J. B. LADD.

ABRADING.

APPLICATION FILED APR. 2, 1915.

1,198,136.

Patented Sept. 12, 1916.

3 SHEETS—SHEET 1.

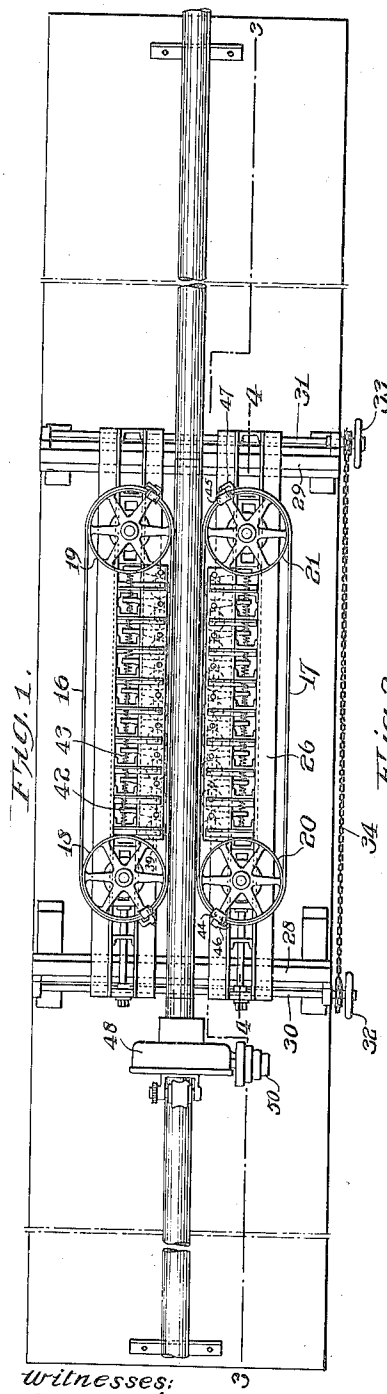


Fig. 1.

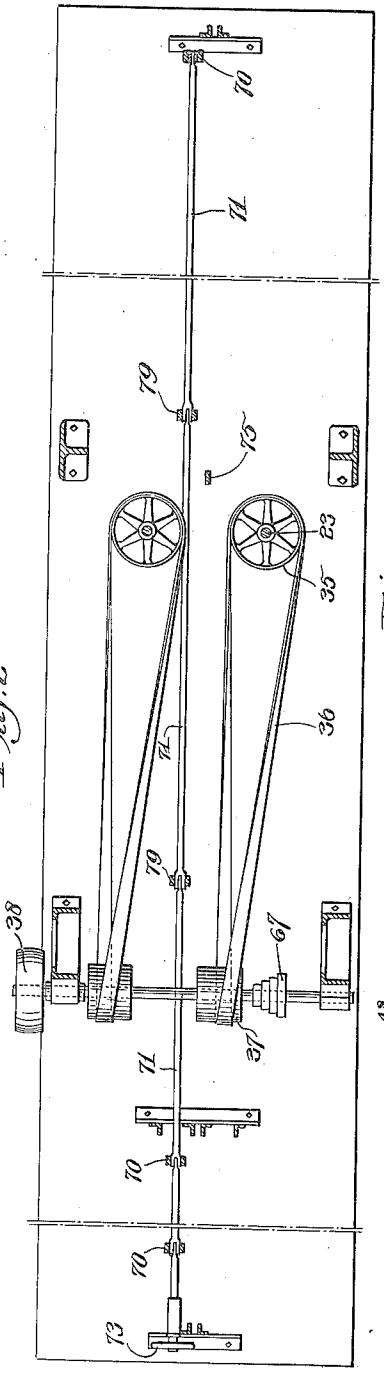


Fig. 2.

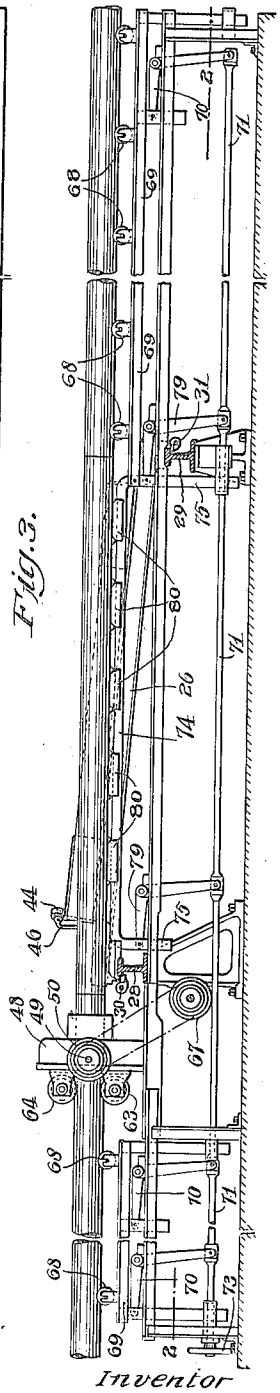


Fig. 3.

Witnesses:

Mae Hofmann

Inventor

James B. Ladd

By Mc Cormick

Attorney.

J. B. LADD.

ABRADING.

APPLICATION FILED APR. 2, 1915.

1,198,136.

Patented Sept. 12, 1916.

3 SHEETS—SHEET 2.

Fig. 4.

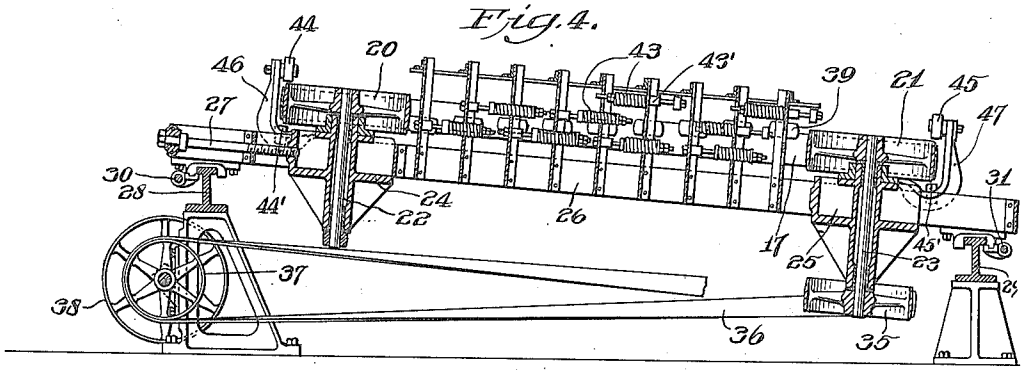


Fig. 6.

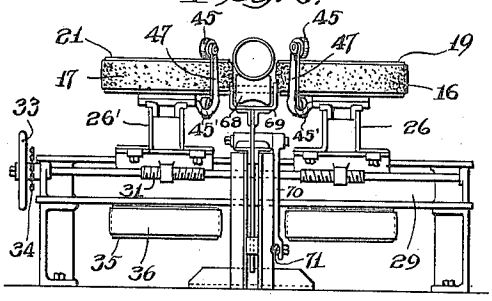


Fig. 5.

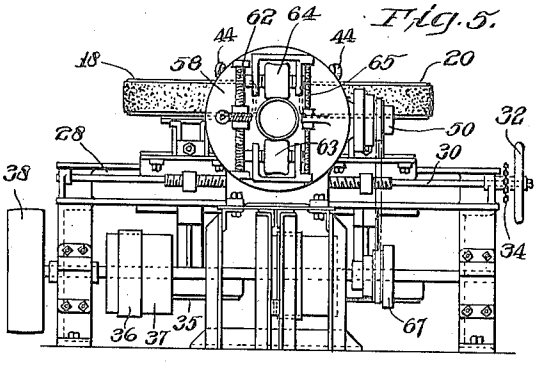


Fig. 8.

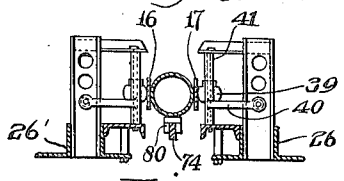


Fig. 7.

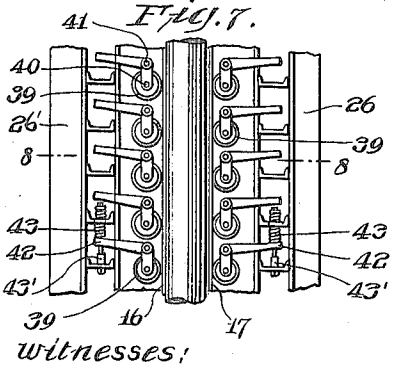
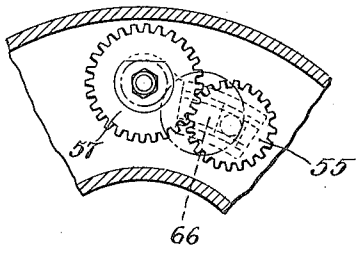


Fig. 13.



Witnesses:

Mae Hofmann

Howard S. Rice

Inventor

James B. Ladd

By Thos. Howard

Attorney

J. B. LADD.

ABRADING.

APPLICATION FILED APR. 2, 1915.

1,198,136.

Patented Sept. 12, 1916.

3 SHEETS—SHEET 3.

Fig. 12.

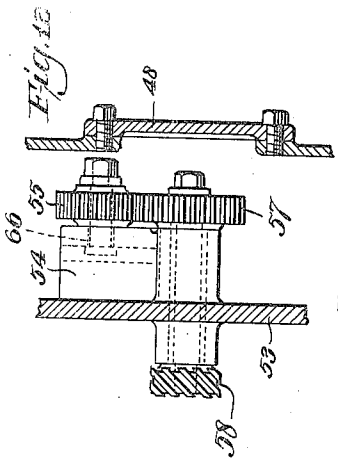


Fig. 11.

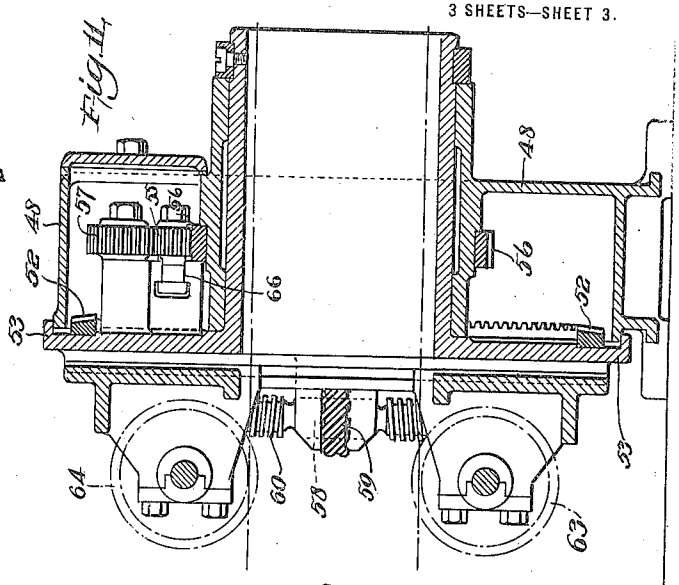


Fig. 10.

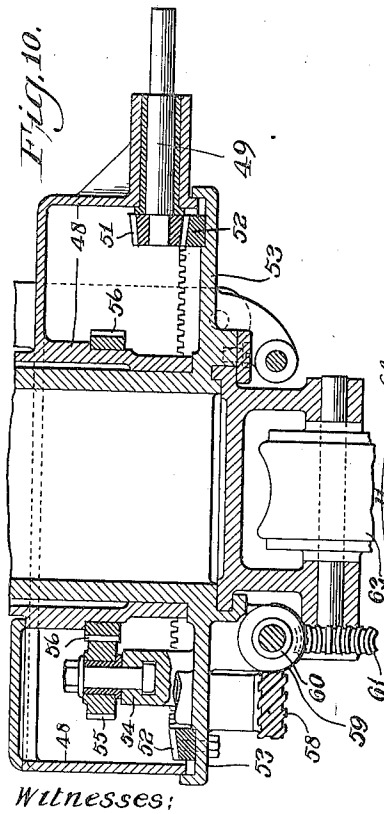
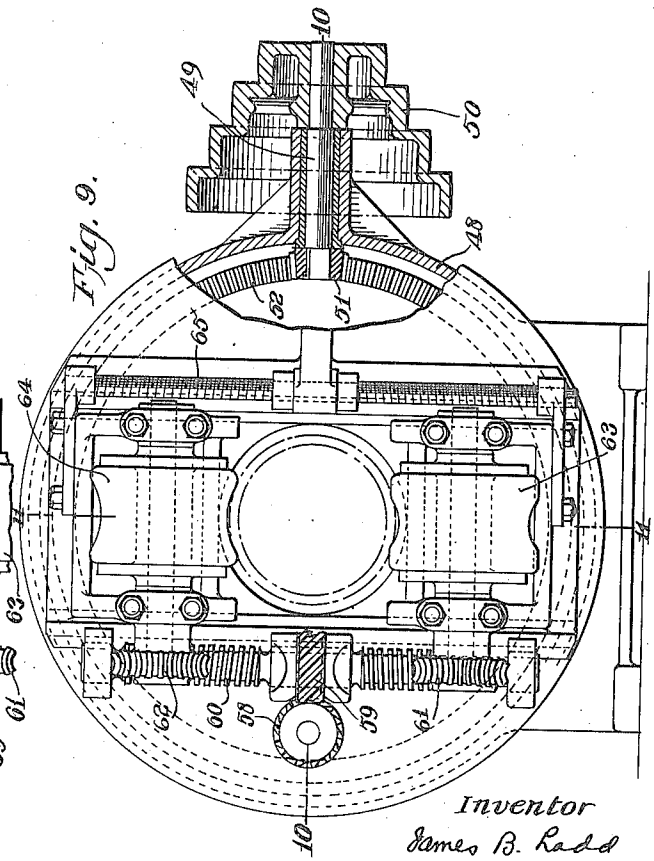


Fig. 9.



Witnesses:
Mae Hofmann
Howard J. Klein

Inventor
James B. Ladd
By
Wm. F. Worsdale
Attorney

UNITED STATES PATENT OFFICE.

JAMES B. LADD, OF ARDMORE, PENNSYLVANIA, ASSIGNOR TO BALTIMORE TUBE COMPANY, INCORPORATED, OF BALTIMORE, MARYLAND, A CORPORATION OF VIRGINIA.

ABRADING.

1,198,136. Specification of Letters Patent. Patented Sept. 12, 1916.

Application filed April 2, 1915. Serial No. 18,637.

To all whom it may concern:

Be it known that I, JAMES B. LADD, a citizen of the United States, residing at Ardmore, in the county of Montgomery, State of Pennsylvania, have invented a new and useful Abrading, of which the following is a specification.

My invention relates to improvements in method and means for abrading.

The object is to provide improved method and means for abrading or polishing the surfaces of metal tubes or other stock.

The invention comprises longitudinal and rotative movement of the stock relatively to the moving abrading surfaces.

The invention comprises the movement of oppositely disposed abrasive surfaces in opposite directions and insuring efficient engagement of said abrading surfaces with the surface of the stock to be operated upon.

The invention is adapted for continuous and automatic operation, and also comprises method and means for adjusting the various elements to suit the requirements of different dimensions, etc. of the stock operated upon.

Referring to the drawings, which illustrate merely by way of example, suitable means for effecting my invention—Figure 1 is a plan view. Fig. 2 is a horizontal section on line 2—2 of Fig. 3. Fig. 3 is a longitudinal vertical section on line 3—3 of Fig. 1. Fig. 4 is a longitudinal section, on a slightly enlarged scale, on line 4—4 of Fig. 1. Fig. 5 is the feed end elevation. Fig. 6 is the discharge end elevation. Fig. 7 is a detail in plan showing the presser rollers and associated mechanism. Fig. 8 is a section on line 8—8 of Fig. 7. Fig. 9 is a front elevation of the feeding head on an enlarged scale, part broken away. Fig. 10 is a section on line 10—10 of Fig. 9. Fig. 11 is a section on line 11—11 of Fig. 9. Fig. 12 is a fragmentary section showing the interchangeable and adjustable pinions. Fig. 13 is a face view of the pinions shown in Fig. 12.

Similar numerals refer to similar parts throughout the several views.

The belt 16 is mounted on the wheels or pulleys 18 and 19. The belt 17 is mounted on the pulleys 20 and 21. The outer surfaces of these belts are coated with an abrasive substance, such for example, as emery. As the arrangement and operation of these two belts and the associated mechanism are substantially the same, a description of one will suffice for both.

Referring to Fig. 4 the pulleys 20 and 21 are mounted on shafts 22 and 23 journaled in boxes 24 and 25, which are mounted on the framework 26. These wheels or pulleys carry the abrading belt 17. The box 24 is longitudinally adjustable in the framework 26; such adjustment being controlled by the screw 27, for the purpose of maintaining the belt under proper tension. The framework 26 is mounted on the I-beams 28 and 29 and has a lateral movement thereon; such movement is caused by means of the threaded rods 30 and 31 operated by the hand wheels 32 and 33. The said rods are connected together by the sprocket chain 34 to secure simultaneous actuation. It will be understood that these threaded rods 30 and 31 are provided with right hand and left hand threads in order to move the frames 26 and 26′ to or away from each other, to bring the abrasive belts 16 and 17 into proper relative position with respect to size of the stock to be operated upon.

To the lower end of shaft 23 is secured the pulley 35, connected by belt 36, with pulley 37, which is connected with pulley 38 driven from any suitable source of power, not shown. From an inspection of Fig. 2 it will be seen that the pulleys 19 and 21 are each driven in the same direction, the adjacent abrading belt portions are driven in opposite directions, that is, the portions of the belts engaging the stock move in opposite directions, or by changing the method of driving the belts may be made to travel in the same direction. In order to secure the efficient engagement with the stock by the two belts throughout their entire extension between their respective pulleys, a series of presser rollers 39 are provided. Each of these rollers is mounted on a bell lever 40 pivotally mounted at 41 and having its free end 42 engaged by the spring 43 which serves to actuate the presser roller to maintain the belt in efficient engagement with the stock to be operated upon. The shoulder or lug 43′ is adapted to engage the end of lever 42 to limit its spring actuated movement. It will also be noted from an inspection of Fig. 4 that these presser rollers are maintained in substantially horizontal alinement, that is, engaging the belt near its upper edge

at one end, being the discharge end, and near its lower edge at the other end, which is the feed end; this being substantially the line of contact between the stock and the belt. It will be observed that the two belts are supported in position inclined to the horizontal, so that the stock, which moves horizontally, will engage with the entire surfaces of the belts during its travel between the same, as will readily be understood.

The rollers 44 and 45, mounted on the brackets 46 and 47 serve to counteract any tendency of the belt to ride upwardly from the pulleys 20 and 21, due to the engagement of the same with the stock at an angle therewith, and 44′ and 45′ in like manner serve to counteract any tendency of the belt to ride downwardly.

As an example of the stock to be operated upon I have shown a series of metallic tubes. These are joined together by inserting short tubes in abutting ends, so that the operation may be a practically continuous operation.

The feed mechanism.—Referring to Figs. 9 and 10, 48 indicates the stationary housing. In this is mounted the shaft 49 carrying the cone pulley 50, at its outer end, and the pinion 51 at its inner end. This pinion 51 meshes with the rack 52 on the movable structure 53. The movable structure or frame 53 carries the stud 54 on which is mounted the pinion 55. The pinion 55 meshes with the annular rack 56 mounted on the stationary housing 48. The pinion 55 meshes with pinion 57, see Fig. 13, which carries on the lower end of its shaft the spiral gear 58. This spiral gear 58 meshes with spiral gear 59, see Fig. 9, which is mounted on the shaft of the right and left hand worm 60. This right and left hand worm 60 meshes with the worm gears 61 and 62. Worm gears 61 and 62 are mounted on spindles upon which are secured the rollers 63 and 64. These rollers are provided with annular grooves to fit the periphery of the stock operated upon, and are either made of rubber or provided with a peripheral surface of rubber to give an effective gripping contact with the stock to be operated upon. These rollers 63 and 64 are mounted in frames slidable in the rotating structure 53 and are operated by the right hand and left hand screw 65 to move the rollers toward or away from each other, to fit the size of the stock to be operated upon. The pinion 55 is mounted on a stud adjustably secured in an arc-shaped slot 66, the arc being that of a circle whose center is the center of movement of the frame 53. The pinion 57 is interchangeable with other pinions of different diameter, and the pinion 55 has the adjustable movement in order to bring it in mesh with such differing diameter of pinion. It will be understood that whatever the position of adjustment assumed by pinion 55, it will always mesh with the annular rack 56.

The operation is as follows: The cone pulley 50 is driven from any suitable source of power, preferably from a pulley on the shaft operating the abrading mechanism, as for example pulley 67, so that the feeding and abrading mechanisms shall have a relative speed of movement. Upon the rotation of pinion 51 engaging with rack 52, the frame 53 is rotated and consequently the pinion 55 meshing with the fixed rack 56 is caused to rotate thereby giving rotative movement to pinion 57 and spiral gear 58, which in turn communicates movement to the spiral gear 59 and the worms 60. The worms 60 are right and left hand worms so that they communicate movement to the worm gears 61 and 62, and corresponding movement to the rubber faced rollers 63 and 64. The relative speed between the movement of the rollers 63 and 64, and the rotating movement of the movable frame or housing 53, is secured by determining the diameter of the pinion 57. It will therefore be seen that as the tube or other stock is carried forward between the rollers 63 and 64, it is also giving a rotative movement about its axis. As the tube or series of tubes are carried forward to and away from the abrading mechanism, they are supported on the rollers 68. These rollers are mounted on bars 69. These bars 69 are provided with vertical extensions suitably guided on the stationary framework, and are supported on the bell levers 70 mounted in the stationary framework. The lower ends of these bell levers are all connected with the rod 71 having a threaded portion operated by the hand wheel 73 to give it a longitudinal movement in one direction or the other to cause the elevation or lowering of the roller 68 as required. The bar 74 extends between the abrading belts and is provided with the down-turned ends 75, working in suitable guides in the stationary framework. This bar is supported on the bell levers 79. These levers are also connected with the common actuating rod 71. This rod 71 is adapted to support a number of wooden saddles 80 as shown in Fig. 8. These saddles are interchangeable; so that the required size may be used to suit the size of stock operated upon. Between the saddles 80 are secured spacing blocks, of the same width as the bar 74, merely to maintain the saddle in proper position.

By the use of the word stock, in the following claims, I mean to include any body of material whether hollow or solid, the surface of which is adapted to be operated upon by the abrading means herein illustrated and described.

I have stated, merely as a specific ex-

ample, that the several tubes are joined together by inserting short tubes in the abutting ends thereof. It will be understood, however, that such other means may be employed for securing together the several units of stock to be operated upon, as circumstances may require.

While I have shown the abrading belts inclined to the horizontal, it is obvious that the same result is gained so long as the longitudinal movement of the stock is in a line inclined to the path of travel of said abrading belts.

While I have shown one feeding head, adapted to feed the stock to the abrading belts, it may under some circumstances be desirable to place another feeding head at the other end of the abrading belts, further to control the movement of the stock.

In certain cases it may be desirable to place blocks, similar to block 80, or other guiding devices, above the stock between the abrading belts, further to control its movement, or to maintain the same in the required path of travel.

What I claim is:—

1. The combination of a belt having an abrasive surface, supporting rollers and actuating means therefor, and means for supporting and moving stock in the required path of travel in contact with said abrasive surface simultaneously throughout the greater portion of its longitudinal extension from roller to roller in a direction inclined to the path of travel of said belt.

2. The combination of a pair of belts having abrasive surfaces, supporting pulleys for said belts so positioned as to maintain the oppositely disposed abrasive surfaces parallel and inclined to the axis of the stock, and means for supporting and moving stock between said parallel abrasive surfaces.

3. The combination of a pair of belts having abrasive surfaces, supporting pulleys for said belts so positioned as to maintain the oppositely disposed abrasive surfaces parallel and inclined to the horizontal, and means for supporting and moving stock between said parallel abrasive surfaces, and in contact with each belt throughout its extension from pulley to pulley.

4. The combination of a pair of belts having abrasive surfaces, supporting pulleys for said belts so positioned as to maintain the oppositely disposed abrasive surfaces parallel and inclined to the longitudinal extension of the stock, and means for supporting and moving stock both horizontally and axially between said parallel abrasive surfaces.

5. The combination of a pair of belts having abrasive surfaces, supporting pulleys for said belts so positioned as to maintain the oppositely disposed abrasive surfaces parallel and inclined to the longitudinal extension of the stock, means for supporting and moving stock between said parallel abrasive surfaces, and means for exerting pressure on the rear of the belt at points close to the line of engagement of the abrasive surface with the stock.

6. The combination of a pair of belts having abrasive surfaces, supporting pulleys for said belts so positioned as to maintain the oppositely disposed abrasive surfaces parallel and inclined to the longitudinal extension of the stock, means for supporting and moving stock between said parallel abrasive surfaces, and means for adjusting the distance between the oppositely disposed abrasive surfaces.

7. The combination of means for supporting and moving stock in the required path of travel, a belt having a surface provided with abrasive material, supporting and actuating pulleys therefor positioned so that the abrasive surface shall engage the surface of the stock throughout the greater part of belt extension from pulley to pulley, and means for raising and lowering the stock supporting means.

8. The combination of means for supporting and moving stock in the required path of travel, a belt having a surface provided with abrasive material, supporting and actuating pulleys therefor positioned so that the abrasive surface shall engage the surface of the stock, throughout the greater part of belt extension from pulley to pulley, and means for adjusting the stock actuating means to fit the different dimensions of the stock operated upon.

9. Means for feeding stock comprising a fixed housing and a body rotatably mounted therein, a pinion mounted in the fixed housing adapted to be driven from a suitable source of power, an annular rack secured to the rotatable body and meshing with the pinion, a pair of stock engaging rollers provided with annular grooves adjustably mounted on parallel axes in the body, an annular rack on the fixed housing near the outer margin thereof, a pinion mounted on the rotatable body meshing with said rack, and a train of gears from said pinion to the rollers.

10. In combination with abrading mechanism, supporting rollers for the stock, frames for supporting the rollers, bell cranks for supporting the frames and a common actuating means for the bell cranks for raising and lower the frames.

11. In combination with abrading means, a stock supporting bar, means for raising and lowering the same, and interchangeable saddle blocks adapted to be mounted on the bar for engaging stock of different dimensions.

12. In combination with abrading means,

a stock supporting bar, means for raising and lowering the same, and interchangeable saddle blocks adapted to be mounted on the bar for engaging stock of different dimensions, and spacing pieces between said saddle blocks.

13. The combination of a belt having an abrasive surface, supporting rollers and actuating means therefor, and means for supporting and moving stock in the required path of travel in contact with said abrasive surface, throughout the greater portion of its extension from roller to roller in a direction inclined to the path of travel of said belt, and means for joining separate units of stock together to facilitate in feeding the same.

14. The combination of a pair of belts having abrasive surfaces, supporting pulleys for said belts so positioned as to maintain the oppositely disposed abrasive surfaces parallel and inclined to the axis of the stock, and means for supporting and moving stock between said parallel abrasive surfaces, and means for joining separate units of stock together to facilitate in feeding the same.

JAMES B. LADD.

Witnesses:
ROBT. NEILSON,
C. H. YATES.