No. 859,003. PATENTED JULY 2, 1907.

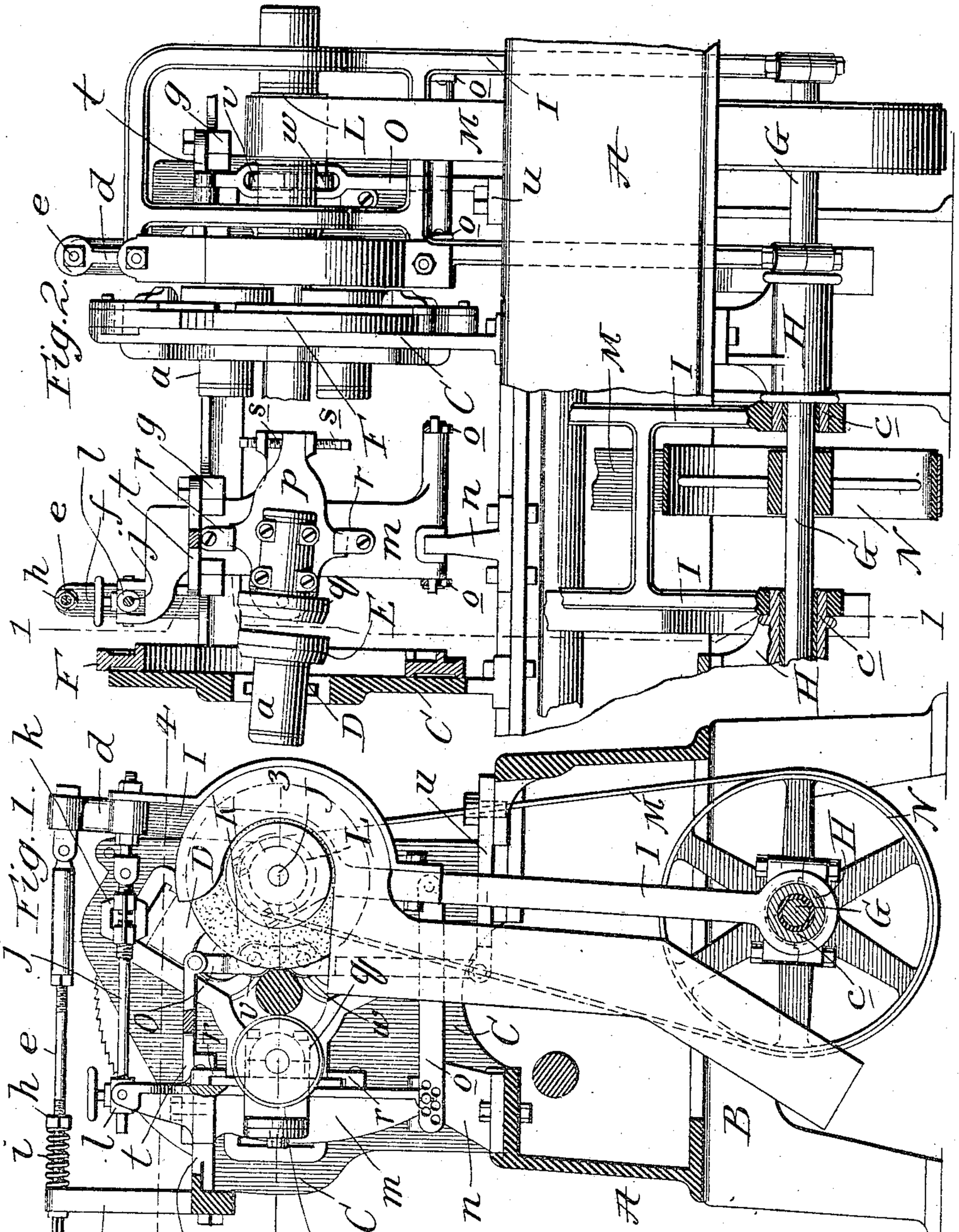
W. J. MUNCASTER.

MACHINE FOR FINISHING SHAFTING.

APPLICATION FILED JULY 26, 1905.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses
C. H. Raider
Fannie Hise

Inventor:
Walter James Muncaster,
By Dodge and Sons,
Attorneys.

No. 859,003. PATENTED JULY 2, 1907.

W. J. MUNCASTER.

MACHINE FOR FINISHING SHAFTING.

APPLICATION FILED JULY 26, 1905.

3 SHEETS—SHEET 2.

Fig. 3.

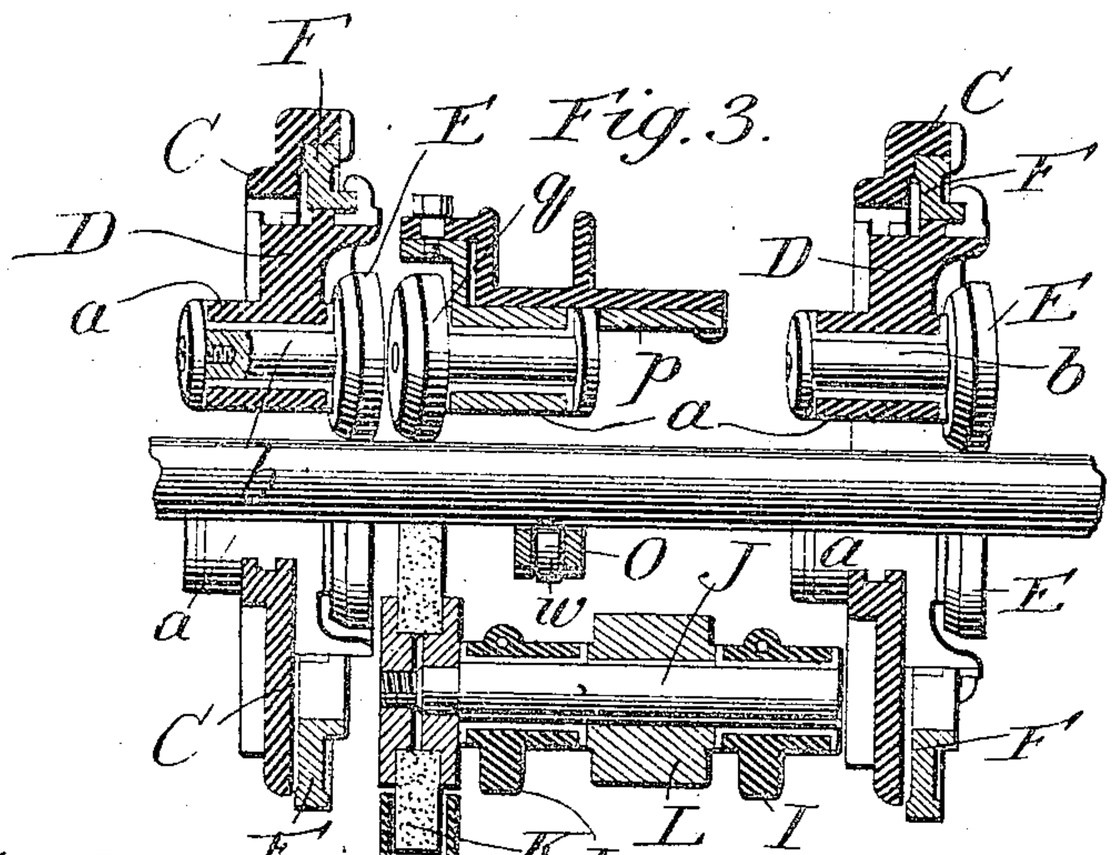


Fig. 4.

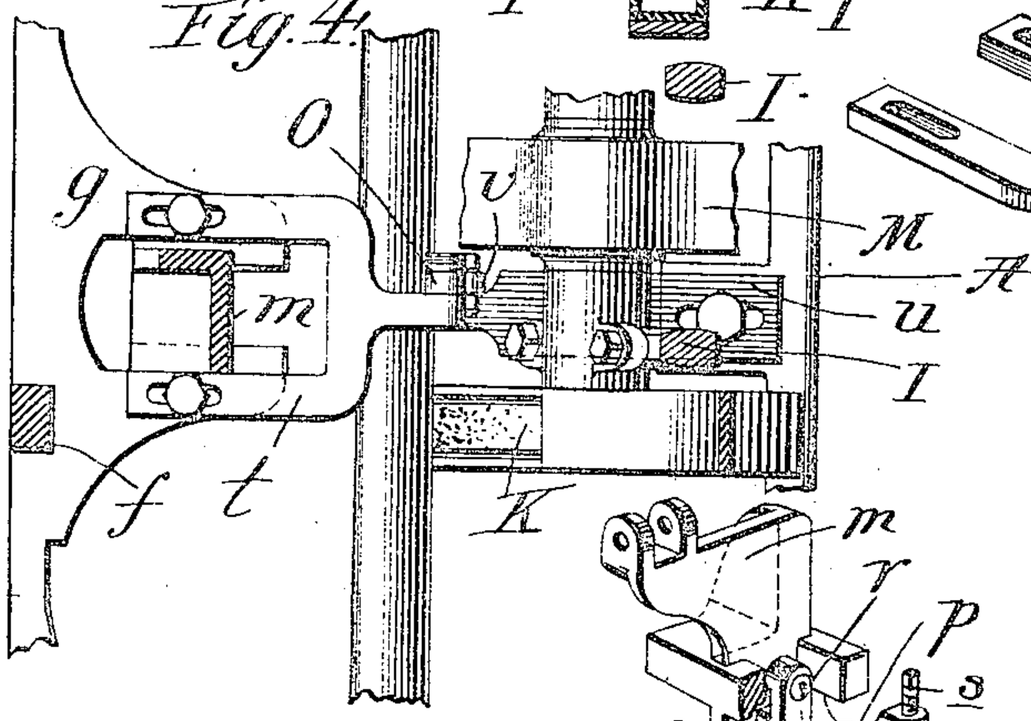


Fig. 5.

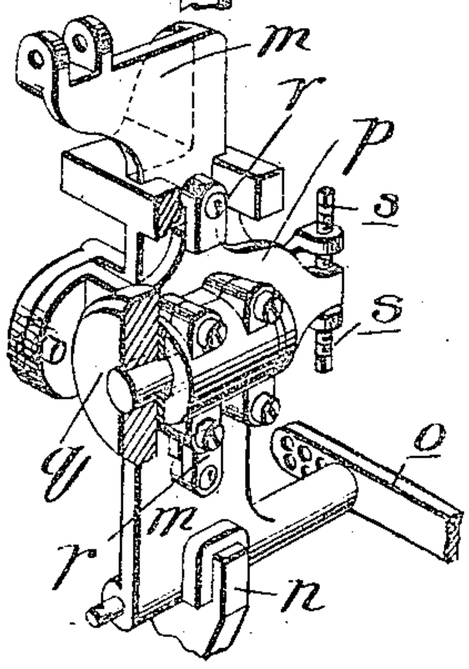
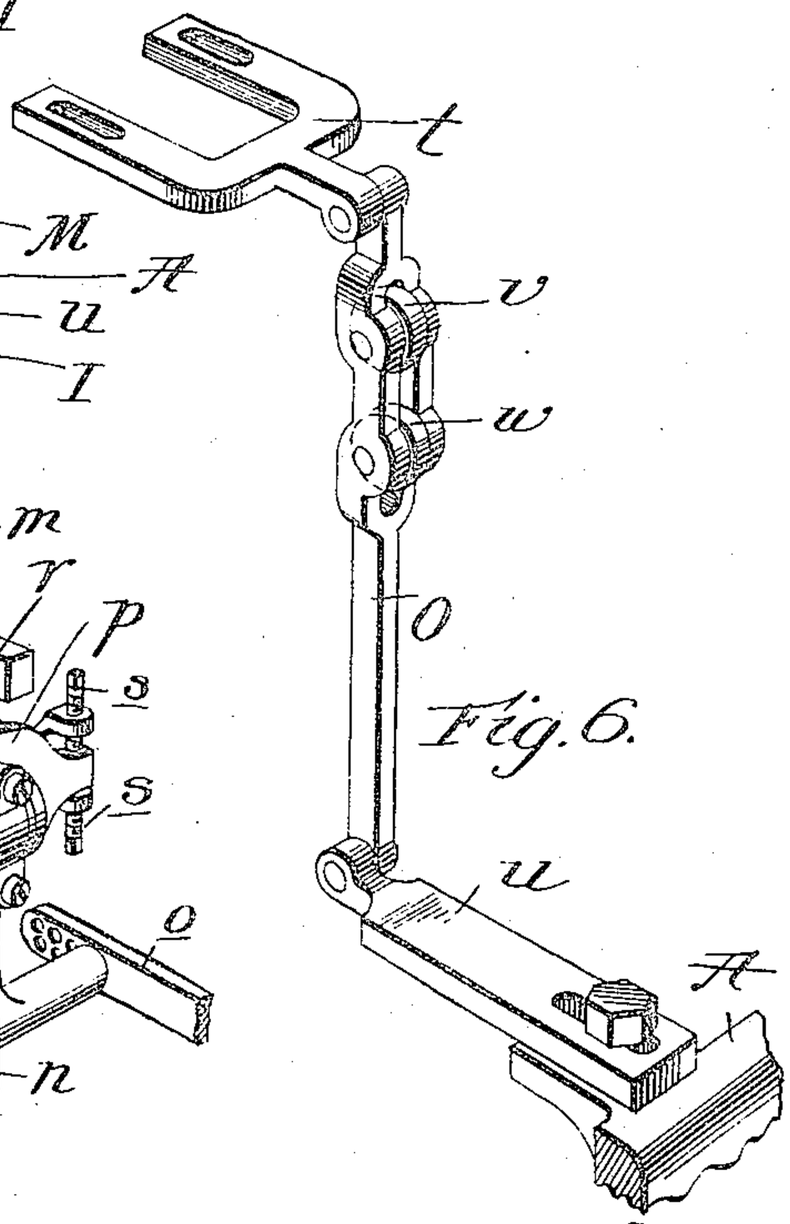


Fig. 6.



Inventor:

Walter James Muncaster

By Dodge and Sons,

Attorneys.

Witnesses:

E. C. Paul.

Fannie Wise

No. 859,003. PATENTED JULY 2, 1907.

W. J. MUNCASTER.

MACHINE FOR FINISHING SHAFTING.

APPLICATION FILED JULY 26, 1905.

3 SHEETS—SHEET 3.

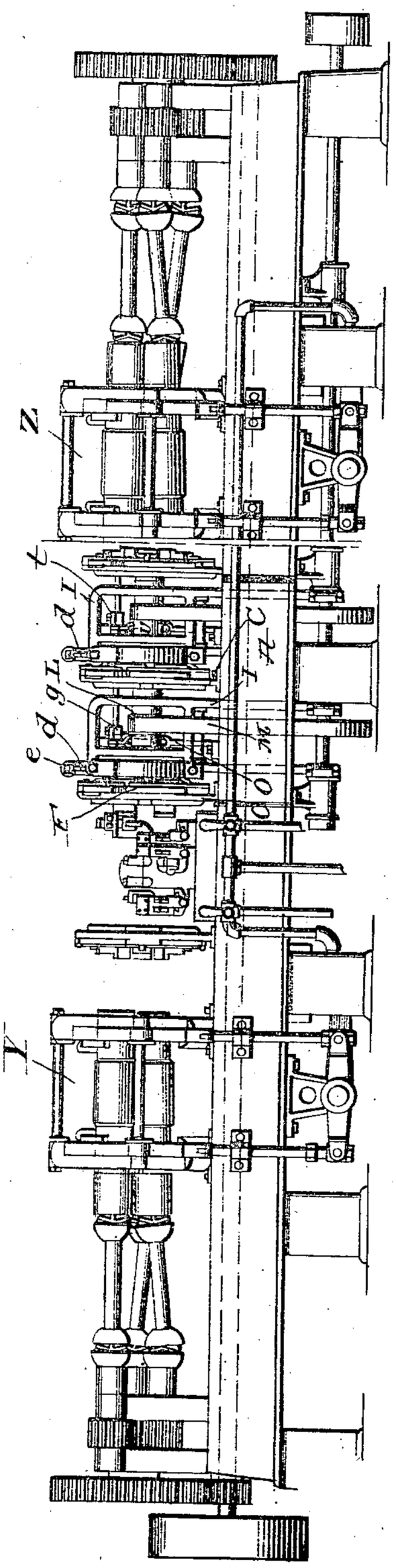


Fig. 1.

Witnesses
C. A. Raeder
J. Stewart Price.

Inventor:
Walter J. Muncaster
by Dodger & Sons,
Attorneys.

UNITED STATES PATENT OFFICE.

WALTER JAMES MUNCASTER, OF CUMBERLAND, MARYLAND, ASSIGNOR TO CUMBERLAND STEEL COMPANY OF ALLEGANY COUNTY, OF CUMBERLAND, MARYLAND, A CORPORATION OF MARYLAND.

MACHINE FOR FINISHING SHAFTING.

No. 859,003. Specification of Letters Patent. Patented July 2, 1907.

Application filed July 26, 1905. Serial No. 271,371.

To all whom it may concern:

Be it known that I, WALTER JAMES MUNCASTER, a citizen of the United States, residing at Cumberland, in the county of Allegany and State of Maryland, have invented certain new and useful Improvements in Machines for Finishing Shafting, of which the following is a specification.

This invention relates to machines for producing highly finished shafting and other cylindrical bodies, and consists in certain features applicable to an organized machine or apparatus heretofore invented by me and set forth in application Serial No. 256,612, filed April 20, 1905.

In the present application, only so much of the complete structure is illustrated as is necessary to a correct understanding of the improvements or novel features and combinations hereinafter described and claimed.

The invention pertains more particularly to grinding and polishing mechanism, and to devices for supporting, steadying and guiding the bodies under treatment, to the end that the grinding and polishing may be performed to the best advantage in all respects.

Referring to the accompanying drawings: Figure 1 is a vertical transverse section through the machine, showing one grinding or polishing wheel, with its carrying and adjusting devices, the rests or supports for the bodies operated upon, etc.; Fig. 2, a front elevation of a portion of the machine, partially broken away or in section to better show the construction and arrangement of parts; Fig. 3, a horizontal section on the line 3—3 of Fig. 1, looking down; Fig. 4, a similar sectional view, also looking down; Fig. 5, a perspective view, partly in section, of the inner or rear upright of the jointed frame work by which the grinding or polishing roll is caused to follow or to maintain proper relation to the shafting or body under treatment; Fig. 6, a perspective view of a rest or stop to prevent the shaft or body under treatment from moving unduly toward the grinding or polishing wheel; Fig. 7, a front elevation of a machine for finishing shafting, embodying my present invention.

In the practical operation of machinery for dressing, grinding and polishing shafting, and particularly where it has been attempted to produce truly cylindrical bodies of very accurate measurement, considerable difficulty has been experienced in bringing the supporting or steadying devices so close to the cutting, grinding, or polishing members as to avoid springing of the shafting or other body.

Obviously, the more nearly the support is brought into working plane with the cutting tool, grinding or polishing wheel, or other operating member, the less danger will there be of any bending, springing, or distortion of the shafting or body. Heretofore, this point has not received due consideration, and in consequence of the considerable distances allowed, and in fact necessitated by prior constructions, injurious springing or distortion has resulted,—truly cylindrical bodies have not been uniformly or even generally produced; and there has usually been a waste end portion which it has been deemed necessary to remove before placing the shafting upon the market.

This difficulty is especially pronounced where the shafting moves longitudinally through the machine and passes successively the different dressing or finishing devices, its forward end being unsupported except by the steady-rests, bushings, etc., through or over which it passes.

While due provision has been made to prevent the cutting tool or wheel from moving toward the axis of the shafting and reducing its diameter below that intended, similar provision has not been made to guard against the shafting, if eccentric, warped, or sprung, from moving out of its normal or proper path and toward the cutting or abrading device, and thereby producing the same fault.

The present invention is designed to correct these defects, and I will now describe, with the aid of the drawings, a construction which meets the requirements of the work, but which is susceptible of variation as to details, provided the main features be retained.

A, Figs. 1 and 2, indicates the horizontal main frame or bed of the machine, which is supported at intervals upon stands or stools B, and in and upon which is mounted the operative mechanism, including two stands of feeding rolls, Y and Z, one at or near either end of the machine, said rolls being grouped about a common axis which is the axis of the shafting passing through the machine, and being set slightly oblique to said common axis, so that by their rotation they shall both advance and rotate the shafting.

The complete machine comprises, in addition to what is here illustrated, some form of mechanism for simultaneously advancing and rotating the shafting, rod, tube or other body to be treated, obliquely arranged rolls symmetrically grouped about a fixed common axis being the preferred feeding means. Any other well known mechanism capable of performing the work, may, however, be employed.

At suitable points in the length of the frame or bed A are vertical housings or castings C, which, with the parts carried by them, constitute steady rests for the shafting or other work to be treated by the machine.

Each housing consists of a plate-like standard, provided at the lower end with lateral flanges or feet, which are bolted or otherwise made fast to the bed or frame A. A central opening is left for the passage of the shafting or other body, and from this opening extend three radial openings, to form guideways for roll-carrying slides D. Each slide D is formed or furnished with an elongated tubular sleeve or bearing *a*, to receive the shaft or spindle *b*, of a roller E, the several rollers of each steady rest jointly constituting a rolling support for the shafting or other body operated upon. The sleeves *a* are arranged obliquely or at an angle to the fixed common axis about which the rollers and their sleeves are grouped, as seen in Figs. 2 and 3.

It will be seen upon referring to Figs. 1 and 3, that each roller E is car ied at one end of its spindle or shaft and projects beyond the end of the sleeve *a* in which the spindle turns, hence there is no box, bearing or support interposed between the roller and the grinding wheel, cutter or implement. As a consequence the roller can stand in a plane close to or nearly coincident with that in which the grinding wheel or cutter operates, and there can be no springing or bending of the shafting between said planes. The long sleeve bearing gives adequate support to the spindle and enables me to dispense with the outer bearing of the yoke construction heretofore used.

The several slides D of each set are simultaneously and equally moved toward or from a common center coincident with the axis of the work, by a cam ring F, as in former constructions, to adjust them to different diameters of shafting, but this feature not being involved in the present invention need not be further described.

G indicates a shaft carried in hangers H beneath the frame or bed B of the machine, which shaft may be driven in any convenient way. The hangers are formed with end projections *c*, which serve as supporting pivots for the grinding-roll frames I, of which there are usually from four to six in a machine of the character here contemplated.

The general construction and arrangement of the frames I is the same as in my application, Serial No. 256,612, above mentioned, comprising two cross connected uprights, each carrying a box or bearing for a shaft J which is furnished with a grinding or polishing wheel K and a belt pulley L. Each pulley L receives motion through a belt M from a belt wheel N on shaft G, and, as the frames I are pivoted concentrically with said shaft, it will be seen that they may swing about their pivots without altering the relation of the belt and its carrying wheels.

The shafting to be operated upon passes longitudinally through the machine, between the several rollers E of each steady rest, and the grinding wheels J are maintained in proper relation thereto by the mechanism shown in Figs. 1 and 2, portions of which are also shown in other figures.

Upon referring to Figs. 1 and 2, it will be seen that the frame I is extended upward above the boxes or bearings of shaft G and has an upwardly projecting arm *d*, from which a rod *e* extends to and through a fixed upright *f*, at the opposite side of the machine. The upright *f* is or may be secured to or formed with a horizontal plate or member, *g*, bolted or otherwise made fast to the housings C, and thus serving the double purpose of bracing said housings and as a support for other parts, to be described.

Rod *e* is formed in two sections, one of which screws into the other to vary the length of the rod as a whole, a jam nut being used to prevent accidental unscrewing. At one end the rod is pin-jointed to the upright arm *d* of roll frame I, and at a suitable distance from upright *f* it is furnished with an abutment, represented as a nut, *h*, between which and upright *f* is a spring, *i*, coiled about the rod. This spring tends constantly to press or hold the roll frame I and the grinding wheel K away from the shafting under operation, but permits said parts to move inward under the action of other controlling devices.

Directly below the rod *e* is a second divided or two-part rod, *j*, the proximate ends of which are threaded in the same direction but with threads of slightly different pitch. These threaded ends are connected by a turn buckle *k*, the turning of which gives an adjustment equal to the differential of the two threads, as is common in micrometers and the like.

One end of rod *j* is pin-jointed to the upper extension of roll frame I or to a yoke secured thereto, and the opposite end is passed through and is clamped in a block, *l*, pivotally supported in the forked upper end of a vertical beam or casting *m*, the lower end of which is forked or slotted to straddle and slide upon a fixed horizontal guide *n*. Links *o*, pin-jointed at one end to the beam *m* and at the other end to roll-frame I, connect said parts, provision being made for varying the effective length of the links.

Beam *m* has a broad face in a vertical plane parallel with the travel of the work. Lying against this face and pivotally connected with the beam at one end is a plate or casting *p*, carrying a long sleeve bearing or box to receive the shaft or spindle of a roller *q*, of the same character as the rollers E of the steady rest. Clips *r* hold the plate *p* close against the face of the beam, and a tail or rear extension of the plate is carried between two adjusting screws, *s*, *s*, by which the plate can be swung about its pivot to set the roller *q* at any desired angle to the work, against which it is designed to bear at a point in vertical plane with but diametrically opposite the point of contact of the grinding wheel K. Under this construction and arrangement the grinding roll, though prevented by rod *e* and spring *i* from moving unduly inward toward the axis of the shafting or work, will nevertheless be caused to follow the shafting in the event of the latter swinging away from the grinding wheel by reason of eccentricity, springing, or other causes.

It will be apparent on referring to Fig. 2 that rollers E and *q*, being on the ends of their respective shafts or spindles and beyond the boxes or bearings in which the latter turn, may be brought very close together, hence the shafting operated on will scarcely lose the support of one before reaching the other. It will also be observed that the grinding or polishing wheel K is carried at the end of its shaft, which, having two widely separated bearings, is well steadied, and I am thus enabled to bring the grinding wheel into the same vertical plane with roller *q*, and nearly into plane with the steady rest rollers E. In this way the support is brought so close to the point of operation that there is no chance

of springing the shafting through any working pressure that can come upon it. This provision I have found of great practical importance, enabling me to attain an accuracy and finish previously unattainable, and with a materially reduced number of grinding wheels.

Light shafting, tubes, etc., are liable to spring, or, if not perfectly centered and true, to throw outward from true axial alinement. Such action is apt to result in forcing the body unduly against the grinding wheel and to cause it to be reduced below the proper diameter. To guard against this, I provide the device shown detached in Fig. 6, and in position in Figs. 1, 2, 3 and 4. This consists of an upright O, jointed at its upper and lower ends to slotted plates or supports, *t*, *u*, and carrying two rollers *v* and *w*. These rollers project beyond the yoke-shaped portion of upright O in which they are journaled, and are set with their peripheries sufficiently close together to insure their bearing upon the shafting, either normally, or under very slight deflection thereof toward the grinding wheel.

The slotted supporting plates *t* and *u*, which are bolted respectively to bed A and connecting bar or plate *g*, provide means for ready adjustment of the device to suit different sizes of shafting.

It will be seen that the above described construction insures support of the shafting or other work close to the point of operation, and that play, springing or vibration at such points is impossible. It follows that truly cylindrical work will be produced.

In order to permit the rollers of different rests, as, for instance, rollers E and *q*, to be brought into close proximity, some will be placed at the forward and others at the rear ends of their spindles, with reference to the direction of movement of the shafting through the machine. This is well illustrated in Figs. 2 and 3. All the rollers will be beveled on the receiving side to facilitate the entrance of the shafting between them.

The jointed frame which carries roll *q*, the roll itself, and the spacing rod *e* are all in the same plane with grinding or polishing wheel K, or practically so, hence there is no tendency of the parts to twist or spring, and the wheel acts with great steadiness and precision.

While I have shown only an abrading or polishing wheel, it will be understood that a machine of this character does or may have cutting tools instead of or in addition to such wheels, both being shown in the prior application, above referred to. It is therefore to be understood that the claims are to be construed as applying equally to structures employing cutters or grinders.

Having thus described my invention, I claim:

1. In a machine for finishing shafting and like bodies, the combination of a housing having a series of radially arranged guideways; a series of roll-carrying slides mounted one in each of said guideways and each provided with an obliquely arranged tubular sleeve; a series of spindles mounted one in each of said sleeves and each provided with a roller at its end and entirely beyond the sleeve; and a finishing implement facing and in close proximity to the steady-rest and adapted to act upon a body passing through the steady-rest and between the several rolls, the obliquity of the roll axes enabling them to afford a rolling support for the body under treatment as the latter rotates and moves longitudinally, without rubbing or abrading said body.

2. In a machine for finishing shafting and like bodies, the combination of a housing provided with a series of radially arranged guideways; a series of roll-carrying slides mounted one in each of said guideways and each provided with an obliquely arranged sleeve or spindle-bearing; a series of spindles mounted one in each of said bearings and each provided at its outer end and beyond the sleeve or bearing with a roller; a spindle or shaft located at one side of the common axis about which the rolls are grouped and carrying at its end and in close proximity to the supporting rolls a grinding or abrading wheel; a supporting roll in plane with the abrading wheel, but on the opposite side of said common axis or from that on which the abrading wheel is located, said supporting roll having a carrying spindle extending wholly to one side; and a sleeve or bearing for said roll or spindle mounted upon a suitable support and adjustable to vary the relation of the roller-spindle axis to the common axis about which the supporting rollers are grouped, substantially as set forth.

3. In a machine for dressing or finishing shafting, a steady rest comprising a housing with a central opening for the passage of the shafting and a series of slots or guideways opening therefrom; a series of slides mounted and movable in said guideways and each provided with a sleeve or tubular bearing; and a series of rollers, each having a spindle or shaft wholly at one side, the several spindles being mounted in the respective sleeves.

4. In a machine for dressing or finishing shafting, the combination of a main frame; a plurality of steady rests for the shafting, each comprising a plurality of rolls to bear upon the shafting; a grinding or polishing wheel; a movable carrying frame for said wheel; a jointed frame connected with the roll-carrying frame; a roller carried by the jointed frame and arranged to bear upon the side of the shafting opposite that against which the grinding or polishing wheel bears, and to hold said wheel up to the shafting; and a spacing rod provided with a spring to press the wheel away from the shafting, the jointed frame, roller, and spacing rod being in plane with the wheel, substantially as and for the purpose set forth.

5. In a machine of the character described, the combination with means for advancing and for rotating the shafting or other body to be acted upon, and with suitable rests and dressing or abrading devices; of a rest located at the forward side of the path of travel of the work to prevent the same from springing or throwing forward, said rest comprising an upright, adjustable supports therefor, and rollers carried by the upright and adapted to bear upon the front or dressing side thereof.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WALTER JAMES MUNCASTER.

Witnesses:
PAUL T. MENZEL,
G. M. BATCHFORD.