A. C. FYFE & W. E. GLADSTONE.

AUTOMATIC BUFFING MACHINE.

APPLICATION FILED JAN. 27, 1910.

1,017,864.

Patented Feb. 20, 1912.

6 SHEETS—SHEET 1.

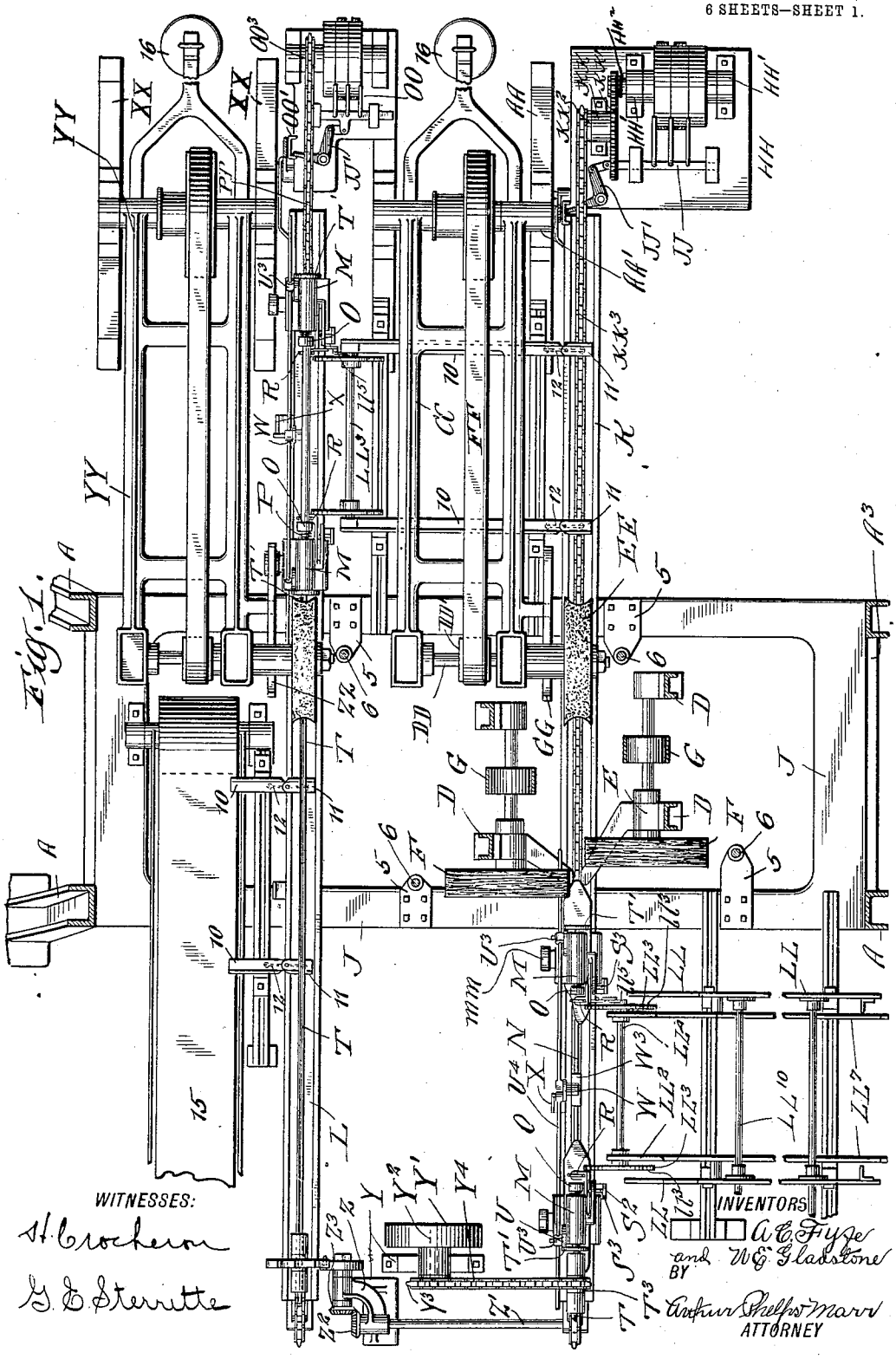

Fig. 1.

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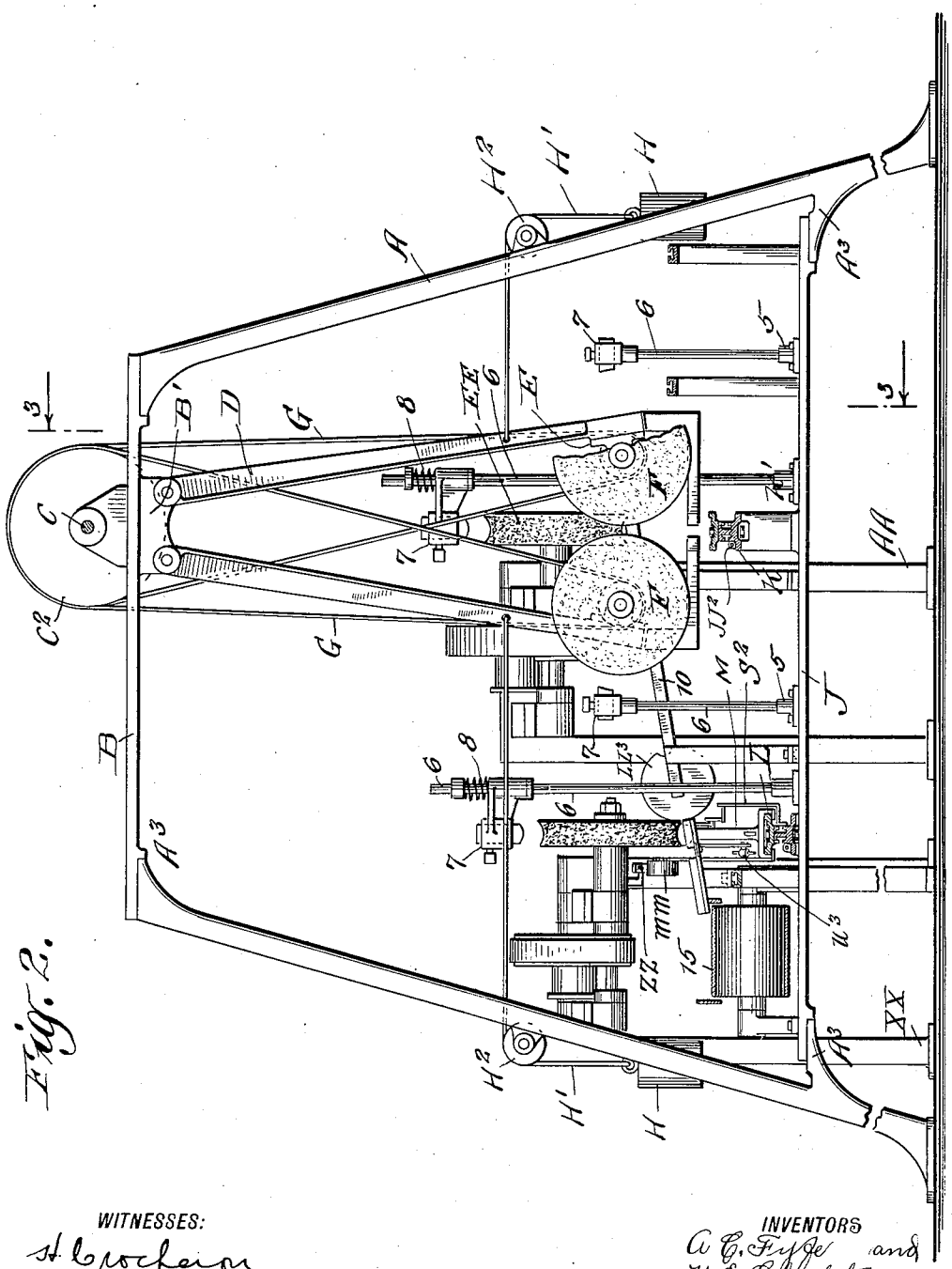

Fig. 2.

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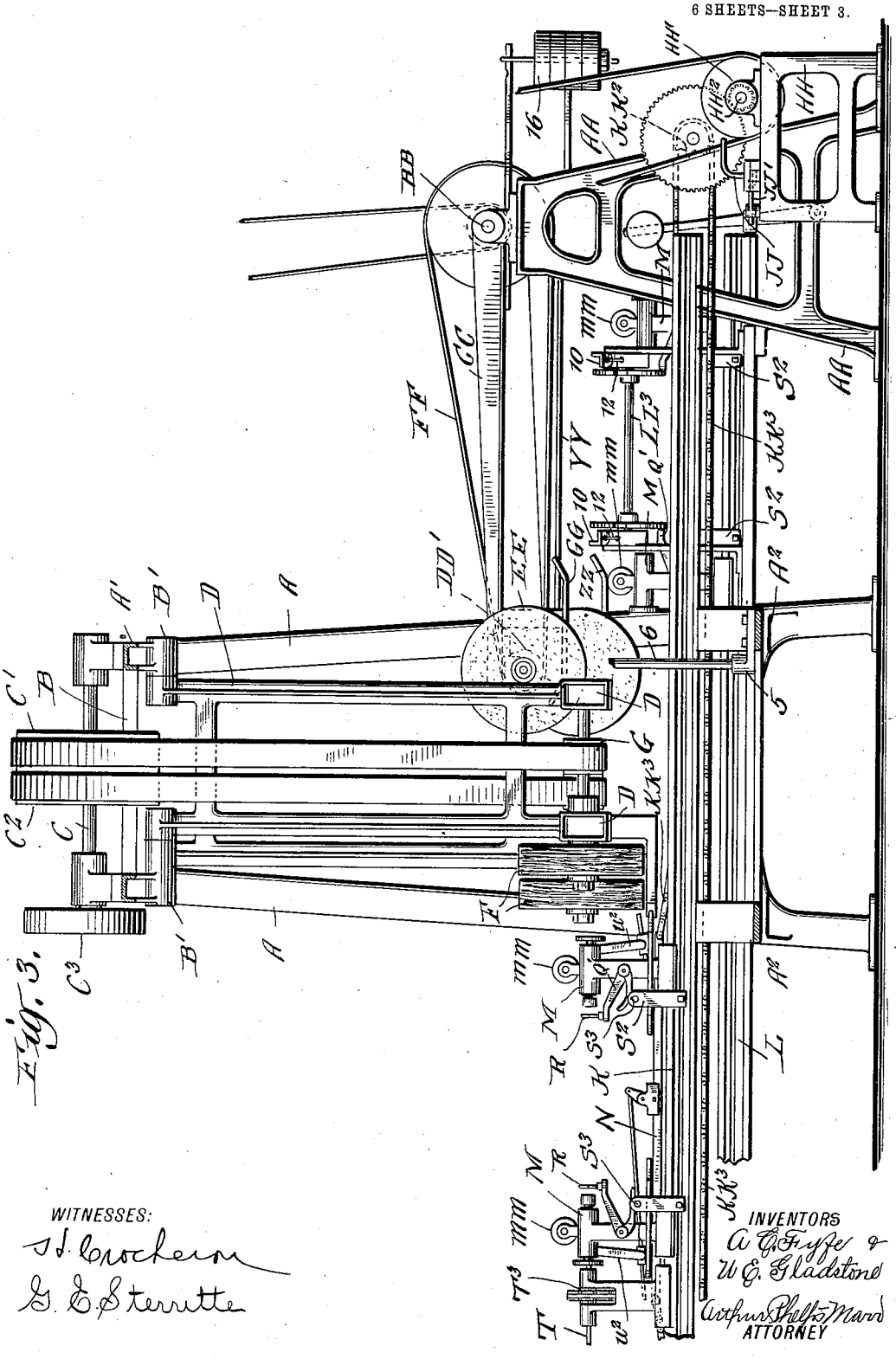

Fig. 3.

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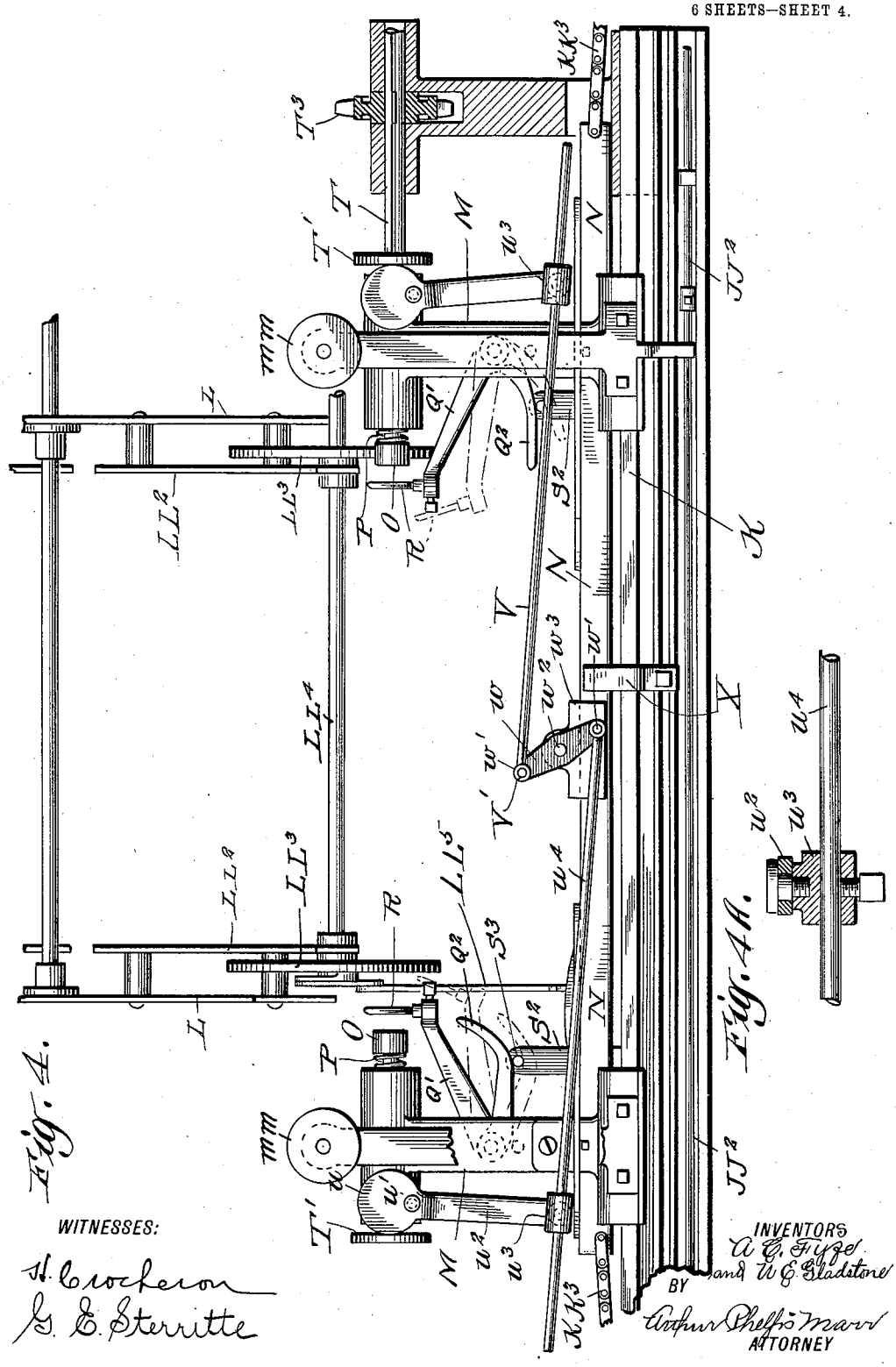

Fig. 4.

Fig. AA.

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6 SHEETS—SHEET 5.

Fig. 5.

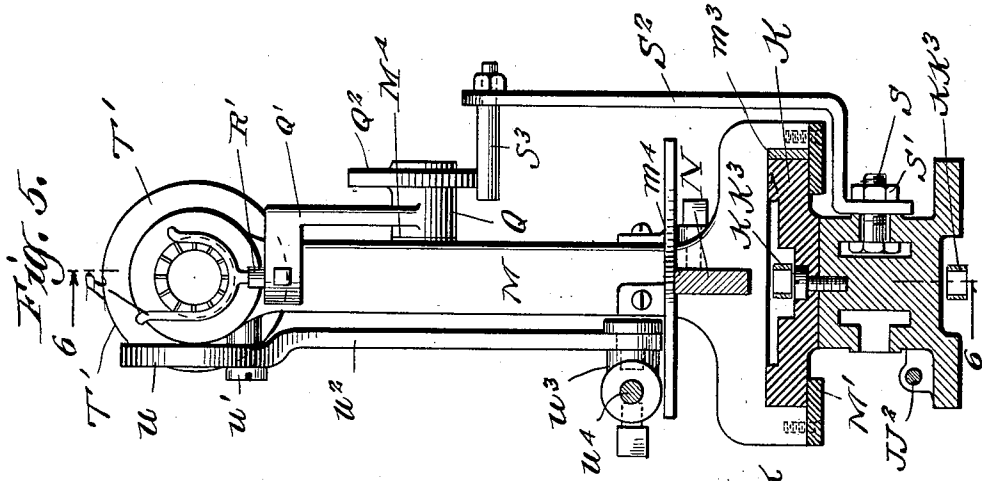
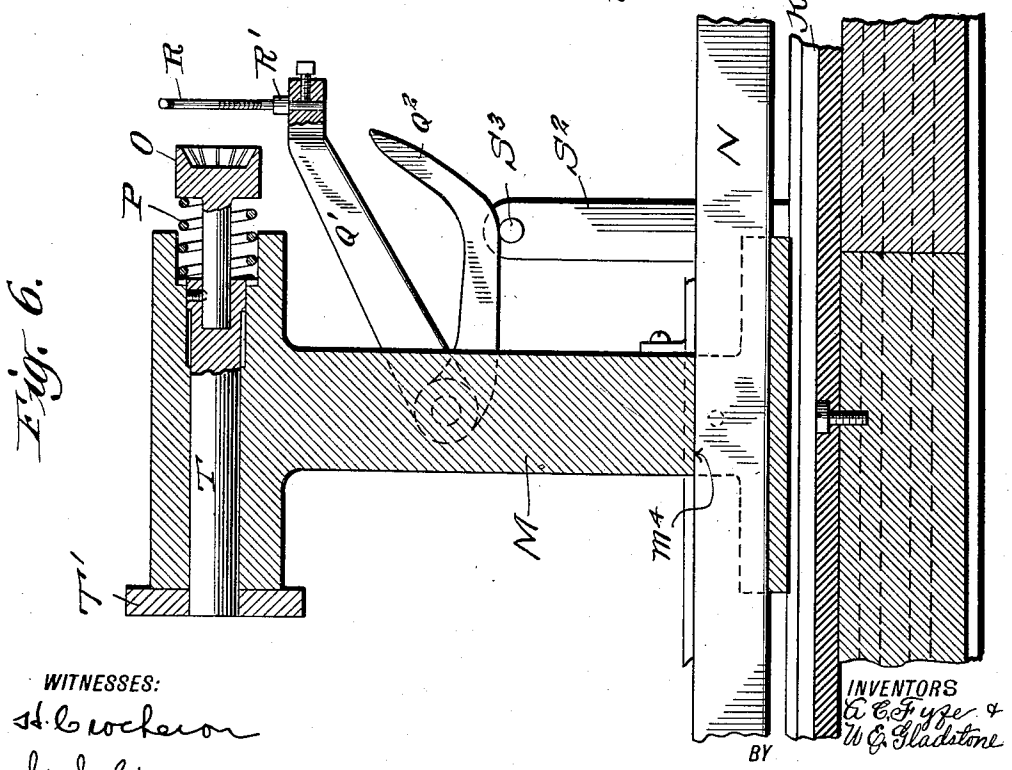


Fig. 6.



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AUTOMATIC BUFFING MACHINE.

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6 SHEETS—SHEET 6.

Fig. 7.

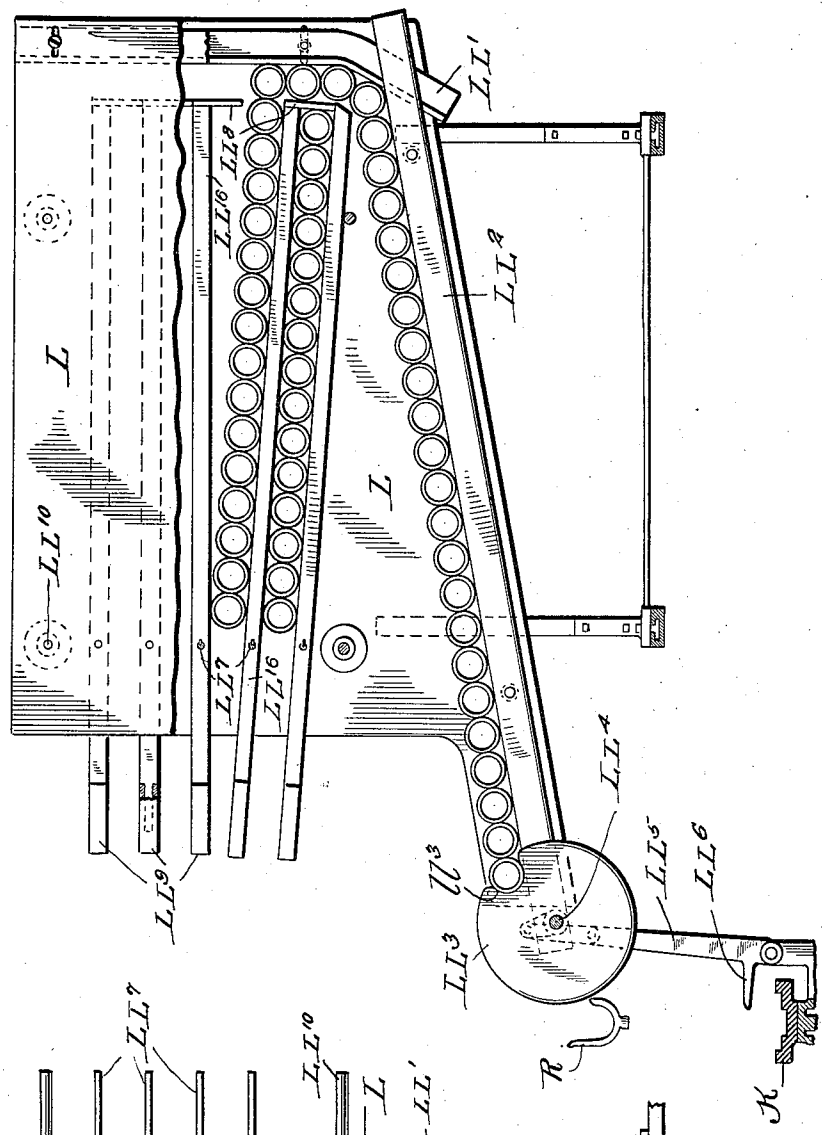
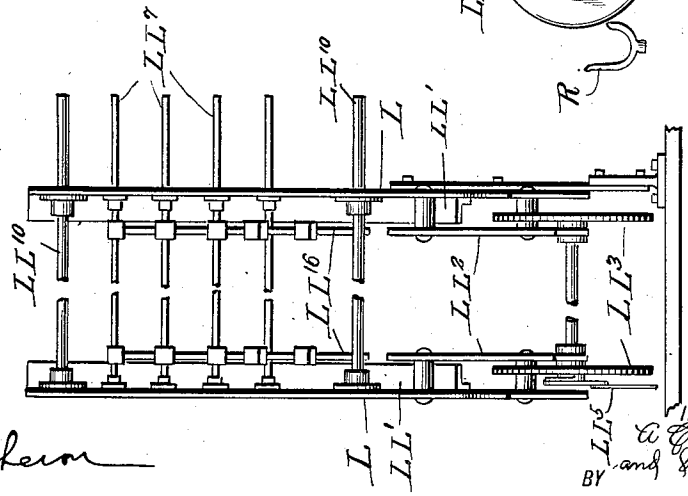


Fig. 8.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC BUFFING-MACHINE.

1,017,864. Specification of Letters Patent. Patented Feb. 20, 1912.

Application filed January 27, 1910. Serial No. 540,352.

To all whom it may concern:

Be it known that we, ALEXANDER C. FYFE and WILLIAM E. GLADSTONE, citizens of the United States, and residents said FYFE of Weehawken and said GLADSTONE of West New York, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Automatic Buffing-Machines, of which the following is a specification.

This machine is intended to expedite a certain portion of the work in places where metal tubing is used to a great extent, particularly if it is desirable to impart to the metal tubing a highly finished or polished surface.

It is a buffing machine which will automatically feed the tubes from a hopper into a pair of chucks, and then automatically present the tube to a series of buffing wheels, which grind away the rough surface and produce upon the exterior of the tube a high polish or satin finish.

There are four of the buffing wheels. The first two which are set almost diametrically opposite are the coarsest and receive and treat the tube first. These wheels are so arranged that their axis are parallel with the tube, and as the tube is slowly revolved while being presented to the buffs, the tube will be be treated circumferentially and all the roughness will be removed but because of the coarseness of the buffs and the abrasive which is used thereon, a series of small circumferential though slightly spiral rings or scratches are produced. Although the scratches are harmless they are objectionable as they operate against the production of a high polish. The third buff of the series is also coarse and uses the same coarse abrasive but this buff is arranged to run at right angles to the first pair of buffs, and by so doing cross cut the rings or scratches left by the first buffs thus leaving a perfectly smooth surface behind.

The treatment by the three buffs is simultaneous or nearly so, the third buff acting as soon after the first two as the mechanical construction will allow, but the treatment by the fourth buff is at a different period and its effect is different, it may be almost considered another operation. After the tube has been treated by the third buff it is automatically discharged from the chucks that are holding it and, sliding down a slight incline it is received by a second pair of chucks properly mounted where it is presented longitudinally to the fourth buffing wheel. The fourth wheel is of fine material and the abrasive that is a good quality of rouge. Because of the fineness and beauty of the finish produced by the fourth wheel it is sometimes called a coloring up wheel. Upon the completion of this operation the tube is discharged, the machine has done its work. Proper and automatic means are provided for traversing the tube and the holding chucks backward and forward as many times as may be convenient to obtain the proper results.

Automatic means is provided for feeding the tubes to the machine. Means for adjusting the tension or pressure of the buffing wheels, and many other advantageous features are included in my device all of which will be described in the detail specification which follows and will be recited in the claims.

The following is what we consider the best means of carrying out this invention.

The accompanying drawings form a part of this specification, in which:

Figure 1 is a plan view partly in horizontal section it shows the operative mechanism in detail but the parts adjacent to the upper platform are omitted: Fig. 2 is an end view partly in vertical section on a line immediately to the left of the main casting and platform. Fig. 3 is a side elevation partly in section it shows in detail the horizontal arm, the buff carried thereon, and the driving mechanism for said buff. Fig. 4 shows on a larger scale the chuck operating mechanism, and parts adjacent thereto. Fig. 4[a] is in section, it shows in detail the adjustable clamping means for the chuck operating rods. Fig. 5 shows in end elevation of the casting M and parts adjacent. Fig. 6 is a section on the line 6—6 in Fig. 5. Fig. 7, shows in side elevation the hopper, the fracture exposes to view the load bars and guide. Fig. 8 is a front or end elevation of the hopper shown in Fig. 7, the central fracture is for the purpose of shortening the figure.

Similar letters of reference indicate like parts in all the figures where they appear.

The operative mechanism of the machine is supported by two large frames A that are similar in all respects. They are of the type

called A frames comprising two upwardly extending legs far apart at the bottom and somewhat closer at the top where they are connected by a crossbar A^1. A crossbar A^2 connects the two legs securely together at an intermediate point between the top and the bottom, or there may be two such bars if the machine be of particularly heavy construction. Inwardly extending lugs A^3 are provided, one at the top of each leg and one low down for a purpose which will be described.

A platform B rests upon the uppermost lugs A^3 and beside holding the tops of the A frames reliably together serve to support a counter shaft C, and the pulleys C^1, C^2 and C^3. Downwardly extending lugs B^1, B^1 are cast integral with the platform B and serve to support the frames D. The frames D are hingedly connected to the platform B, they are of cast iron and are of H frame construction. The two long sides being parallel and being connected together at a convenient point somewhere between the ends. In these particular frames a broad connecting piece is also provided at the lower end upon which is mounted the bearing E for the radial buff wheel F. The weight of the buffs tend to cause the buff wheels to bear with much pressure upon a tube which may be in the operable position, and as it is highly desirable to be able to regulate the pressure of the cutting surfaces we provide a counterweight H connected to each of the frames by a flexible connection H^1, which passes over the pulley H^2 suitably mounted on the side frames A. Resting upon the second set of lugs A^3 is a second platform J, which because of the construction of the machine must be considerably larger and heavier than the platform B. The platform J provides a support for two parallel tracks K and L. Similar in cross-section and very similar as to the respective duties which they are called upon to perform.

Referring to Fig. 5 an end elevation of the track is shown on a larger scale and slidably mounted thereon is shown also in elevation the casting M, which we will sometimes refer to as a chuck casting, a number of these castings are used which are all exactly alike and we will describe one of them in detail later referring to them simply by their name and reference letter. The casting M has at its top a cylindrical enlargement through which a longitudinal hole is bored. The hole is not of the same size for its entire length but is so formed as to produce two steps or shoulders of different diameters near its inner end, one to receive a limiting pin and the other to provide a resting place for a spring P. The base of the casting M is broad and in the inner side of the base a wide groove or way m^3 is produced. A greater portion of the entire surface of the way is finely finished as this is the part that rests upon the track, and it must slide freely thereon. Inwardly projecting guides M^1 are attached to the innerside of the casting M in such a manner that they secure the casting M upon the track. The castings M that hold the chuck O operate in pairs upon a single rail and are in axial alinement with each other, and means are provided for reciprocating the castings M, this means is a rod N which passes through an aperture m^4 in the casting M near its base. High up, but on the side of the casting M, a lug M^4 is produced and attached thereto by means of a pin is a casting Q, which we will call a cradle-arm. The upwardly extending end of the arm is provided with a flattened cylindrical section bored axially and provided with a transverse set screw and it is in the central axial hole that the low end of the cradle R is inserted. This cradle R is of U shape but one of the upwardly extending ends is slightly longer than the other, and the lowermost point or center is extended downward to provide the projection R^1. The casting Q has a second arm Q^2 formed integral but which leaves the casting Q, or hub as it may be called, at an angle of about 60 degrees from the angle of departure of the arm Q^1. The outermost end of the arm Q^2 is upturned and the underside or face of the arm is machined so as to make a smooth surface. Secured in one of the grooves in the side of the rail is a bolt S having a nut S^1, and secured upon the bolt is an upwardly extending bracket S^2, which terminates in a right angle inwardly extending pin S^3, and it is with the upper side of this pin that the lower side of the arm Q^2 comes in contact with the obvious result, that when the casting M^2 and its attached mechanism is reciprocated in such a manner as to pass the bracket S^2, the pin S^3 acts on the arm Q^2 in such a manner as to lift that arm, the arm Q^1 and the cradle R. The chucks O which are carried by some of the castings M are the work holding chucks. One is shown in Fig. 4. It is a hollow mill, the outer end is large and the inner extending end which is by far the greater portion of the length is of smaller diameter. The chuck is securely fitted in the end of a shaft T, and as the shaft is revolved it also revolves the chuck O and work which may be held therein. The work is held by the tension of the springs P which tend to force two of the chucks toward each other. A collar T^1 is secured upon the shaft T and immediately adjacent to the opposite end to that from which the chuck protrudes, and when it is desired to discharge the finished work from the chucks O the collar T^1 is pushed away from the casting M.

We provide automatic means for discharging the work from between the chucks which comprises disks u, drilled eccentrically and provided with a pin u^1 by which they are

attached to the casting M. Formed integral with the disk u is an arm u^2 and rotatably attached to the lower end of the arm u^2 is a block u^3. Through a transverse hole in the block u^3 a rod u^4 passes. The rod u^4 must be of a length equal to a little more than one half the length of the longest tube which it is ever desired to treat, but it may be of small diameter only a little more rigid than sufficient to support its own weight without bending. An eye V^1 is formed at one end of the rod V and is for the reception of a pin w^1 fitted in a rocker-arm w. This rocker-arm w rotates on a shaft w^2 carried by a casting w^3 which is in turn rigidly attached to the bar N and is reciprocated therewith. An upwardly extending bracket X also secured to the rail but to the side opposite to that which the bracket S^2 is secured is adjustable and by contacting with the lower pin w^1 determines the time at which the cams u will operate to spread the chucks O and discharge the work. The chucks and their operating mechanism may be well understood by referring to Fig. 4.

So far we have had to do with the radial buffing but a greater portion of the structure described forms an essential part of the second step of the treatment the horizontal buffing.

A pair of frames AA provides a support at convenient height for two pillow blocks AA^1 and carried by the pillow blocks and extending from one to the other is a shaft BB. A frame CC consisting of parallel sides connected by a plurality of cross-bars has at one end, properly formed lugs which are centrally bored to receive the shaft BB. Between the lugs of the frame CC, a duplex pulley is free to revolve, which is also rotatably mounted upon the shaft BB. The end of the frame CC opposite to the one supported by the shaft BB carries a pair of ball bearings and a shaft free to revolve therein supports a buffing wheel EE in such a manner that is immediately above the rod which it is desired to treat.

Mounted on the shaft DD and secured thereto is a pulley DD^1 and a belt FF passes around the pulley DD^1 and the larger side of the duplex pulley on the shaft BB. A downwardly extending runner GG by contacting with the roller *mm* on one of the castings M lifts the bluff EE well up to allow it to pass freely over the cylindrical top of the casting M and the chuck and other mechanism carried thereby. We have before mentioned a second track L which is also supported by the platform J. This track carries a plurality of castings M in axial alinement and these castings are fitted with chucks and chuck operated mechanisms similar in all respects to those before described in detail, and as they operate for the same purpose and by the same means a specific description will not be required.

Similar in all respects to the frame AA though somewhat lower is a frame XX supporting pillow blocks which in turn carry a shaft and a duplex pulley mounted thereon. A frame YY not unlike the frames CC is supported at one end by the frames XX and shaft carried thereby, and carried at its other end is a plurality of ball bearings, a shaft rotatable therein and a buff mounted on such shaft.

Means ZZ is the runner for elevating the buffing wheel upon the approach of one of the brackets M and a belt running upon suitable pulleys is the driving means for the shaft and buff mounted thereon.

While the rods or tubes are being treated by the plurality of buffs they must be rotated slowly though continuously for the first buffing means and intermittently for the final finishing means. The rotation is accomplished as follows. A bracket Y resting upon the floor or any convenient support has at its upper end a broad bearing. A shaft Y^2 rotatably mounted in such bearing carries a wheel Y^1 at one end and a sprocket Y^3 at its other end. The wheel Y^1 is rotated by any convenient means, and by rotating the shaft upon which it is mounted causes the sprocket Y^3 to revolve. A chain Y^4 connects the sprocket Y^3 with a sprocket T^3 mounted on one of the shafts T, and causes the shaft T to turn when the sprocket Y^3 is turning. A bracket Z carried by the track L or one of the supports therefor is an angle bracket, in which two bearings formed integral with the bracket are at right angles to each other, one of the brackets support a shaft Z^1 and secured to the shaft is a bevel-gear Z^2. A second bevel-gear Z^3 in mesh with the bevel-gear Z^2 is secured to a short shaft that passes through the other bearing of the angle-bracket Z. A pin wheel is secured to the short shaft at the end opposite to that to which the bevel-gear Z^3 is secured and serves to rotate by an intermittent motion a Geneva wheel carried on the shaft T which rotates the chuck for the final buffing means.

We have referred to a reciprocating motion which we desire to impart to the plurality of chucks mounted on each of the tracks K and L, we will now describe how the motion is accomplished. A frame work HH, which may be made of castings for the legs and a platform for the top carries in axial alinement two shaft hangers HH^1. A shaft HH^2 passes through these hangers and mounted upon this shaft adjacent to each other are three pulleys. The center is a tight pulley and the two outside ones are loose upon the shaft. Two belts one straight and the other a cross belt are driven from some convenient source of power and

run upon two of the pulleys on the shaft HH^2. A double shipper JJ properly arranged and secured to the platform which carries the shaft hanger HH^1 determines by its position which of the belts will run upon a tight pulley. A bell crank JJ^1 operates the shipper and is in turn operated by a shaft adjustably associated with the casting M. A third shaft hanger KK carries a short length of shaft and upon this shaft near one end a cut-gear KK^1 is secured which meshes with a pinion on the shaft HH^2 and secured to the shaft with the cut-gear KK^1 is a sprocket KK^2. A chain KK^3 which passes around the sprocket KK^2 and has one of its ends secured to one of the rods N. The other end of the chain by far the longest end passes through a groove provided for it in the under side of the track K over a pulley attached to the far end of the track and is secured to the other end of the rod N which connects the castings M on the same track. It will be seen that any movement of the chain must result in an accompanying movement by the casting M, the rod N, connecting them in line and by the chucks and the work mounted thereon.

The chucks mounted on the rail L require to be reciprocated faster than those mounted on the track K, the ratio being about six to one. This is accomplished by a mechanism driven from a shaft and comprises a reversing means OO, operated through the cam OO^1 by the casting M upon the track L. A chain PP driven by a sprocket OO^3 serves to impart motion to the chuck castings M in either direction as it is driven by the sprocket, and the same means are provided for deflecting the buff wheel up out of the line of travel of the chucks as is used in conjunction with the first track. Adjustable counter weights 16 are provided on the buff arms for varying the pressure which the horizontal buffs exert.

A member of our device not before described but which we have mentioned at different times is the hopper shown in detail in Figs. 7 and 8. This hopper has a peculiar service to perform and as it was designed especially for this class of work we will describe it. Two side frames LL which may be of wood properly braced but which we have made of sheet metal are each provided with an adjustable guide LL^1 attached to the inner face of the plate, and near one of the perpendicular edges. These guides terminate in a track or apron LL^2, and at the lower end of the apron is a horizontal shaft running parallel with the lowermost end of the apron but on a somewhat lower plane. Disks LL^3 are mounted on the shaft LL^4 in such a manner that the grooves ll^3 are in perfect alinement with each other. A link LL^5 operated by a cam LL^6 rotates the disks LL^3 through a part of a revolution, and as the cam LL^6 is timed to operate at the proper period the disks LL^3 will deliver a rod to the chucks O each time that the chucks reach a point in their reciprocations directly opposite the apron LL^2.

Difficulty was experienced in inducing the tubes to leave the hopper and to travel down the apron in single file without jamming or packing. A series of rods LL^{10} pass quite through each of the side frames LL and carry with freedom for rocking two load-bars LL^7 on each of the rods LL^{10}. The bars are arranged by means of retaining rings to remain upon the shafts LL^{10} immediately adjacent to the side frames LL. They therefore support the rods or tubes by the ends, and as the load-bars are normally at an incline they offer little frictional resistance to a free movement or roll of the tubes.

When the device is loaded the tubes lie close together on the apron and against the guides LL^1, and each of the load bars LL^7 carries as many tubes as there is room for without stacking. The movement of the tubes down the guides and apron causes the tubes to leave the uppermost of the load-bars first. The pins LL^8 retaining the tubes on the remainder of the bars. As soon as the last tube has left the uppermost load-bar the counter weight LL^9 acts to depress the end to which it is attached and consequently elevate the opposite end, thereby making inoperative the uppermost pins LL^8 and the tubes of the next layer are free to roll on the guide rails LL^1. This action continues from load-bar to load-bar until the lowermost series of bars is reached. These bars are stationary and by the time they are empty an attendant should refill the hopper by placing a fresh supply of tubes upon the load-bars. It will be noted that the shafts or rods LL^6 extend from one of the side frames, this is to allow for adjustment when it is desired to treat longer tubes or rods. The adjustment is accomplished by withdrawing the side frame LL through which the rods LL^{10} extend. An extended screw and hand wheel may be used for this purpose.

Another member of our device not before described is the automatic means for feeding the abrasive to the buffing wheels. At a convenient point which may be upon the platform J, we secure a socket 5 and a vertical shaft 6 is adjustably secured within this socket. The upper end of the shaft carries a box which may be of wood but which we have constructed of cast iron. The box is oblong and an interior false bottom or platform is operated by a spring 8. The abrasive in the form of an oblong block or brick is inserted in the open inwardly-disposed end of the box 7, and the spring operated

platform is depressed to its full extent. The action of the deflector forces the buffing wheels out of their operating path and brings them in contact with the exposed end of the block of abrasive. The rotating of the buff causes it to "pick up" a sufficient quantity of the abrasive. One of these holders is adjacent to each of the buffing wheels.

Still another member of our device is the "carrying across" means which provides a support for the tubes during their passage from the chucks on the track K to the chucks on the track L. Two parallel though slightly inclined rods 10, the upper ends of which terminate in a pivotally attached part 11 serve as an apron upon which the tubes fall when they are discharged from the chucks on the track K. The pivotally attached parts are normally held in a position to make the whole length of the rails straight and a spring 12 is provided for that purpose, but during the passage of the chucks the pivotally attached members 11 are brushed aside assuming a position nearly at right angles to the remainder of the rail. The rails are suitably supported and at the lower end a shaft LL^3 is mounted and operated by means of a link LL^5 and a cam LL^6 for the purpose of feeding the tubes between the chucks upon the track L. The completely finished tubes after their treatment by the finishing buff are discharged upon a conveyer 15, which may be an ordinary belt conveyer suitably driven and are conveyed to the lacquering room.

Modifications may be made within the scope of the appended claims without departing from the principle or sacrificing the advantages of this invention. Parts may be used without the whole.

The track K and operative mechanism adjacent thereto with the automatic feed and discharge forms a desirable type of machine but more complete work and greater satisfaction can be obtained from the use of the complete device as we have shown it.

It is obvious that independent motors can be used to impart motion to the separate moving parts.

The roughing arms can be dispensed with but it may be considered more economical to have an attendant apply the abrasive as it is required.

What we claim and desire to secure by Letters Patent is:—

1. In an automatic buffing machine, means for buffing a rod peripherally and longitudinally, simultaneously, means for presenting a rod to said buffing means, mechanically operated means for presenting an abrasive to said buffing means, and a mechanically operated cam for discharging said rod after its treatment.

2. In an automatic buffing machine, means for buffing a rod peripherally and longitudinally, simultaneously, means for presenting a rod to said buffing means, means for treating a rod longitudinally, and means for discharging said rod after its treatment by the first buffing means, and means for conveying said rod from the first buffing means to the second final buffing means.

3. In an automatic buffing machine, means for buffing a rod peripherally and longitudinally, simultaneously, means for presenting a rod to said buffing means, additional means for treating said rod longitudinally, means for automatically presenting an abrasive to all of said buffing means, and an automatically operating cam for discharging said rod after its second treatment.

4. In an automatic buffing machine, means for buffing a rod peripherally and longitudinally, simultaneously, means for presenting a rod to said buffing means, additional means for treating said rod longitudinally, automatic means for discharging said rod after its second treatment, in combination with mechanically operated chucks for holding said rod while it is being buffed.

5. In an automatic buffing machine, means for buffing a rod peripherally and longitudinally, simultaneously, means for presenting a rod to said buffing means, additional means for treating said rod longitudinally, automatic means for discharging said rod after its second treatment and an automatically operated device for supplying said rods to said chucks.

6. In an automatic buffing machine, means for buffing a rod peripherally, and longitudinally, simultaneously, means for presenting a rod to said buffing means, additional means for buffing said rod longitudinally, in combination with mechanically operated and automatically operating chucks for holding said rods while being buffed.

7. In an automatic buffing machine a plurality of buffs and means for supporting them, a plurality of chucks and means for supporting them in axial alinement with each other, means for holding a tube in two of said chucks and means for presenting said tube in operative relation to said buffs.

8. In an automatic buffing machine a plurality of buffs and means for supporting them, a plurality of chucks and means for supporting them in axial alinement with each other, means for presenting said chucks in operative relation to such buffs, a hopper, and delivering means therefrom for supplying rods to be treated to such chucks.

9. In an automatic buffing machine a plurality of buffs and means for supporting them, a plurality of chucks, and means for supporting them in axial alinement with each other, means for presenting said chucks in operative relation to such buffs, a hopper and delivering means therefrom for sup-

plying rods to be treated to such chucks, in combination with additional chucks properly supported parallel to said first chucks, for receiving the rods after they have been acted upon by said first mentioned buffs and an additional buffing means arranged to act upon a rod while it is being supported by said additional chucks.

10. In an automatic buffing machine a plurality of buffs, and means for supporting them, a plurality of chucks and means for supporting them in axial alinement with each other, and means for presenting said tube in operative relation to said buffs, in combination with means for reciprocating said chucks while the rod is being treated.

11. In an automatic buffing machine a plurality of buffs, and means for supporting them, a plurality of chucks and means for supporting them in axial alinement with each other, and means for presenting said chucks in operative relation to said buffs in combination with means for reciprocating said chucks while the rod is being treated, and means for rotating said chucks while the rod is being treated.

12. In a machine of the character described, two side frames, a platform supported by said side frames, bearing lugs cast integral with said platform, arms supported by said lugs and buffs upon said arms, means for rotating said buffs, and means for adjusting the operating pressure of said buffs.

13. In a machine of the character described, two side frames, a platform mounted upon the ends of said frames, a plurality of buffs suspended from said platform, a second platform parallel to but beneath said first platform, a track upon said second platform, a plurality of chucks mounted upon said track for supporting work in operative relation to said buffs.

14. In a machine of the character described, a plurality of platforms, and means for supporting them one above the other, lugs cast integral with one of said platforms, buffing means supported by said lugs, a track supported by the other platform, work supporting means mounted upon said track, and a sprocket and chain arranged for reciprocating said work supporting means upon said track.

15. In an automatic buffing machine, side frames, a platform supported upon the ends of said side frames, lugs cast integral with said platform, a plurality of buffs supported by said lugs, a second platform, a track carried thereon, a plurality of work holding chucks mounted upon said track, means as a chain and sprocket, and a plurality of belts for reciprocating said chucks, a hopper, an automatic delivery from said hopper, and automatically operated means for placing into said chucks the material which has been discharged from said hopper.

16. In an automatic buffing machine, side frames, a platform supported upon the ends of said frames, lugs cast integral with said platform, a plurality of buffs supported by said lugs, a second platform, a track carried thereon, a plurality of work holding chucks mounted upon said track, means as a chain and sprocket and a plurality of belts, for reciprocating said chucks, a hopper, an automatic delivery from said hopper, and automatically operated means for placing into said chucks the material which has been discharged from said hopper, in combination with automatic means for discharging the finished work from said chuck.

17. In an automatic buffing machine, side frames, a platform supported upon the ends of said side frames, lugs cast integral with said platform, a plurality of buffs supported by said lugs, a second platform, a track carried thereon, a plurality of work holding chucks mounted upon said track, means for reciprocating said chucks, a hopper, and automatic delivery from said hopper, and automatically operated means for placing into said chucks the material which has been discharged from said hopper, in combination with automatic means for discharging the finished work from the chucks, and a horizontal buffing means arranged to operate upon the work immediately before its discharge.

18. In an automatic buffing machine, a plurality of side frames, a plurality of platforms supported by said side frames, two tracks on one of said platforms, a plurality of chucks mounted upon each of said tracks, vertically disposed and supported buffs in operative relation to one of said tracks and the chucks mounted thereon, and horizontally disposed and supported buffs in operable relation to both of said tracks and the chucks mounted thereon, means for reciprocating said chucks upon said tracks, and automatic means for supplying work to said chucks and discharging therefrom.

19. In an automatic buffing machine, two tracks and means for supporting them, a series of chucks in axial alinement on each of said tracks, two vertically supported buffs adjacent to one series of chucks, a horizontally supported buff adjacent to one series of chucks, means for rotating said chucks, means arranged between said two series of chucks for transferring work from one series of chucks to the other, and means for reciprocating said chucks.

20. In an automatic buffing machine, two tracks and means for supporting them, a series of chucks in axial alinement on each of said tracks, two vertically supported buffs adjacent to one series of chucks, a

horizontally supported buff adjacent to each series of chucks, means for rotating said chucks, one series continuously, the other series intermittently, means for reciprocating said chucks, and means for adjusting the length of each reciprocation in combination with means arranged between said tracks for transferring work from one series of chucks to the other.

21. In a machine of the character described, two tracks, chucks supported upon said tracks, buffs in operable relation to said chucks, automatic means for feeding the work to the first set of chucks, automatic means for passing the work from the first to the second set of chucks, and a continuously operating means for conveying the work from the second set of chucks combined as specified.

22. In a machine of the character described, a plurality of buffing means, a plurality of work holding means, in operable relation to said buffing means, automatic feeding mechanism for one of said work holding means, means for transferring the work from one of said work holding means to the other, and means for reciprocating said work holding means in combination with means for conveying away the finished product.

23. In an automatic buffing machine, two tracks and means for supporting them, a series of chucks in axial alinement on each of said tracks, two vertically supported buffs adjacent to one of said tracks, a horizontally supported buff adjacent to each series of chucks, means for rotating said chucks, one series continuously the other series intermittently, means for reciprocating said chucks, and means for adjusting the length of each reciprocation, in combination with automatic means for supplying work to the first series of chucks and automatic means for transferring the work from the first to the second series of chucks, and continuously operated means for conveying away the finished product.

24. In an automatic buffing machine, a plurality of side frames, a plurality of platforms supported by said side frames, two tracks on one of said platforms, a plurality of chucks mounted upon each of said tracks, a plurality of buffs in operable relation to said tracks, a hopper and automatic delivery therefrom to said chucks, means for adjusting said hopper and said chucks to accommodate work of a different size, and means for transferring the work after it has been acted upon by the first buffs and feeding it to the second series of chucks to be acted upon by additional buffs as herein specified.

Signed at New York city in the county of New York and State of New York this 17th day of January A. D. 1910.

ALEXANDER C. FYFE.
WILLIAM E. GLADSTONE.

Witnesses:
F. A. CHICKERING,
ARTHUR PHELPS MARR.