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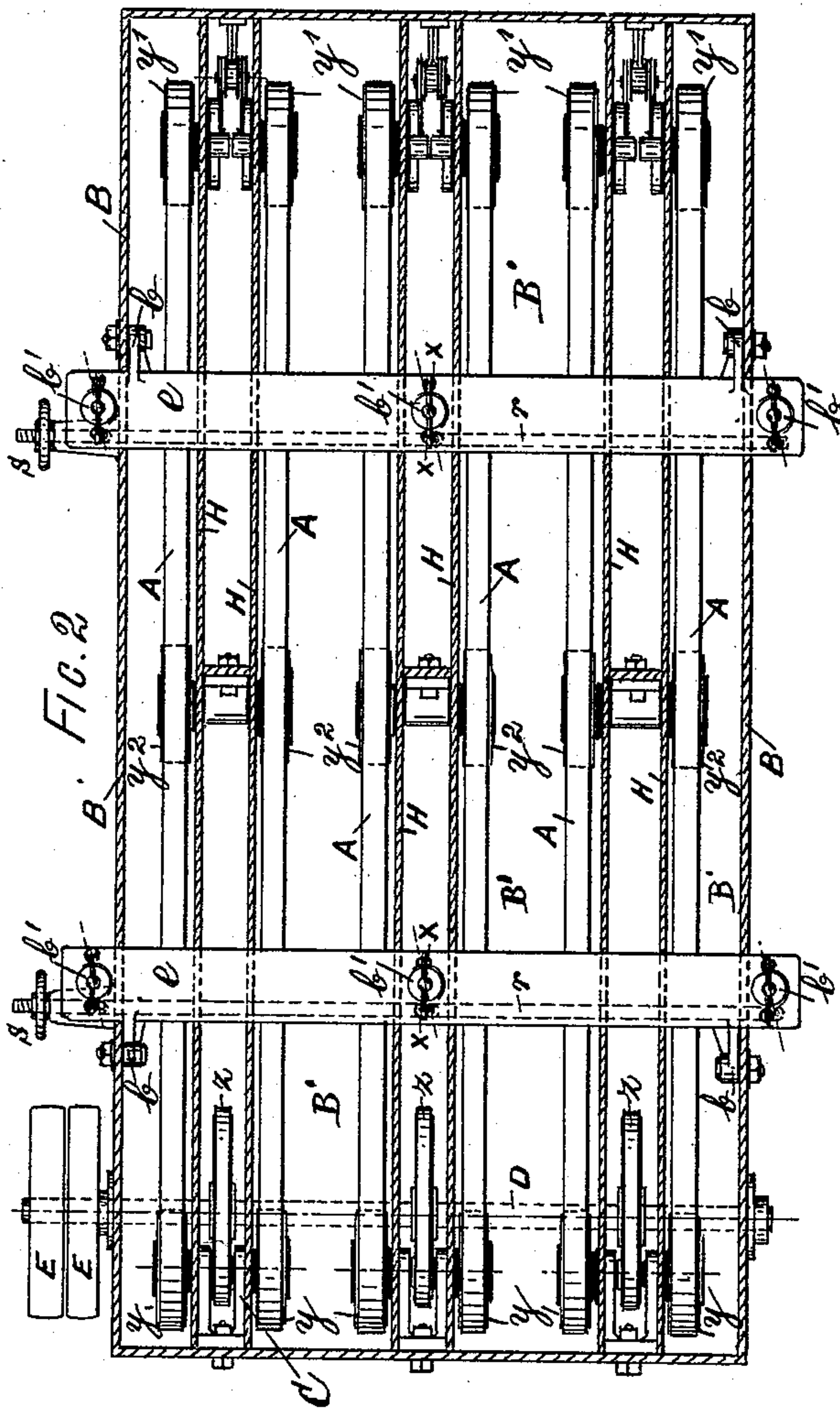
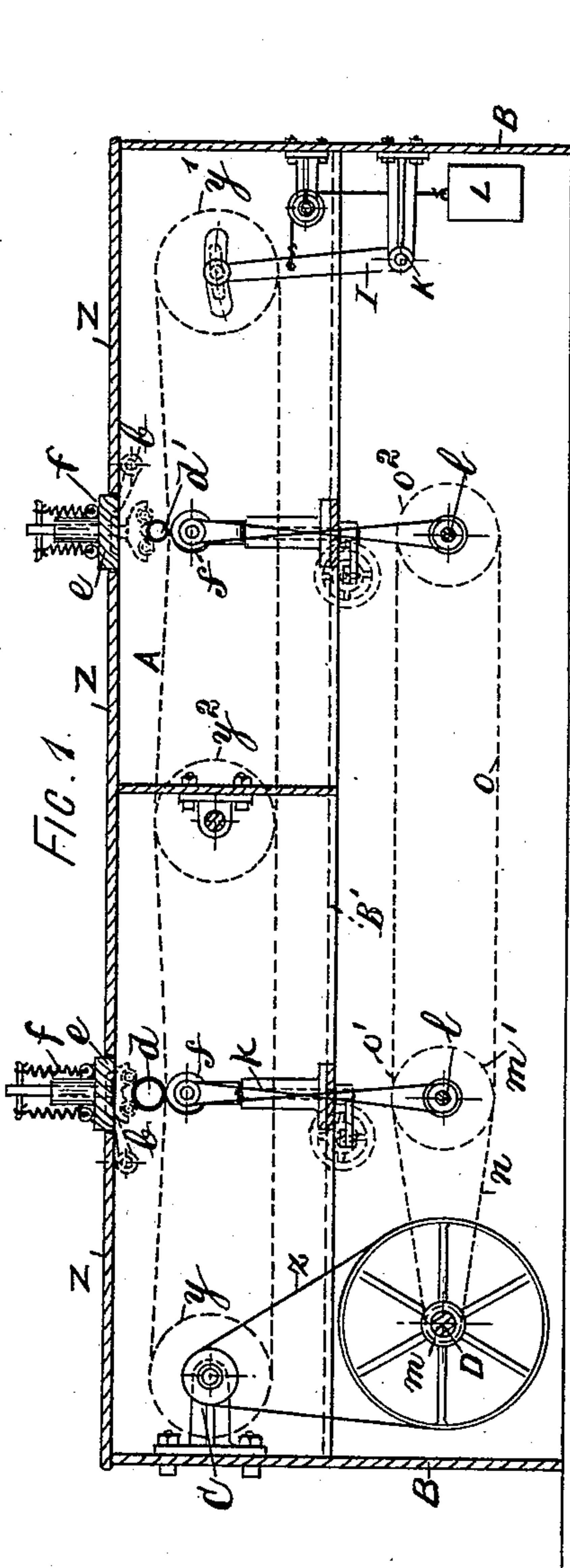
3 Sheets—Sheet 1.

R. J. & A. EDWARDS.

MACHINERY OR APPARATUS FOR GRINDING OR POLISHING.

No. 465,170.

Patented Dec. 15, 1891.



Witnesses:  
M. B. Harris  
J. C. Wilson.

Richard John Edwards,  
Archer Edwards,  
Inventors:  
by  
Whitman & Wilkinson,  
Attorneys.

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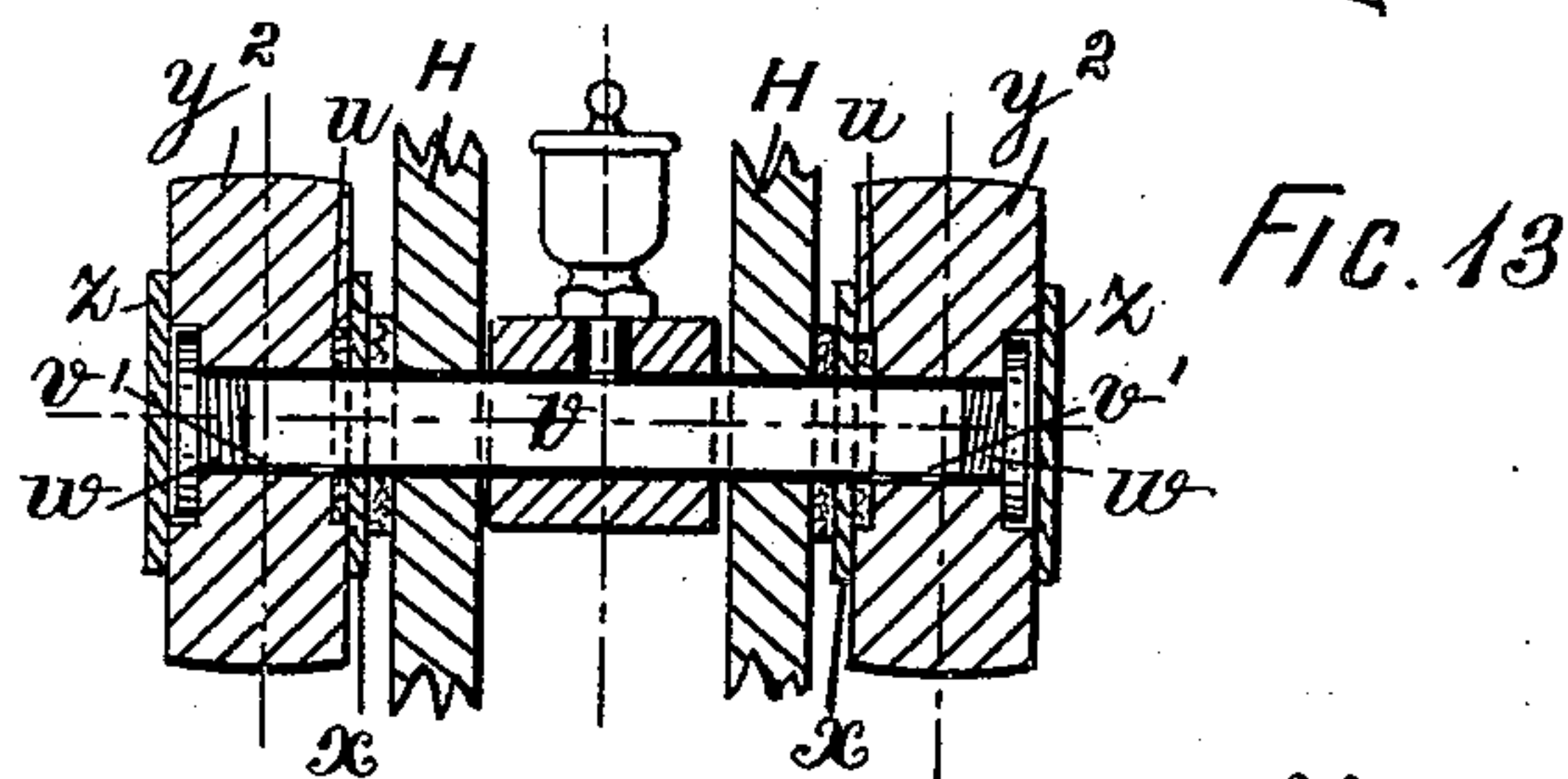
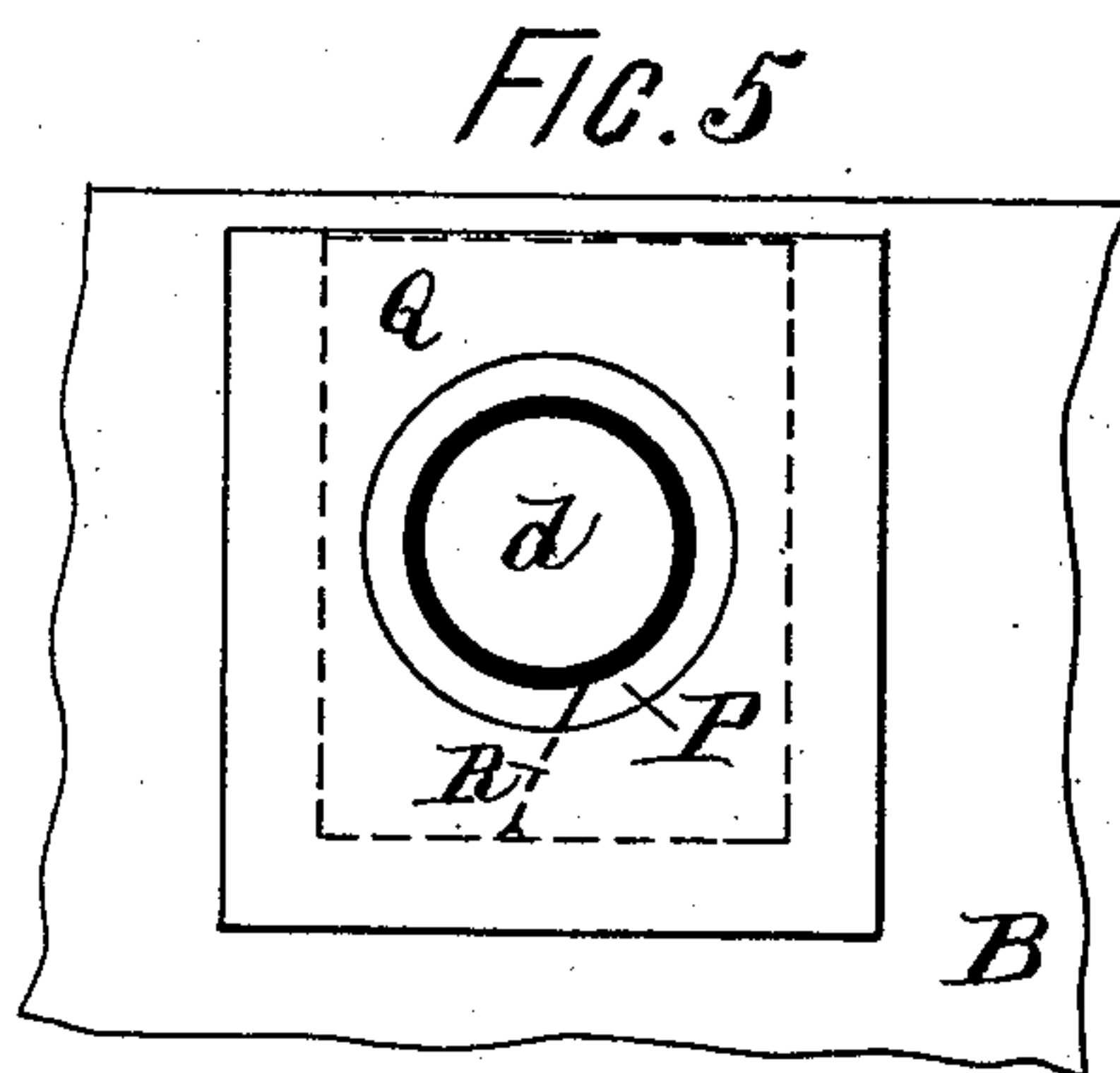
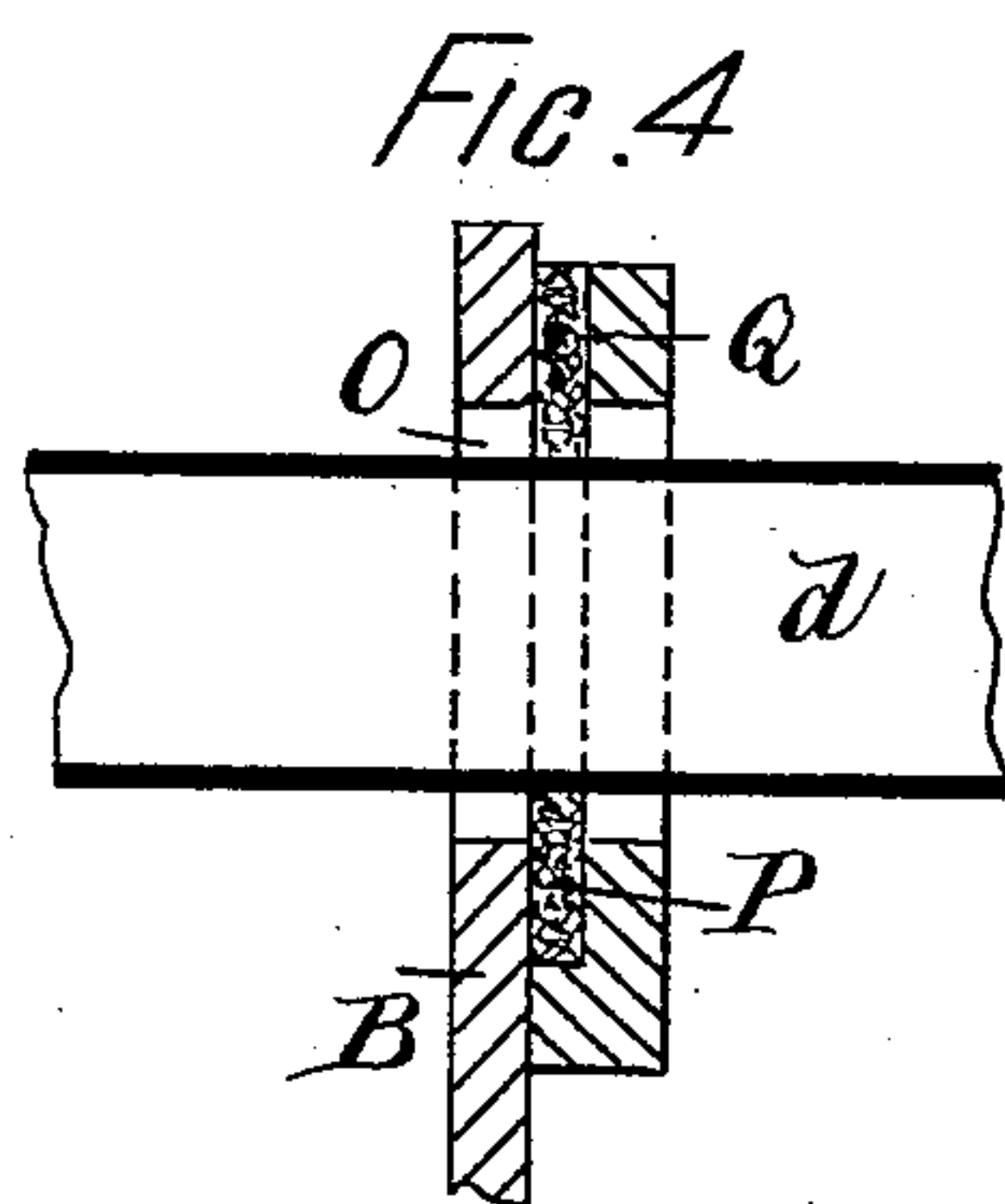
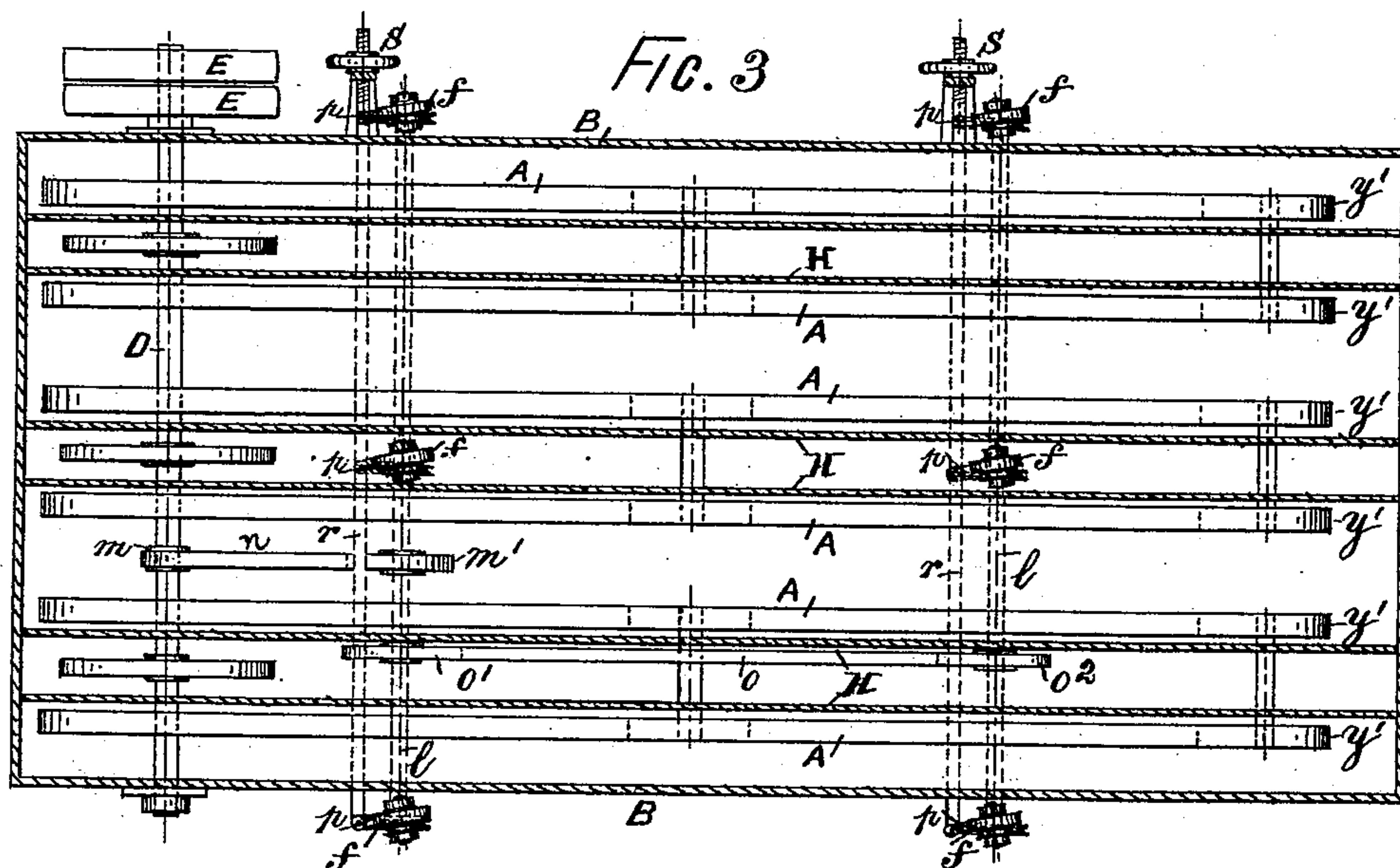
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Attys



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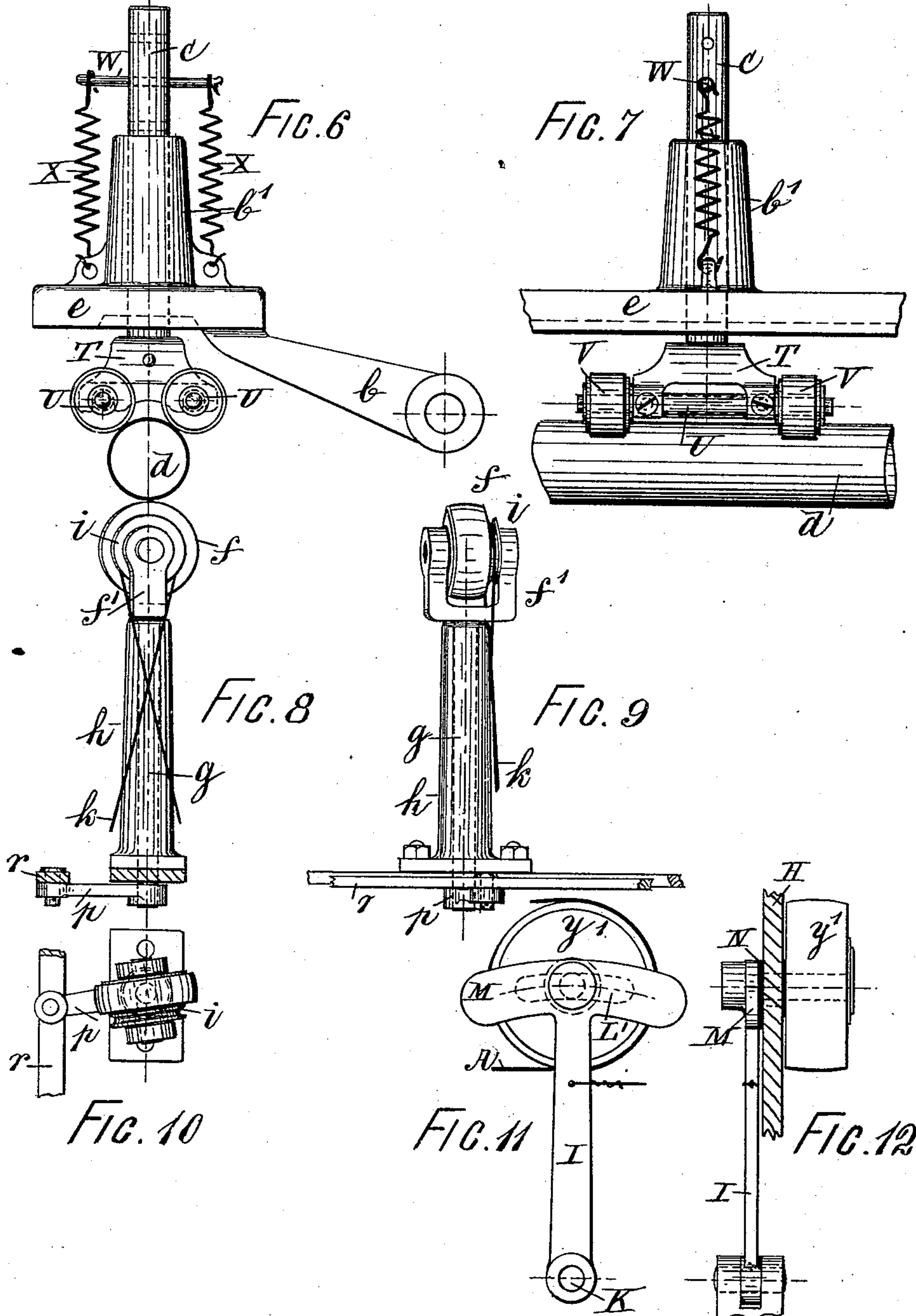
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Witnesses:  
M. B. Harris  
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Richard John Edwards, +  
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# UNITED STATES PATENT OFFICE.

RICHARD JOHN EDWARDS AND ARCHER EDWARDS, OF LONDON, ENGLAND.

## MACHINERY OR APPARATUS FOR GRINDING OR POLISHING.

SPECIFICATION forming part of Letters Patent No. 465,170, dated December 15, 1891.

Application filed February 18, 1891. Serial No. 381,881. (No model.) Patented in England January 29, 1885, No. 1,292, and in France November 17, 1885, No. 172,319.

*To all whom it may concern:*

Be it known that we, RICHARD JOHN EDWARDS and ARCHER EDWARDS, both subjects of the Queen of Great Britain, residing at London, in the county of Middlesex, England, have jointly invented a certain new and useful Improvement in Machinery or Apparatus for Grinding and Polishing, (for which we have received Letters Patent in England, No. 1,292, dated January 29, 1885, and in France, No. 172,319, dated November 17, 1885,) of which the following is a specification.

Our present invention relates to machinery or apparatus for grinding and polishing the surface of bars or tubes more or less cylindrical in transverse section and of any length of metal or other material; and it has for its objects to provide for the grinding and polishing of tubes or bars at a single continuous operation, to prevent the escape of dust and the wear of the moving parts, to cause the tubes or bars to turn upon their axes and at the same time to move forward at any desired speed, to keep the tubes or bars steadily pressed down and held while being ground and polished, to afford ready access for the purpose of changing the abrasive bands, and to keep the abrasive bands constantly stretched while in use. We attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal section through the machine; Fig. 2, a top view of the machine; Fig. 3, a horizontal section. Fig. 4 is a vertical section of an end of a tube and a portion of the trough, showing our method of preventing the escape of polishing-dust. Fig. 5 represents an end view of the same tube and dust-tight attachment. Fig. 6 represents a section through the axes of the pulleys of the polishing-belt. Fig. 7 represents a side view of the bar and spring-pressure attachment. Fig. 8 represents a section across a bar being polished, and shows our device for holding the bars in position, adjusting the pressure thereon, and regulating the motion thereof. Fig. 9 represents a side view of one of the angularly-disposed disks and its mountings. Fig. 10 represents a plan view of the same. Fig. 11 represents a side view of the

adjustable pulley for the polishing-bands, and Fig. 12 represents an end view of the same.

Similar letters refer to similar parts throughout the several views.

In Figs. 1, 2, and 3, B is a horizontal bed or trough, above which the tubes or shafts  $d$   $d'$  to be ground and polished are adjusted. This trough B is provided with a sufficient number of moving abrasive bands A A A A in contact with the tube or shaft  $d$  at different parts of its length, the bands A being supported by end pulleys or drums  $y$   $y'$ , as well as by intermediate ones  $y^2$ . The pulleys  $y$   $y'$ , by which the bands A are driven, are carried and rotate upon spindles supported in bearings C, bolted to the trough B, and they are provided with pulleys driven by belts  $z$  from driving-pulleys upon the driving-shaft D below, which is itself driven by the fast and loose pulleys E by steam or other power. The trough B is divided by longitudinal partitions H H into separate compartments, in some of which the belts A run, while in the others the driving apparatus and the mechanism for turning the tubes or bars upon their axes and feeding them forward while being ground and polished are placed. The several compartments are kept entirely separate from each other, by the means hereinafter described, so that no dust, or particles of the emery, or other abrasive material used can pass from one to another, and the bearings and other parts liable to wear are thus kept from injury. Each of the pulleys  $y'$ , which carry the outer ends of the bands A A, is carried upon a lever I, turning upon a center K and provided with a weight L, passing round a pulley, by which the moving bands are kept properly stretched.  $y^2$  are pulleys which support the bands A at the middle of their length. Each of the pulleys  $y$   $y'$   $y^2$ , which drive and support the belt A, is carried upon the end of its spindle and revolve in compartments in which the grinding and polishing processes take place, the spindles of the pulleys  $y$   $y^2$  passing through holes in the partition H H, with the intervention of disks or pieces of soft felt by which dust is prevented from passing.

The spindles upon the levers I, which carry the pulleys  $y'$ , (shown upon a larger scale at



Figs. 11 and 12,) pass through curved holes  $L'$  in the partition  $H$ , and the lever  $I$  has a plate  $M$  upon its upper end which always covers the hole  $L'$ , in whatever position the lever  $I$  may be, a piece of soft felt  $N$  being interposed between the plate  $M$  and the partition  $H$ , so that dust is prevented from passing through the hole  $L'$  when the lever moves backward and forward as the belt  $A$  is more or less stretched.

Fig. 13 shows an arrangement for preserving the bearings upon which the pulleys revolve from dust and wear by means of disks or washers of felt. The spindle  $v$ , upon which the pulleys  $y^2$  revolve, is made tubular, and  $u$  is a ring of felt pressed into a recess in the side of the pulley and held by the plate  $x$ . The pulleys are lubricated through the hollow spindle  $v$ , which is perforated inside the pulley at  $v'$ , and the outer end of the spindle is closed by a screw  $w$ , having a head which keeps the pulley in its place, the thread of the screw being made in the same direction as the pulley revolves.

The tubes or bars  $d$   $d'$  to be ground and polished pass through holes in the sides of the trough  $B$ , the holes being kept dust-tight in a somewhat similar way by means of felt, as illustrated in Figs. 4 and 5, in which  $d$  is a tube passing through a hole  $O$  in the side of the trough  $B$ , a piece of felt  $P$  being fitted round the tube  $d$  and held in position in a chamber or recess  $Q$ . The felt  $P$  is cut at  $R$ , so that it can readily be fitted over the tube.

The tube or bar  $d$  or  $d'$  is supported upon trestles or supports and pushed forward until its end is caught by the feeding and turning device, which is illustrated at Figs. 8, 9, and 10. This consists of a roller  $f$ , covered with india-rubber or other suitable material and fixed upon a spindle which revolves in the fork  $f'$ , upon the lower end of which is formed a spindle  $g$ , which turns in a vertical guide or standard  $h$ , fixed directly below the tube or bar  $d$ , so that the latter is supported upon the roller  $f$ . The spindle or axis of the roller is provided with a pulley  $i$  for a cord or band  $k$ , which is driven by a driving-pulley upon a shaft  $l$  below, Figs. 1 and 3, which is itself set in revolution at the proper speed by pulleys  $m$   $m'$  and a strap  $n$  from the driving-shaft  $D$ , Figs. 1 and 3.

In Figs. 1, 2, and 3 two tubes  $d$   $d'$  of different sizes are being ground and polished, the same bands  $A$   $A$   $A$   $A$   $A$  acting upon both of them, and these supporting and feeding rollers  $f$  are shown under each tube, as shown in Fig. 3, one being arranged at the center and one outside each side of the trough  $B$ . The two shafts  $l$  are connected by a belt  $o$ , passing round pulleys  $o'$   $o^2$ , Figs. 1 and 3, upon the shafts, so that all the rollers  $f$  are driven at the required speed. If the tubes  $d$   $d'$  be held down upon the rollers  $f$ , when the latter are revolving, the tubes are also made to revolve upon their axes, and if at the same

time the rollers  $f$  are made to take a position somewhat inclined across the tubes, as shown in Figs. 3, 8, 9, and 10, the latter are made to travel forward as well as to revolve, the speed of their forward movement depending upon the angle of the rollers  $f$ . In order to adjust and hold the rollers at any desired angle, the lower ends of the spindles  $g$  have fitted upon them levers  $p$ , to the outer ends of which is jointed a rod  $r$ , the end of which is provided with a screw and wheel  $S$ , Fig. 3, by which the exact position of the levers  $p$  and the angle of the pulleys  $f$  can be simultaneously altered and adjusted.

In order to hold down the tubes or bars  $d$   $d'$  upon the pulleys  $f$ , we arrange across the trough  $B$ , above each tube or bar, a transverse beam or frame  $e$ , Figs. 1 and 2, pivoted upon arms  $b$  to the sides of the trough  $B$ , so that it can be turned up out of the way when desired. These beams  $e$  are shown upon a larger scale in Figs. 6 and 7, and upon the upper sides they have formed upon them vertical guides or sockets  $b'$   $b'$   $b'$ , in which fit spindles  $c$ , the lower ends of which carry the guiding-carriages  $T$   $T$   $T$ . Each of these carriages has fitted and fixed upon its lower side two parallel tubes  $U$   $U$ , in which turn freely spindles having fixed upon their ends wheels or rollers  $V$   $V'$ , covered with india-rubber, which press upon and hold down the tubes or bars  $d$   $d'$ . The spindle  $c$  has at its upper end an adjustable cross-bar  $W$ , to which springs  $X$   $X$  are attached, by which the spindle  $c$  and the rollers  $V$  are pressed down with any desired force upon the tubes or bars  $d$   $d'$ , directly above the pulleys  $f$ .

The parts of the trough  $B$  below the bands  $A$   $A$   $A$  are closed by horizontal partitions  $B'$ . These horizontal partitions form the floors and the partitions  $H$  the side walls of a number of separate closed compartments, and these separate closed compartments in which the bands move are supplied with emery or other abrasive powder of different degrees of fineness, the coarsest being supplied to the compartment which the tube or bar first enters and the finest to that which it passes through last, and the several compartments are closed by covers  $Z$ , which can be readily removed and replaced when desired, but when in position entirely close the trough  $B$ , so that no dust can escape.

Two machines may be placed side by side, the tubes or bars  $d$   $d'$  passing from one to the other.

The operation of the machine is as follows: The driving-shaft  $D$  being set in revolution, driven by the belts  $z$ , the pulleys  $y$ , which carry the endless bands  $A$ , are thus kept in rapid movement, and are kept stretched and in proper position by the weighted pulleys  $y'$  at the other end, and the central pulleys  $y^2$ , their surfaces being kept supplied with suitable grinding and polishing powders. The tubes  $d$  and  $d'$  are introduced through holes



in the sides of the trough B, made dust-tight by felt packing P, and are supported and fed forward by the inclined rollers *f*, while they are held down by the rollers V, carried by the hinged cross-frames *e*, and pressed down by the springs X. The rollers *f* are set and held at the proper angle by the levers *p*, rods *r*, and adjusting-wheels *s*, and are made to revolve at the proper speed to turn and feed forward the tubes or bars *d d'* by the pulleys and belts *m, m', n, o, o', o', i, and k*. It will be seen that the machine is entirely closed in and that the parts in which the grinding and polishing take place are completely separated from the parts in which the bearings and other parts liable to wear are situated, so that the machine is very durable and requires little attention or repair.

When necessary, the covers Z can be removed and the cross-beams *e* turned upon their hinged arms *b*, and easy access can then be had to the interior to change the bands A, or for other purposes.

As the pulleys which carry the bands A have no bearings or other obstructions on their outer side, the bands can be very easily removed and changed.

In the figures two tubes *d d'* are shown; but it is evident that any other number may be simultaneously operated upon by increasing the number of cross-beams *e*, with their spring-rollers, and of the inclined supporting and feeding rollers *f* below.

The bands A may consist of strips of emery-cloth or other abrasive material of varying fineness, or of plain bands of cloth or other material to which the abrasive powder is kept supplied.

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

1. The combination, in a machine for grinding and polishing tubes and bars, of the trough B, partitions H, pulleys *y y' y''*, fixed bearings C, abrasive bands A, and weighted levers I, substantially as set forth.

2. The combination, with the abrasive bands A, of the adjustable inclined turning and feeding rollers *f*, the transverse beams *e*, pressure-wheels V, and springs X, substantially as set forth.

3. The spindle C, carriages T, tubes U, pressure-wheels V, standard *b'*, movable cross-bar W, and springs X, substantially as and for the purpose set forth.

4. The spindle *g*, fork *f'*, adjustable roller *f*, pulley *i*, lever *p*, rod *r*, and adjusting-wheel

*s*, substantially as and for the purpose set forth and shown.

5. The combination, with the endless abrasive bands A, of the pulleys *y'*, levers I, partitions H, provided with curved elongated holes L', plate M, felt N, and weights L, substantially as and for the purpose set forth and shown.

6. In a device for holding tubes or bars while being polished, the combination, with the tube or bar, of a rotating shaft, a disk set angularly thereon for turning the tube or bar and moving it in the line of said shaft, a spring-plunger mounted over said disk, a plurality of anti-friction rollers at the base of said plunger and attached thereto for engaging said tube or bar, and a pivoted arm for bearing down said spring-plunger and adjusting the pressure on said bar, substantially as described.

7. In a device for holding tubes or bars while being polished, the combination, with the tube or bar, of a rotating shaft, a plurality of disks set at an angle thereon for turning the tube or bar about its axis and moving it in the direction of said shaft, a plurality of spring-plungers mounted over said tube or bar and adjusting the pressure thereon and on said rotating disks, a transverse beam connected to the springs of all of said spring-plungers, a plurality of arms connected to said beams, and a rock-shaft actuating said arms and so adjusting the pressure of said tube or bar on said angularly-placed disks, substantially as described.

8. In a device for polishing tubes or bars, the combination, with the tube or bar, of a trough for holding the polishing material, said trough having holes in the side thereof loosely inclosing said tube or bar, a felt washer fitting snugly against said tube or bar, and a following plate or board holding said felt washer in position, substantially as described.

9. The combination of the pulley *y''*, hollow spindle *v*, having perforations *v'*, felt disk *u*, screw *w*, and plates *x* and *z*, substantially as set forth, and shown in Fig. 13.

In testimony whereof we have hereunto set our hands in the presence of two witnesses.

RICHARD JOHN EDWARDS.  
ARCHER EDWARDS.

Witnesses:

JANE G. A. RIDGWAY,  
ARTHUR ERNEST EDWARDS.