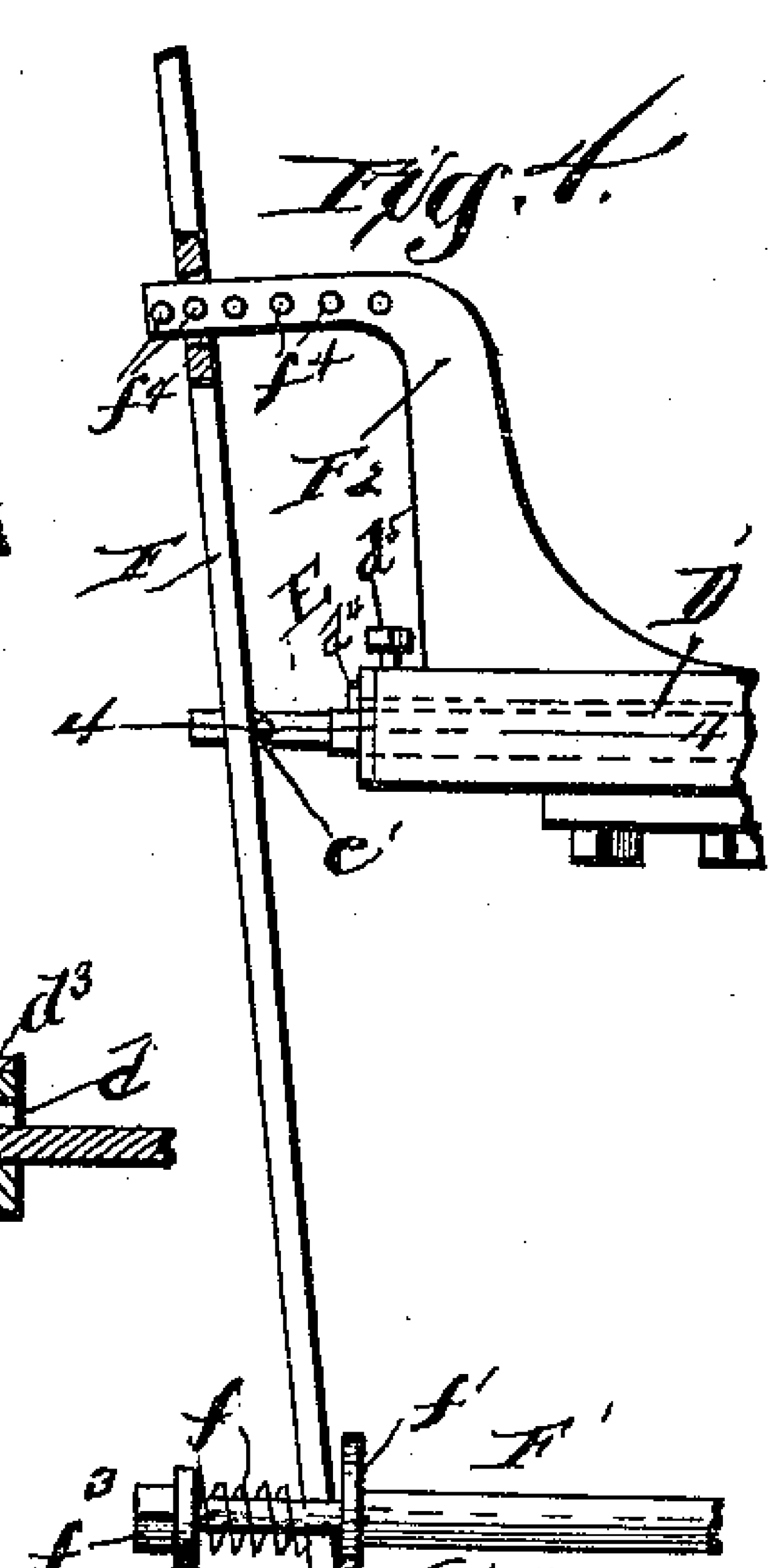

Fig. 5.

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UNITED STATES PATENT OFFICE.

BARTON E. SPERRY, OF BATAVIA, ILLINOIS.

GRINDING AND POLISHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 446,170, dated February 10, 1891.

Application filed February 20, 1890. Serial No. 341,166. (No model.)

To all whom it may concern:

Be it known that I, BARTON E. SPERRY, a citizen of the United States, residing at Batavia, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in Grinding and Polishing Machines, which are fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a plan view of a machine embodying my improvements, some small portions being broken away; Fig. 2, a front end elevation of the same; Fig. 3, a detail vertical section taken on the line 1 1 of Fig. 1; Fig. 4, a detail vertical section taken on the line 2 2 of Fig. 2, and Fig. 5 a detail plan section taken on the line 4 4 of Fig. 4.

My invention relates to machines for grinding and polishing vessels of metal, being especially intended for machines for polishing kettles, though not restricted to this particular use.

The invention refers to mechanisms for giving the required movements to the tools for grinding or polishing the entire interior surface of kettles or other like vessels, the said vessels being mounted on revolving shafts.

I will describe in detail the construction and operation of a machine in which I have embodied my improvements in one practical way, and will then point out definitely in claims the improvements which I believe to be new, and wish to secure by Letters Patent.

In the drawings, A represents the supporting-frame of the machine, which is of such form and construction as to provide for the mounting of the several parts hereinafter specified.

At one end of the machine, which may be called the "rear end," is a horizontal shaft B, mounted in suitable bearings on the top of the frame and extending forward toward the front of the machine. This shaft is provided with a driving-pulley *b* and an idler *b'*. An ordinary sliding belt-shifter C is mounted in proper relation to this shaft on the supporting-frame, whereby the belt may be shifted from one to the other of these pulleys, as may be desired, by means of a handle or rod *c*, extending from the shifter to the front end of the machine in reach of the attendant.

The kettle B', or other vessel, is secured at its bottom to the forward end of the shaft B by any ordinary and suitable devices, and consequently rotates with it, being centered so that its axis is coincident with the axis of the shaft.

At the front end of the frame are two end bars *a*, arranged one above the other and preferably round. On these bars is mounted a carrier D, the bars passing through the upper and lower ends thereof, and the carrier being free to slide upon them. The stock E for the central polisher is mounted upon this carrier, and extends rearward, being of sufficient length to pass into the vessel to the bottom thereof, and carrying upon its rear end a grinding or polishing device *e* of any usual construction and material. The stock is in the same horizontal plane as the axis of the shaft B, but is movable back and forth in said plane, as hereinafter explained, so as to carry the polisher back and forth across the bottom of the vessel. This stock E is mounted on the carrier, so as to be adjustable thereon lengthwise. This is accomplished by means of a holder D', which is fastened to the top of the carrier, and is provided with an opening *d* through its length, which is adapted to receive the forward end of the stock. This opening is gradually widened on one side from front to rear, as seen in Fig. 5 of the drawings, and on that side of the holder a spring *d'* is fastened at its front end to the outside of the holder, and being extended inward along the side of the latter is provided with a clamping-block d^2 at its other end, which passes through an opening d^3 in the side of the holder, so as to rest against the stock, as seen in Fig. 5 of the drawings. This holds the stock in proper position in the holder, but at the same time provides for slight lateral yielding to permit the polisher to adjust itself to the vessel, and especially to the curve on which it may be carried slightly at the limit of its horizontal movement. A gib d^4 is inserted above the stock when in place in the holder, and is held by a small screw d^5, as seen in Fig. 4, the gib partly in dotted lines, which devices take up any lost motion.

In order to set the stock up against the bottom of the kettle and hold it in position, a lever F is provided, having a slot *f* some ways from its upper end, which receives the front

end of the stock, the latter being provided with a pin e', against which the lever bears when forced inward. This lever at its lower end is provided with an eye, which is slipped over the front end of a rod F', fastened to the lower end of the carrier and extending forward therefrom. A stop-flange f' is arranged on this rod near its front end to limit the inward movement of the end of the lever, and in front of the latter is a spiral spring f^2 around the rod, held in place by a nut f^3, turned on its extremity of the rod. An elbow F^2 rises from the top of the holder D', as seen in Fig. 4 of the drawings, with its horizontal member extending forward from the front of the machine, and provided with a series of holes f^4. The upper end of the lever F receives this horizontal member of the elbow, and is secured thereto in any desired position by an ordinary spring-pin and hand-latch f^5. It will be seen then that the stock may be held up to its work by this lever, and at the same time a yielding of the latter is provided by the spring at its lower end if any yielding of the stock is required in its operation.

A lateral reciprocation is given to the carrier, and hence to the stock, by means of a bell-crank lever G, which is pivoted at its angle to a cross-bar toward the rear of the frame. One arm g of this lever extends forward to the front end of the machine and is provided with a series of holes g'. The other arm g^2 extends outward underneath the shaft B to the side of the frame, as seen in Fig. 1 of the drawings. A link-rod G' is hinged at one end to the carrier D, and at the other is connected to the front end of the arm g by means of a swiveling joint g^3, which is fastened to the arm by placing its pivot-pin in one of the holes g'. Now, obviously, the vibration of the lever G will reciprocate the carrier back and forth on its supports. This vibration of the lever is effected by means of a pitman G^2, which is connected at one end by a swiveling joint g^4 to the outer end of the arm g^2.

At the front end of the machine is a transverse shaft H, mounted in bearings on brackets a', extending outward slightly from the front end of the supporting-frame and about midway of its height. This shaft has a crank-wheel h at its end on the side of the machine, where the pitman G^2 is located, and the latter is connected to its crank-pin. A worm-wheel h' is also fixed to this shaft near its opposite end.

A shaft I is mounted in suitable bearings on the main frame and extends from front to rear of the machine, being arranged so that its forward end comes directly underneath the said worm-wheel, and being provided at this point with a worm-pinion i, which engages with the worm-wheel on the shaft H. This shaft carries at its rear end a band-wheel i', through which the requisite rotation is communicated to the shaft. Obviously the rotation of this shaft will rotate the shaft H and thus vibrate the lever G by means of the pitman G^2, and this vibration of the said lever will reciprocate the stock-carrier on its supports, as already described, the range of this movement being regulated by changing the connection between the link-rod G' and the lever from one hole to another of the series g. A second stock J is mounted in a carrier K, arranged at one side of the stock E, so that it may operate upon the side of the vessel through a grinder or polisher j, which is attached to the rear end of the stock and is of any suitable construction and material.

The carrier K is something like a T-head in form, as seen in Fig. 3 of the drawings, and the horizontal member is perforated to receive the stock J, which is free to slide back and forth therein. The vertical member of the carrier is mounted by pivot-bearings k, located, respectively, on a short bracket a^2, extending forward a little from the lower one of the end bars a, and at the upper end in a bracket a^3, bending upward, forward, and inward slightly, as seen in Figs. 1 and 2 of the drawings, so as to bring its extremity directly over the bracket a^2. The carrier is free to turn on these pivot-bearings and so permit a horizontal vibration of the stock J to make it conform to the flare or inclination of the vessel, the rear or inner end of this stock being passed into the vessel and resting against the interior side surface thereof for the purpose of grinding or polishing this portion of the vessel. The polishing end of this stock is held up against the side of the vessel constantly by means of a stiff arm k', rigidly fastened at one end to the upright portion or shaft of the carrier K and extending rearward a little below the vessel, where it is connected at its other end to a spring k^2, fastened to the main frame. The tension of this spring operates to pull the inner or rear end of the arm outward, which of course will tend to oscillate the carrier on its pivot-bearings, which movement will vibrate the stock horizontally, and so it is evident that the operation of the spring will hold the polisher up to its work on the inside of the vessel, but at the same time yields to permit the polisher to vibrate horizontally to suit the inclination of the vessel as it is reciprocated lengthwise. There must of course be this reciprocation of the stock J lengthwise or the polisher would simply act upon a narrow band around the inside of the vessel, and this reciprocation must be in degree corresponding to the depth of the vessel in order to bring the entire surface under the action of the polisher. This sliding movement of the stock is effected by means of an upright lever L, which is pivoted at its lower end to a floor bracket or standard M. The upright m of this bracket is provided with a series of holes m', and the lower end of the lever L is provided with a corresponding series of holes l. This lever is arranged to stand about under the forward

projecting end of the stock J, and is connected to the outer extremity of the latter by a link-bar N, which is attached at one end to the upper end of the lever by means of a swivel-pin n and at the other end to the stock by a similar swivel-pin n', as seen in Fig. 3 of the drawings. About midway of this lever is a cam projection l', extending inward or rearward, where it is brought in operative contact with a cam h^2 on the shaft H, as seen in Fig. 3 of the drawings. The lever is held up into contact with the cam by means of a weight O, attached to a cord o, which is fastened at its other end to the upper end of the lever, and passes thence inward over a pulley o' on the end of an arm i^2 on the upright portion of the carrier K, and extending inward therefrom. For convenience this cord may pass through an opening cut for it in the carrier, as shown in Fig. 3 of the drawings, if desired.

Now it is obvious that the operation of the cam on the rotating shaft H will vibrate the lever L outward and the action of the weight will move it inward as it is relieved from the force of the cam. This vibration of the lever will of course reciprocate the stock J lengthwise through its bearing in the carrier K by means of the link-bar N and so reciprocates the polisher back and forth upon the inside of the vessel from the top to the bottom thereof. The required range of this reciprocation is obtained by adjusting the connection between the lever and the standard M by means of the series of holes in the two parts heretofore mentioned, and the lateral vibration of the stock heretofore referred to is accommodated by means of the swiveling connections between the link-bar N and the stock and lever.

From the description above the operation of this machine will be understood without lengthy explanation. Power being applied to the shaft B, the kettle or whatever vessel is mounted on the shaft will be set in rotation, and power being applied to the shaft I the mechanisms are set in operation which reciprocate the stocks which carry the polishers, the central one in a lateral direction and the side one lengthwise, as already explained. The lateral reciprocation of the central stock moves the polisher back and forth across the bottom of the vessel. The lengthwise reciprocation of the side stock moves the polisher which it carries back and forth along the entire side of the vessel, and as the latter is in rotation the combined effect of these movements will be to bring the polishers or grinders into action upon every part of the inside of the vessel, the polishing material being held up into contact with the bottom and side of the vessel, as already explained.

Other devices may be substituted for some of the special devices herein shown and described, and there may be changes in the construction and arrangement of those which are here mentioned without departing from the principle of my invention.

It is evident that the precise means for mounting the stocks and holding them properly to the surfaces upon which they are to act, respectively, may be varied from the construction herein specified. Hence I do not wish to be understood as limiting my invention to all of the particular devices which are herein shown and described for the purpose of illustrating one way in which my invention is embodied in a practical operative machine.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The revolving shaft B, on which the vessel is mounted, in combination with a central polishing-stock, a sliding carrier on which said stock is mounted and movable laterally thereto, a side polishing-stock arranged to operate upon the side of the vessel and sliding lengthwise, and an oscillating carrier in which said stock is mounted, substantially as and for the purposes specified.

2. The revolving shaft B, which carries the vessel, in combination with the sliding carrier D, the end bars a, on which said carrier is mounted and on which it is free to slide, and the polishing-stock E, mounted on said slide and extending inward to the bottom of the vessel, substantially as and for the purposes specified.

3. The carrier D, mounted on ways on which it is free to slide, in combination with the central polishing-stock E, mounted on said carrier, the bell-crank lever G, link-rod G', pitman G^2, and crank-wheel h, substantially as and for the purposes specified.

4. The sliding carrier D, in combination with the stock-holder D', mounted thereon, the central polisher-stock E, passing through said holder and adjustable lengthwise therein, and the yielding lever F for holding the polisher up to the bottom of the vessel, substantially as and for the purposes specified.

5. The stock-holder D', provided with an opening d, running through it lengthwise and widening from the front to the rear end of the holder, in combination with the central polisher-stock E, passing through said opening in the holder, the spring d', and the clamping-block d^2 on said spring and passing through an opening d^3 in the holder to rest upon the stock, substantially as and for the purposes specified.

6. The holder D', in combination with the central polisher E, mounted therein and provided with a pin e' near its outer end, the lever F, provided with a slot f, the rod F', receiving the lower end of the lever, the spring f^2, and a fastening device for securing the upper end of the lever in any adjustment desired, substantially as and for the purposes specified.

7. The side polisher-stock J, in combination

with an oscillating carrier K, in which said stock is mounted and which is itself mounted on vertical pivots, and a yielding retainer arranged to hold the inner end of the stock against the inclined side of the vessel, substantially as and for the purposes specified.

8. The oscillating carrier K, mounted on vertical pivots, in combination with the side polisher-stock J, mounted to slide back and forth in said carrier, the arm k', and the spring k^2, substantially as and for the purposes specified.

9. The oscillating carrier K, in combination with the side polisher-stock J, mounted to slide freely lengthwise in said carrier, the vibrating lever L, connected at its upper end to said stock, the cam h^2 on the shaft H, and the weight O, substantially as and for the purposes specified.

10. The oscillating carrier K, in combination with the side polisher-stock J, mounted to slide back and forth in said carrier, the lever L, adjustably pivoted at its lower end, the link-bar N, connected by swivel-joints respectively to the stock J and lever L, the cam h^2, and the weight O, substantially as and for the purposes specified.

11. The oscillating carrier K, mounted on vertical pivots, in combination with the side polisher-stock J, mounted to slide therein, the arm k', retaining-spring k^2, vibrating lever L, cam h^2, and weight O, substantially as and for the purposes specified.

12. The driven shaft H, provided with the crank-wheel h and cam h^2, in combination with the bell-crank lever G, sliding carrier D, central polisher-stock E, mounted on said carrier, vibrating lever L, oscillating carrier K, and side polisher-stock J, mounted to slide back and forth in said carrier, whereby the required reciprocatory movements of both stocks are produced by the same shaft, substantially as and for the purposes specified.

BARTON E. SPERRY.

Witnesses:
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