No. 891,281. PATENTED JUNE 23, 1908.

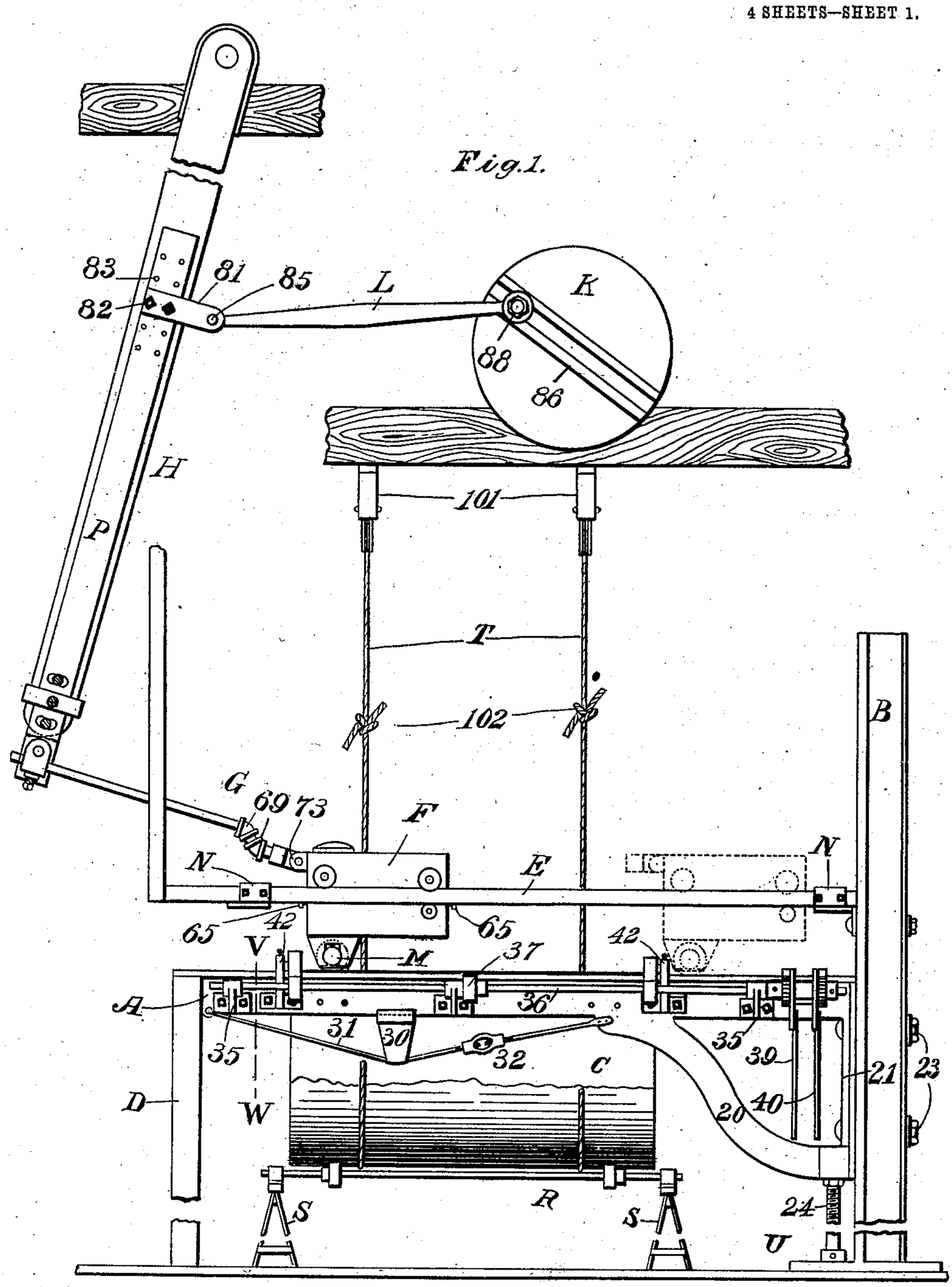
D. W. MULLIN.

METAL FINISHING MACHINE.

APPLICATION FILED DEC. 3, 1906.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
Lindorf A. Nicol.
Fisher H. Pearson

Inventor:
Daniel W. Mullin,
by his attorney,
Gardner W. Pierson

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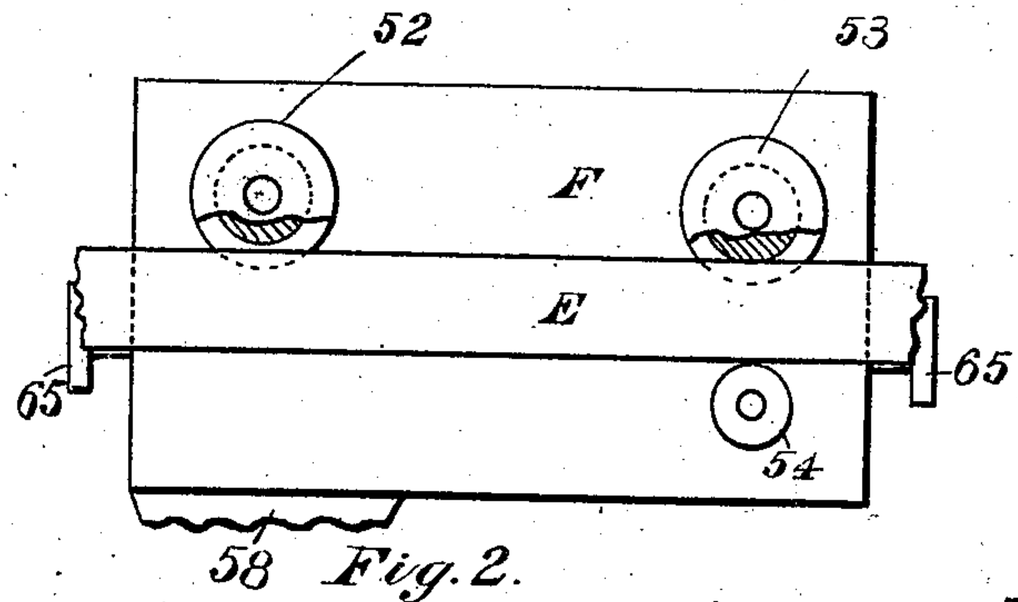

Fig. 2.

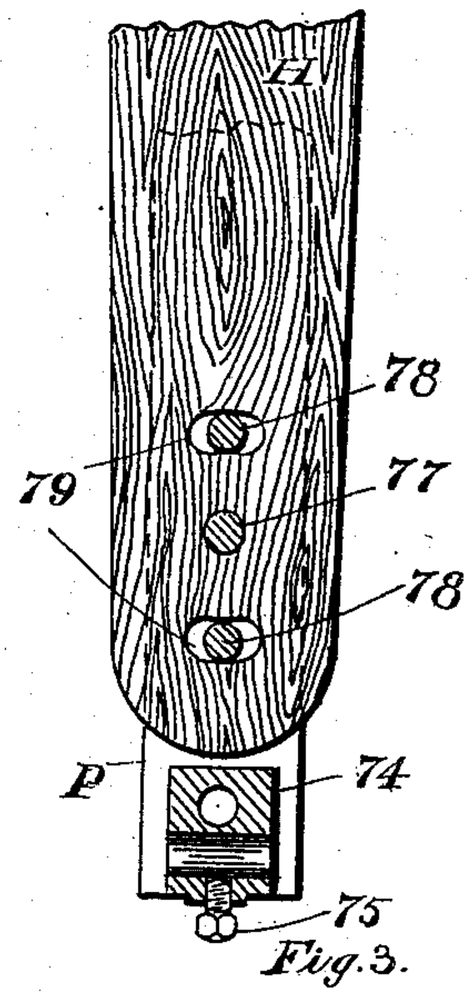

Fig. 3.

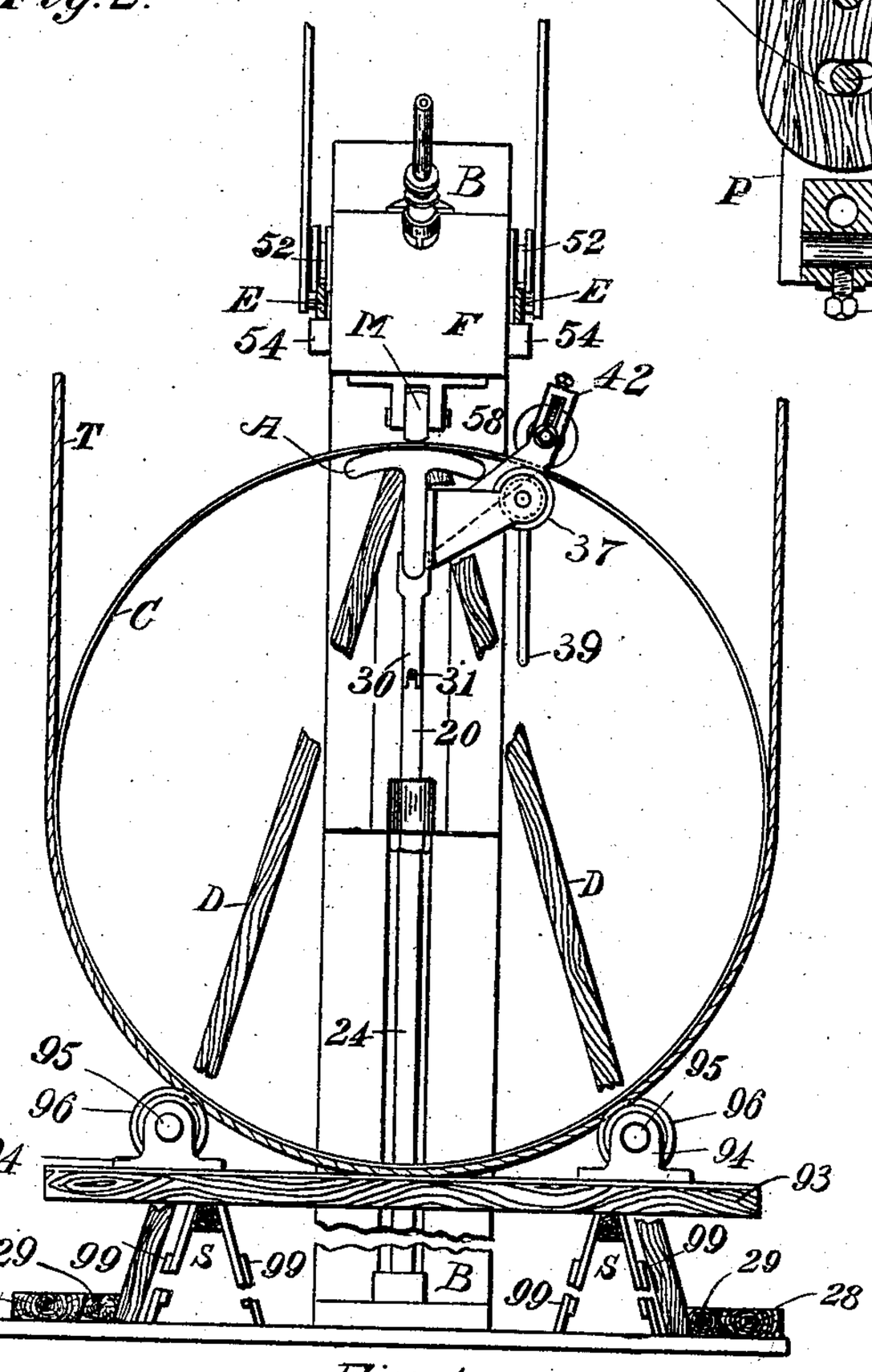

Fig. 4.

Witnesses:
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4 SHEETS—SHEET 3.

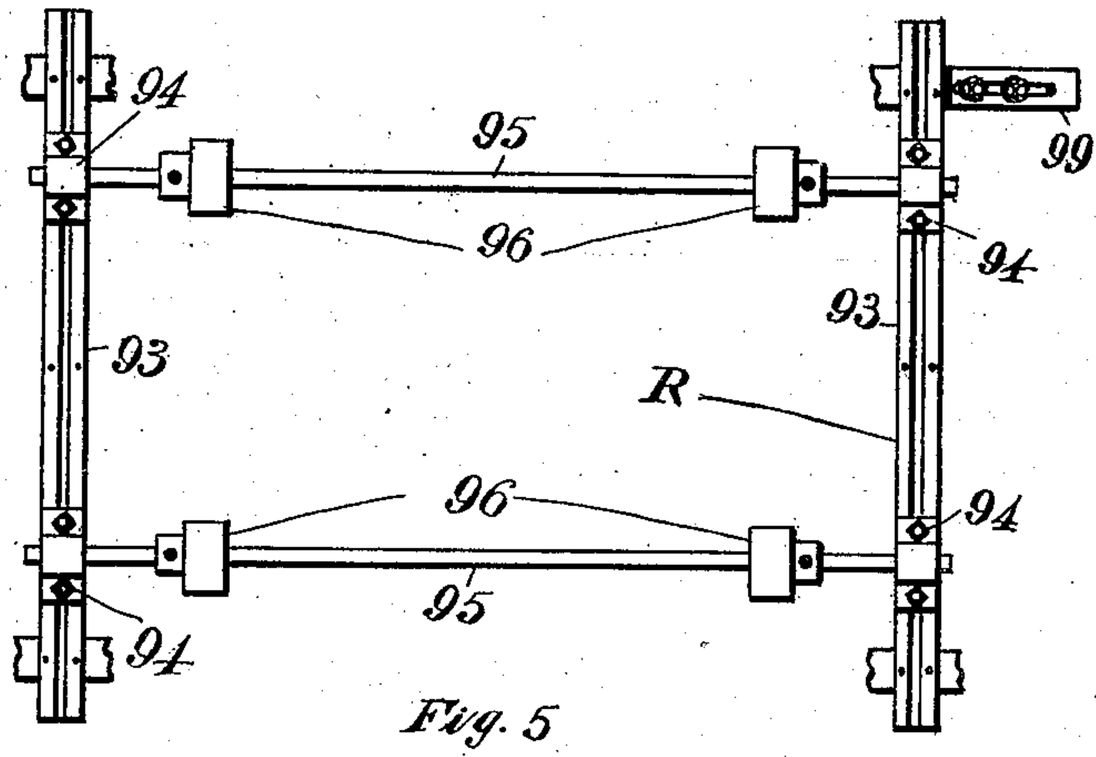

Fig. 5

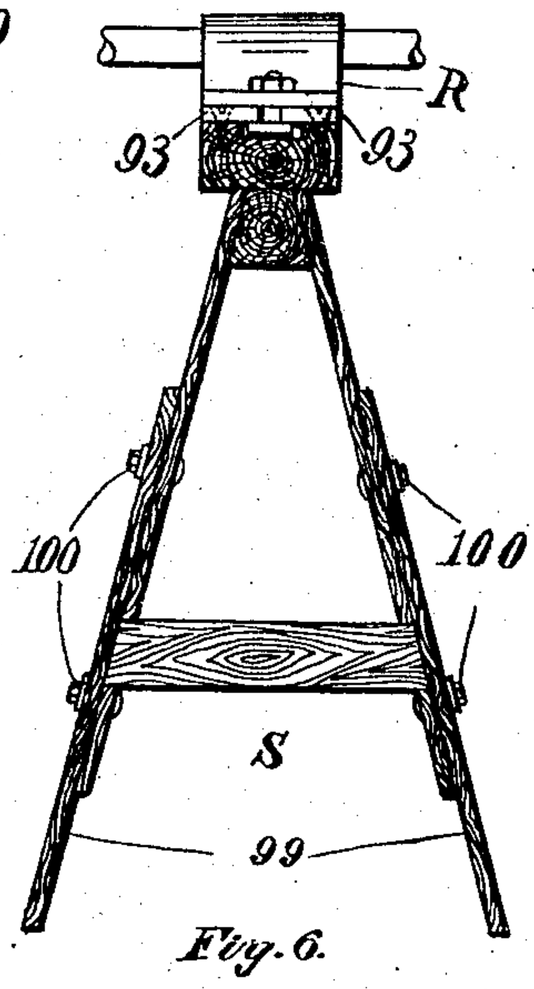

Fig. 6.

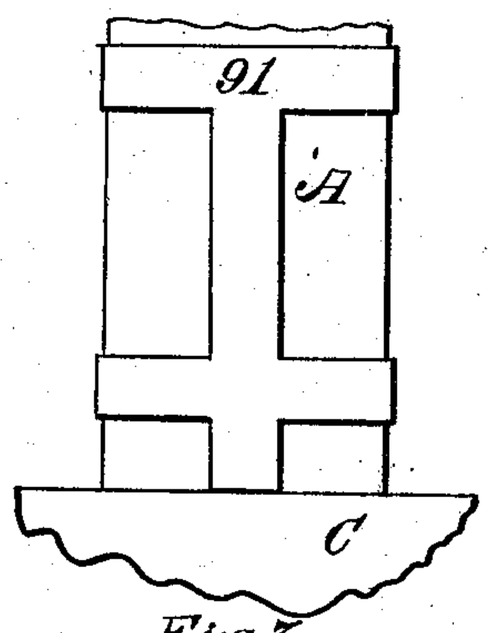

Fig. 7.

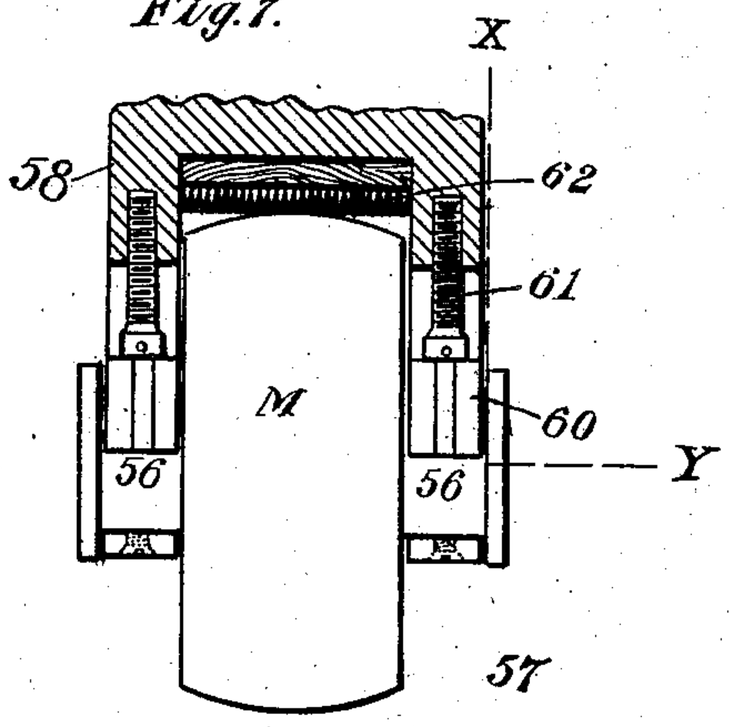

Fig. 8.

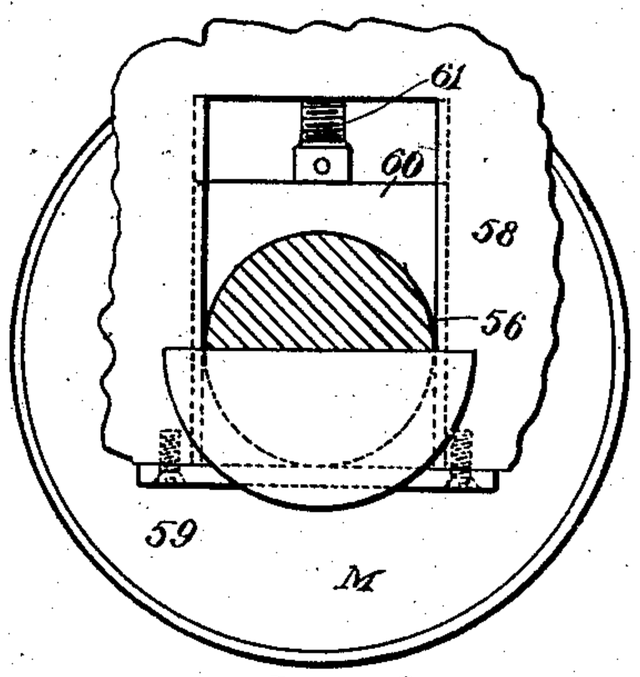

Fig. 9.

Witnesses:
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4 SHEETS—SHEET 4.

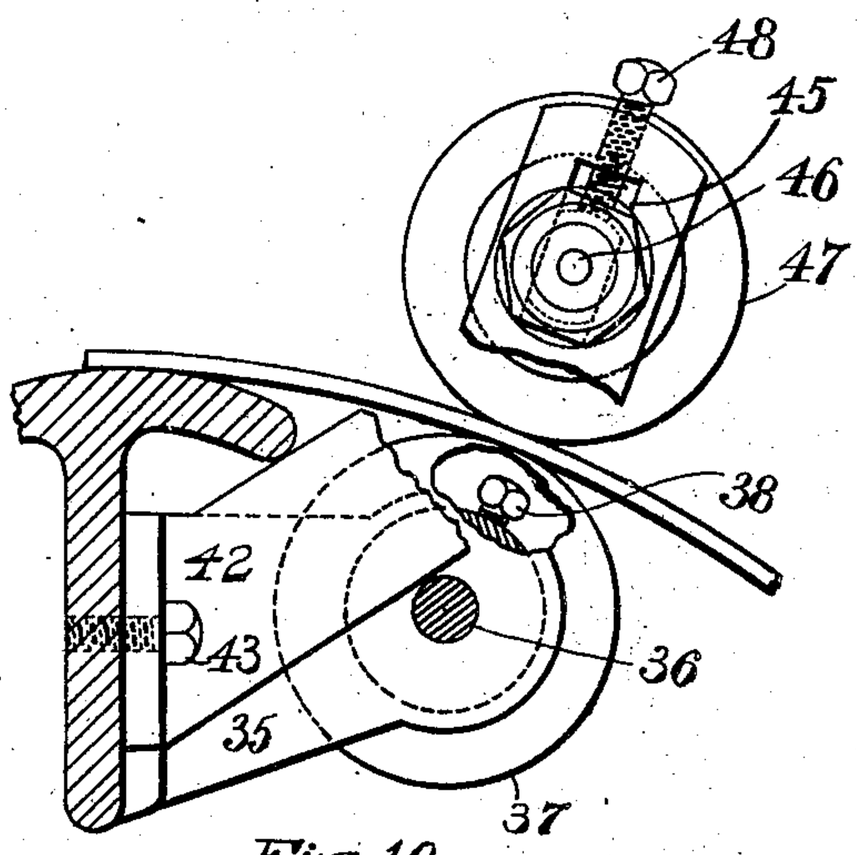

Fig. 10.

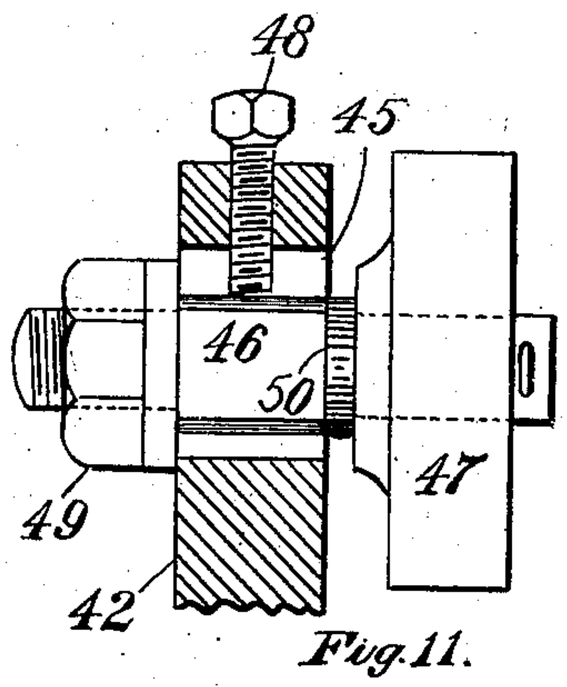

Fig. 11.

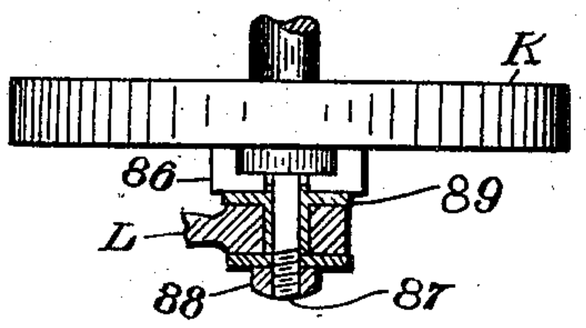

Fig. 12.

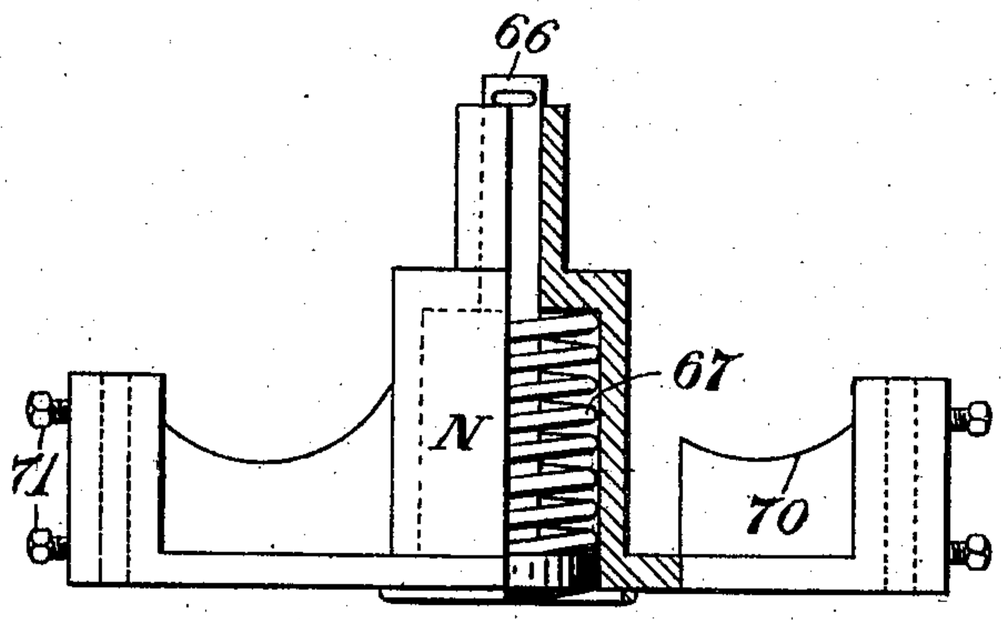

Fig. 13.

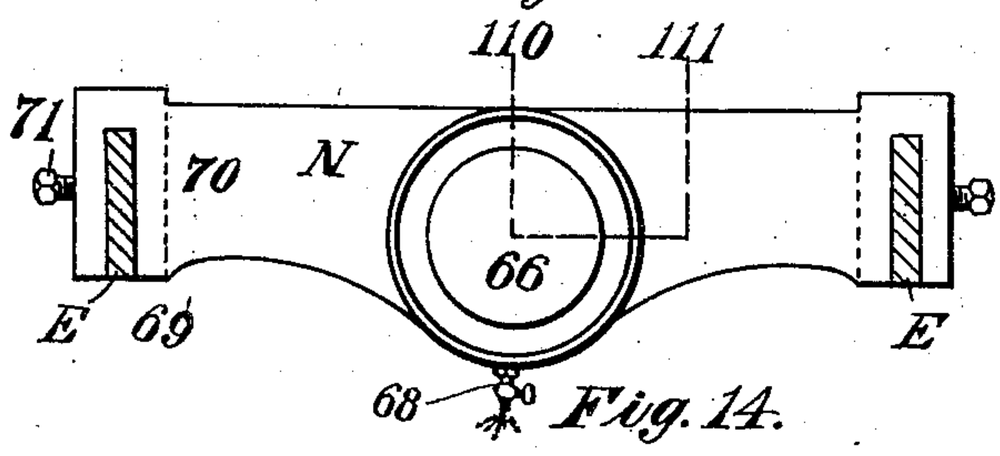

Fig. 14.

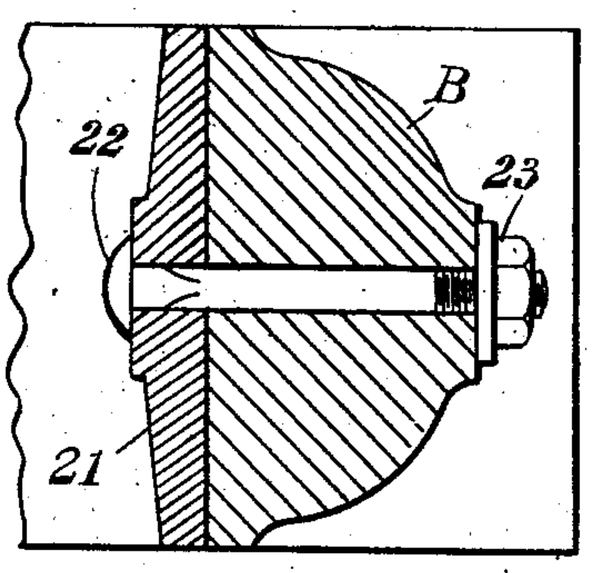

Fig. 15.

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Gardner D. Pearson

UNITED STATES PATENT OFFICE.

DANIEL W. MULLIN, OF LOWELL, MASSACHUSETTS.

METAL-FINISHING MACHINE.

No. 891,281. Specification of Letters Patent. Patented June 23, 1908.

Application filed December 3, 1906. Serial No. 346,167.

To all whom it may concern:

Be it known that I, DANIEL W. MULLIN, a citizen of the United States, residing at Lowell, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Metal-Finishing Machines, of which the following is a specification.

My invention relates to machines for polishing, smoothing, hardening, and stretching to size such large cylinders of copper or other similar ductile material as are used for drying machines and for other similar purposes. The cylinders in question are usually made so thin that they will not support their own weight when placed on their sides and, at the same time, their circumference must be smooth and of a uniform diameter and must correspond to a small fraction of an inch with the inside circumference or the outside circumference of the rings which hold the cylinders in shape when in use. It is also necessary in drying machines for cloth, warps, etc., that the drying cylinder drums should be highly burnished. These cylinders vary in diameter from three or four feet up to ten feet. The difficulty in handling such cylinders lies in the fact that they are so large and flexible that no pressure can be applied to the outside surface without a corresponding pressure on the inside surface. My device is adapted for burnishing the outer surface and, at the same time, and by the same process the cylinder is hardened and is stretched to any extent desired within reasonable limits.

My invention is disclosed in the accompanying drawings, in which:—

Figure 1 is a side view of the complete device with a cylinder in place thereon. Fig. 2 is a side view of a portion of the guide rail and burnishing carriage. Fig. 3 is an enlarged view of the end of the pendulum showing the hanger for the pivoted arm. Fig. 4 is an end view of the lower part of the device leaving out the pendulum and face plate. Fig. 5 is a top view of the supporting rack. Fig. 6 is an elevation of one of the supporting horses. Fig. 7 is a top view of one of the bar straps. Fig. 8 is an end view of the burnishing roll with the hanger in section. Fig. 9 is an enlarged sectional side view of the burnishing roll and hanger on the line X, Y, of Fig. 8. Figs. 10 and 11 are details of the feed rollers. Fig. 12 is a detail of the face plate. Figs. 13 and 14 are details of the dash-pots which check the carriage. Fig. 13 shows a section on line 110—111 of Fig. 14. Fig. 15 is a detail in section of the main supporting post.

The principle of my device is to support the cylinder by means of a bar upon which the cylinder rests along a line parallel with its axis and to apply a burnishing roll along the outside of the cylinder along the corresponding line to that at which it rests upon the bar. This bar line is straight and the burnishing roll is made to travel back and forth upon it. The line of contact is shifted at the end of each stroke by slowly rotating the cylinder. This process burnishes and stretches and also hardens the metal of the cylinder.

In a general way, my device operates as follows: The cylinder C to be burnished is supported by a bar A which is, in turn, supported at one end by a post B and at the other end by props D D. The burnishing is done by a burnishing roll M which supports a weighted carriage F. This weighted carriage F runs along guide rails E E which are above and parallel with the bar A. The weight of the carriage F comes upon the burnishing roll M and the carriage F is operated by a pivoted arm G. Arm G is pivotally connected with the pendulum H swung from a suitable beam or from the ceiling and motion is given the pendulum by a revolving face plate K through the medium of a connecting rod L. By means of suitable feed rollers and ratchets, cylinder C is rotated by hand so as to bring a different line in contact with the burnishing roll at every swing or after several swings of the pendulum.

The bar A consists, substantially, of a T beam with the upper surface curved, as shown in Fig. 4, to correspond in a general way with the curve of the cylinders to be operated upon. Bar A is stiffened and supported by a bracket arm 20 and is provided with an end plate 21 which connects the end of the bar A with the end of arm 20. Through this end plate 21 pass the bolts 22 which also pass through suitable slots in the post B and are provided with nuts 23 on the outside of the post. A set screw 24 permits this end of the bar A to be raised or lowered to any extent desired by loosening nuts 23. When at the desired heights nuts 23 are tightened, thus holding the bar A in place. The other end of bar A is supported by props D which fit under the wings of bar A, as shown in Fig.

4, and their other ends rest upon the floor. On the floor are fixed blocks 28, and by means of removable blocks 29, which may be of different sizes, this end of bar A may be raised or lowered and held in place. It is seldom necessary to change the height of either end of the bar A, but it is sometimes desirable to level bar A or to raise or lower it to accommodate cylinders wherein the stock is of different thickness. As bar A is long and must support the weight of carriage F, I provide a brace 30 with a strap 31 and turn buckle 32, whereby the middle of bar A may be trued up when desired.

Along one side of bar A are fixed hangers 35 in which rests a shaft 36. Shaft 36 carries two or more friction feed rollers 37, 37, preferably rubber covered, which may be set in any desired position along shaft 36 by means of set screws 38. Shaft 36 may be rotated either way by oppositely acting ratchets 39 and 40. These ratchets are provided with suitable handles. Bar A also carries brackets 42 which may be adjusted at different points along bar A to accommodate cylinders of different lengths by means of a series of holes in bar A coinciding with holes in brackets 42, and bolts 43. The upper end of each bracket 42 is formed with an oblong opening 45 in which fits a squared shaft 46 which carries a friction roller 47. This squared shaft 46 may be raised or may be forced downward by bolt 48 and is held in place by washer and nut 49 and by the shoulder 50. When a new cylinder is to be placed on bar A, or when an old cylinder is to be removed, the roller 47 and shaft 46 at each end are removed entirely after unscrewing nuts 49 to allow the new cylinder to drop into place, or the old cylinder to be removed.

The carriage F is provided with double flanged guide wheels 52, 52 and double flanged supporting guide wheels 53, 53 which fit over the guide rails E E. The carriage F is so adjusted that supporting guide wheels 53 rest upon the rails E, E and sustain part of the weight of the carriage while guide wheels 52, 52 merely guide but do not support it. Most of the weight is sustained, however, by the burnishing roll M. I also provide additional guide wheels or rollers 54 underneath the rails and below guide wheels 53, 53, to prevent that end of the carriage from tipping up. This carriage F may be weighted to any extent desired. At each end is fixed a fender 65.

The burnishing roll M, which may be convex, more or less, or flat, is carried by the shaft 56, and is adapted to slide up and down in suitable slots in hanger 58. A strap 59 prevents shaft 56 from falling out and shoes 60 together with adjusting bolts 61 allow the burnishing roll to be raised or lowered or to be leveled or canted one way or the other. I prefer to attach a brush 62 to carriage F in contact with roll M for the purpose of keeping the surface of burnishing roll M clean.

Attached between rails E E in such a position as to be struck by fenders 65, 65 near the end of each stroke, are the dash-pots N N, shown in Figs. 13 and 14. These dash-pots comprise a cylinder portion in which works a piston 66 which is held normally in the position shown, by spring 67. The cylinders either have no outlet behind the piston head or have a very small outlet 68. These dash-pots N N are formed with wings 70 in which are slots of a size to fit over guide rails E, E. Dash-pots N N may thus be slid along rails E E for adjustment to any length of stroke and they may be clamped in place thereon by set screws 71. These dash-pots provide a pneumatic cushion at each end of the stroke of the pendulum and help to stop the powerful momentum of the heavily weighted carriage F.

The arm G is pivoted to the carriage F at 73 and at its other end passes through an opening in the pivoted hanger 74 which is carried by the bottom of the pendulum straps P. This pivoted hanger is free to swing except as controlled by arm G.

The elbows 69 permit carriage F to be properly alined, with reference to rails E, E and pendulum H. A set screw 75 holds arm G in place. Set screw 75 may be unloosened when it is desired to push back carriage F to the position shown by the dotted lines in Fig. 1, as is desirable when a new cylinder is being put on or when an old cylinder is being removed. The position of the path of carriage A with reference to bar A may be regulated by pushing arm G through hanger 74 whichever way desired and by then locking it in place by tightening set screw 75.

The hanger 74 is pivoted between the ends of pendulum straps P which pass down on each side of pendulum H and are pivoted at 77 near the end thereof. These straps P extend beyond the end of the pendulum H to accommodate the hanger 74. The two straps P are connected by studs or bolts 78, 78 which pass through curved openings 79, 79 in pendulum H, whereby the movement of straps P on pivot 77 is limited.

At the upper end of each strap P is bolted an arm 81 in such a manner that said arms may be shifted in position by means of bolts 82 and holes 83. The two arms 81 are connected by a stud 85 which serves as a pivot for the connecting rod L. By raising or lowering arms 81, the leverage on pendulum H can be increased or diminished and its swing decreased or increased accordingly. This permits the use of a smaller face-plate K which is very desirable.

The face plate K, through which motion is applied to my device, carries a grooved track 86 which extends along one diameter. Within the groove of this track is the head of

a pin 87 and the pin carries a nut 88 at its other end. A sleeve 89 with double flanges is carried by pin 87 between nut 88 and track 86. This sleeve 89 serves as a pivot for connecting rod L. By loosening nut 88, pin 87 and sleeve 89 may be moved along to any point along track 86 where it may be fastened in place by tightening bolt 88. In this manner, the length of the throw of connecting rod L and consequently the length of the swing of pendulum H and the length of the path traveled by carriage F may be regulated. The position of the extreme points of the path of burnishing roll M can thus be regulated by the position of arm G with reference to pivoted hanger 74, and the length of the path by shifting arms 81 and collar 89.

As the carriage F is heavily weighted and acquires great momentum, it is desirable not only to use the dash-pots N N but to provide the straps P which, by reason of the pins 78 and curved openings 79, allow a considerable give at the end and beginning of each stroke whereby a large amount of racking and wear and tear is avoided. This loose motion of the pendulum H and its flexibility also decrease the impact of carriage F against dash-pots N and prevent the pendulum from being shattered.

On most classes of cylinders, it is desirable that the burnishing roll M should run right up to the edge and, preferably, that it should pass beyond the edge of the cylinder. It is evident that to prevent the burnishing roll M and carriage F from dropping a distance equal to the thickness of the material of the cylinder, there must be something to receive the roll when it leaves the cylinder. For this purpose I use a bar strap 91, see Fig. 7, which is of the thickness of cylinder C and is provided with wings adapted to fit over the edges of bar A to hold the strap in place. I use one of these at each end of cylinder C.

To prevent cylinder C from sagging or collapsing, I support it at the bottom by means of a rack R. The ends of rack R are formed of parallel strips of metal 93, 93 attached over grooves therein to the tops of horses S. Between strips 93, 93, bearings 94 for shafts 95 are adapted to slide and to be held in any position by suitable bolts. Along shafts 95 are rubber covered pulleys 96, 96, 96, 96 capable of being fixed in any position by means of set screws. The rack can thus be adjusted for any sized cylinder, by moving bearings 94 or pulleys 96, or both. This rack R is supported on horses S capable of vertical adjustment by means of the extension legs 99, 99 which are slotted and may be held in any position by tightening nuts 100.

It is sometimes necessary on very large cylinders to provide supports in addition to rack R to prevent sagging and to prevent sharp bends in the cylinder. For this purpose, I use the ropes T which pass around the cylinder and up and through pulleys 101. Ordinary knots 102 permit these ropes to be adjusted to different sizes of cylinders. By the use of the pendulum H with straps P, I get a flexible motion which is very desirable with such heavy machinery, as it aids the fenders N, N greatly in taking up the shock and in reversing the movements of carriage F at the end of each stroke. The use of the pendulum H also permits a smaller face plate to be used as stated and permits rapid changes in the adjustment. In rolling such cylinders to a certain size, it frequently happens, through unevenness in the stock, that one end or the middle of the cylinder is too small. When this happens, I can readily adjust the path of the burnishing roll to cover that portion only and can thus obtain accurate results.

What I claim as my invention and desire to cover by Letters Patent is:—

1. In a cylinder burnishing machine, a supporting bar, guide rails parallel thereto, a weighted carriage comprising guide wheels adapted to traverse the guide-rails and a depending hanger in which are vertical slots, shoes adapted to slide in the slots, adjusting bolts screwed into the hanger and bearing against the shoes, a shaft carried in the slots of the hanger, and seated in said shoes, and a burnishing roll carried by the shaft, as described.

2. In a cylinder burnishing machine, a bar forming an interior longitudinal support for the cylinder, a burnishing roll, a weighted carriage supported thereby, guide rails above and parallel with the bar along which the carriage travels, fenders carried by the carriage, two dash - pots, each comprising a spring and a piston working in a cylinder from which extend slotted wings fitted over the guide rails and held in place by adjusting bolts, and means for causing the carriage and burnishing roll to traverse back and forth between the dash-pots, as described.

3. In a cylinder burnishing machine, a bar forming an interior longitudinal support for the cylinder comprising a bracket and an end plate at one end, a supporting post provided with vertical slots, bolts passed through the end plate and the slots, nuts carried by the bolts, a set screw adapted to raise or lower this end of the bar, combined with removable adjustable props at the other end of the bar.

4. The process of burnishing and stretching cylinders consisting of supporting the cylinder internally parallel with its axis and causing a roll under pressure to travel back and forth upon the outside of the cylinder along the internal support and of rotating the cylinder intermittently so as to bring each portion of the surface successively under the roll.

5. In a cylinder burnishing machine, a bar adapted to enter the cylinder, a burnishing

roll supported thereby, a weighted carriage supported by the roll, guides for the carriage parallel with the bar, a face plate, a pendulum, straps pivoted near their ends to a point near the free end of the pendulum, means for limiting the movement of the straps, a connecting rod pivoted to the face plate and to the long ends of the straps, and a rod pivoted to the weighted carriage and to the straps, as described.

6. In a cylinder burnishing machine, a bar adapted to enter the cylinder, a burnishing roll supported thereby, a weighted carriage supported by the roll, guides for the carriage parallel with the bar, fenders carried by the carriage, dash pots attached to the guides and adapted to be struck by the fenders, a pendulum pivotally connected to the weighted carriage, and means for actuating the pendulum as described.

7. In a cylinder burnishing machine, a bar adapted to enter the cylinder, a burnishing roll supported thereby, a weighted carriage supported by the roll, guides for the carriage parallel with the bar, a face plate, a pendulum, straps pivoted near their ends to a point near the free end of the pendulum, means for limiting the movement of the straps, a connecting rod pivoted to the face plate and to the long ends of the straps, and a rod pivoted to the weighted carriage and to the straps, combined with fenders carried by the carriage, and dash pots attached to the guides and adapted to be struck by the fenders, as described.

8. The process of burnishing and stretching cylinders which consists in supporting the cylinder internally parallel with the axis and then successively subjecting outer portions of the cylinder which are internally supported to the action of a burnishing tool under pressure traveling parallel with the axis of the cylinder.

9. In a cylinder burnishing machine, a bar adapted to enter the cylinder, a burnishing roll supported thereby, a weighted carriage supported by the roll, guides for the carriage parallel with the bar, means for actuating the carriage comprising a loose motion, and elastic buffers near each end of the path of the carriage.

10. In a cylinder burnishing machine, a bar adapted to enter the cylinder, a burnishing roll supported thereby, a weighted carriage supported by the roll, guides for the carriage parallel with the bar, dash pots arranged near each end of the path of the carriage, a pendulum pivotally connected to the weighted carriage, and means for actuating the pendulum as described.

In testimony whereof I affix my signature in presence of two witnesses.

DANIEL W. MULLIN.

Witnesses:

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FISHER H. PEARSON.