10. Bolt, Nut, Rivet, & Screw Making.
Screw Threading,-Tapping, Machines.

No. 867,076. PATENTED SEPT. 24, 1907.

W. PORTEOUS.

HORIZONTAL REAMING, TAPPING, AND FACING MACHINE.

APPLICATION FILED SEPT. 11, 1905.

8 SHEETS—SHEET 1.

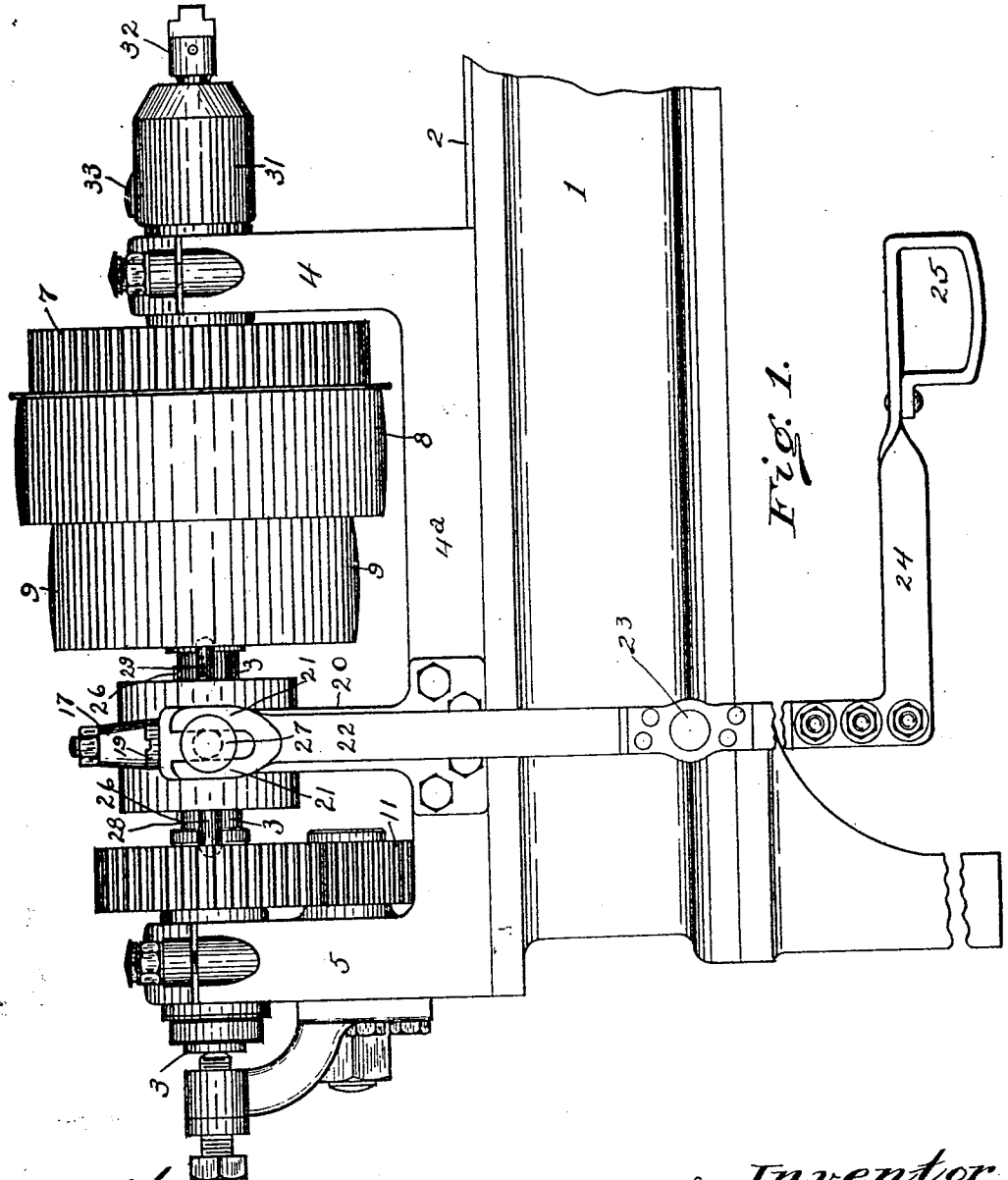


Fig. 1.

Witnesses
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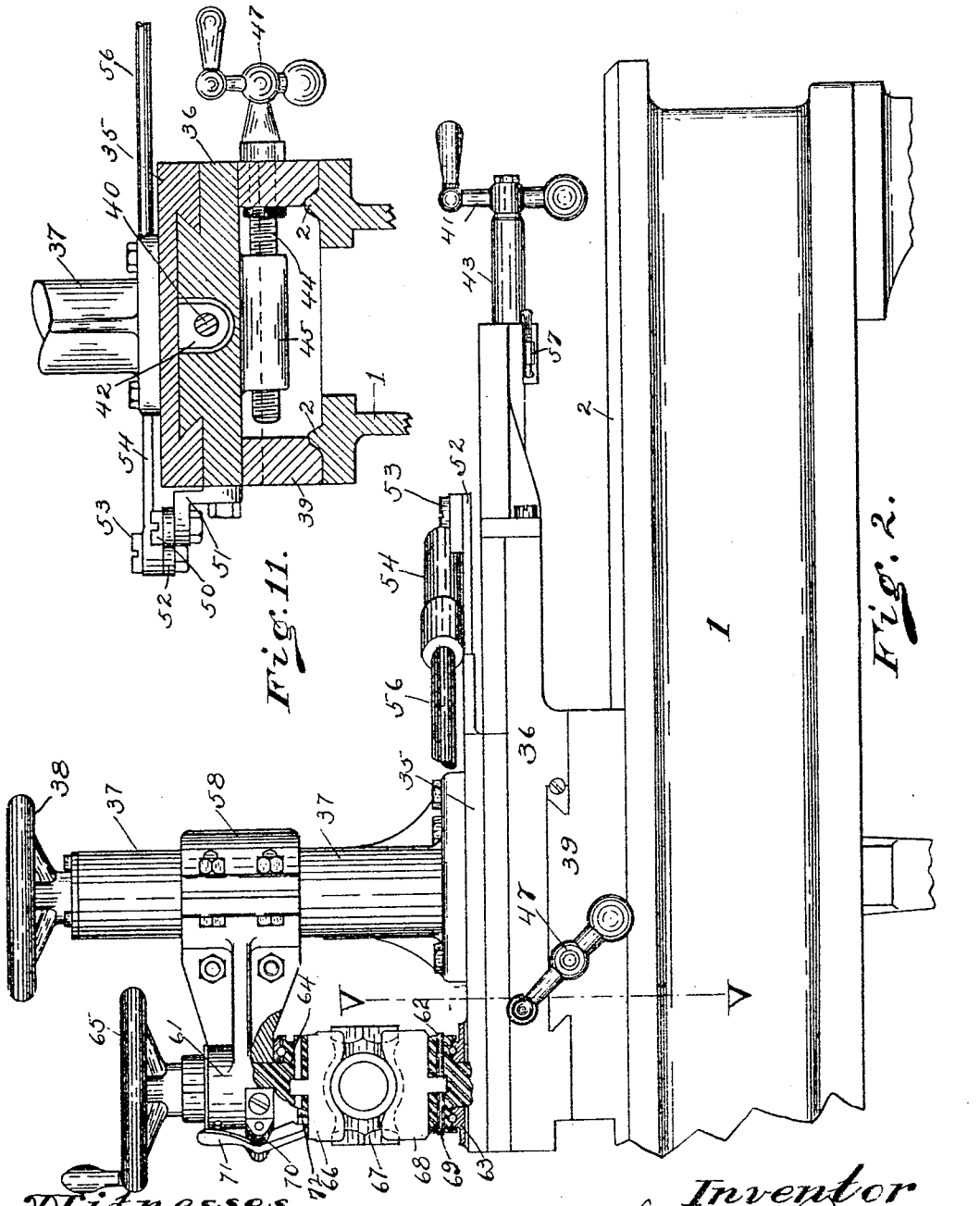
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APPLICATION FILED SEPT. 11, 1905.

8 SHEETS—SHEET 2.



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10. Bolt, Nail, Nut, Rivet, & Screw Making, Screw threading, Tapping, Machines.

Examiner.

No. 867,076. PATENTED SEPT. 24, 1907.

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6 SHEETS—SHEET 3.

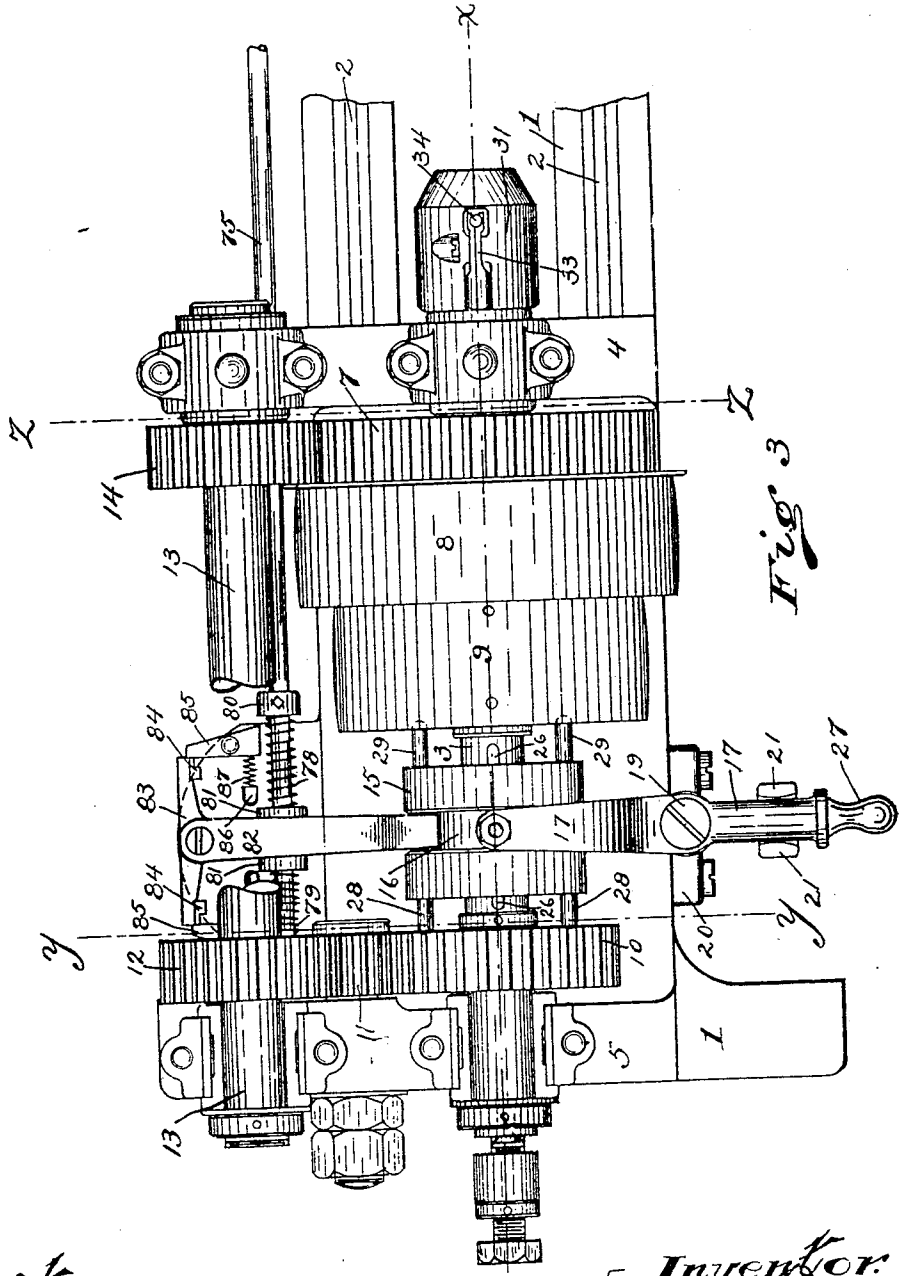


Fig. 3

Witnesses.
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10. Bolt, Nail, Nut, Rivet, & Screw Making, Screw threading, Tapping, Machines.

Examiner

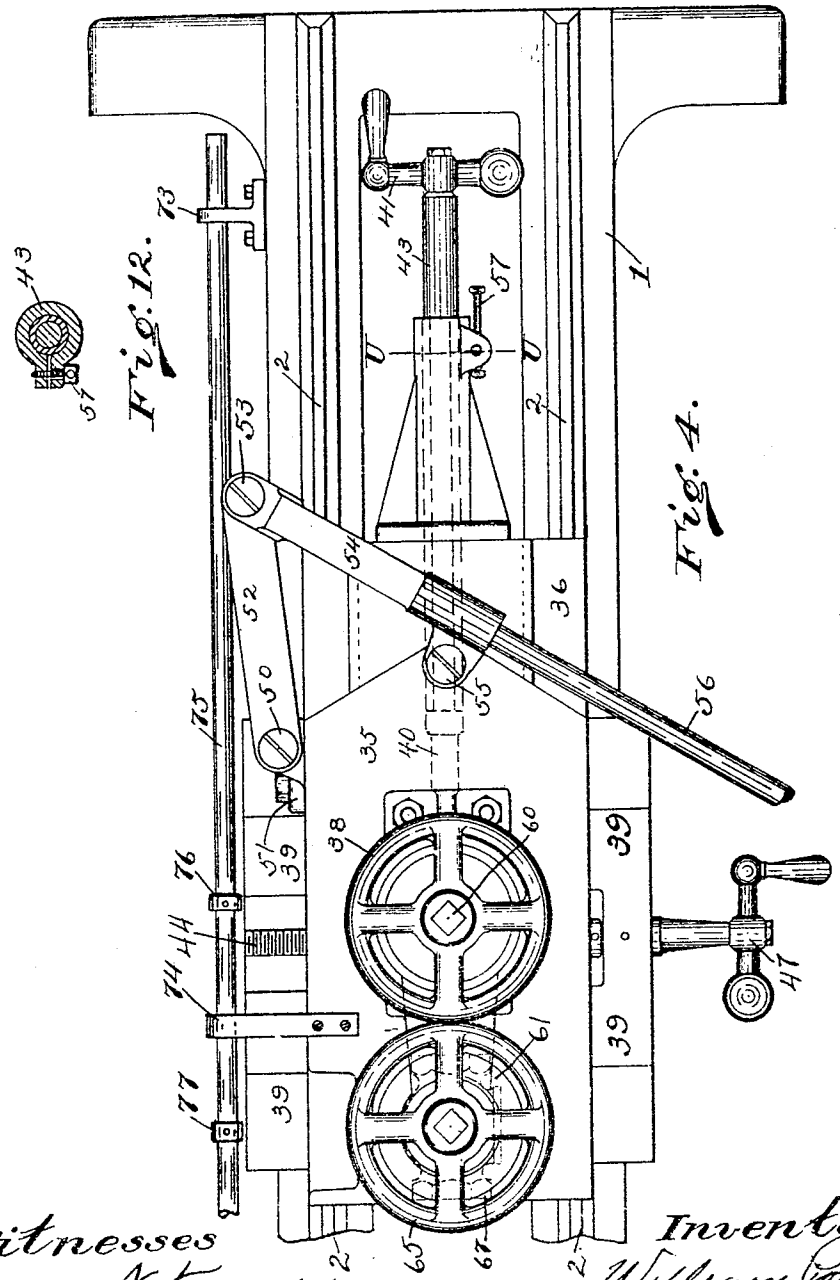
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8 SHEETS—SHEET 4.



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Examiner.

No. 867,076. PATENTED SEPT. 24, 1907.

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APPLICATION FILED SEPT. 11, 1905.

8 SHEETS—SHEET 5.

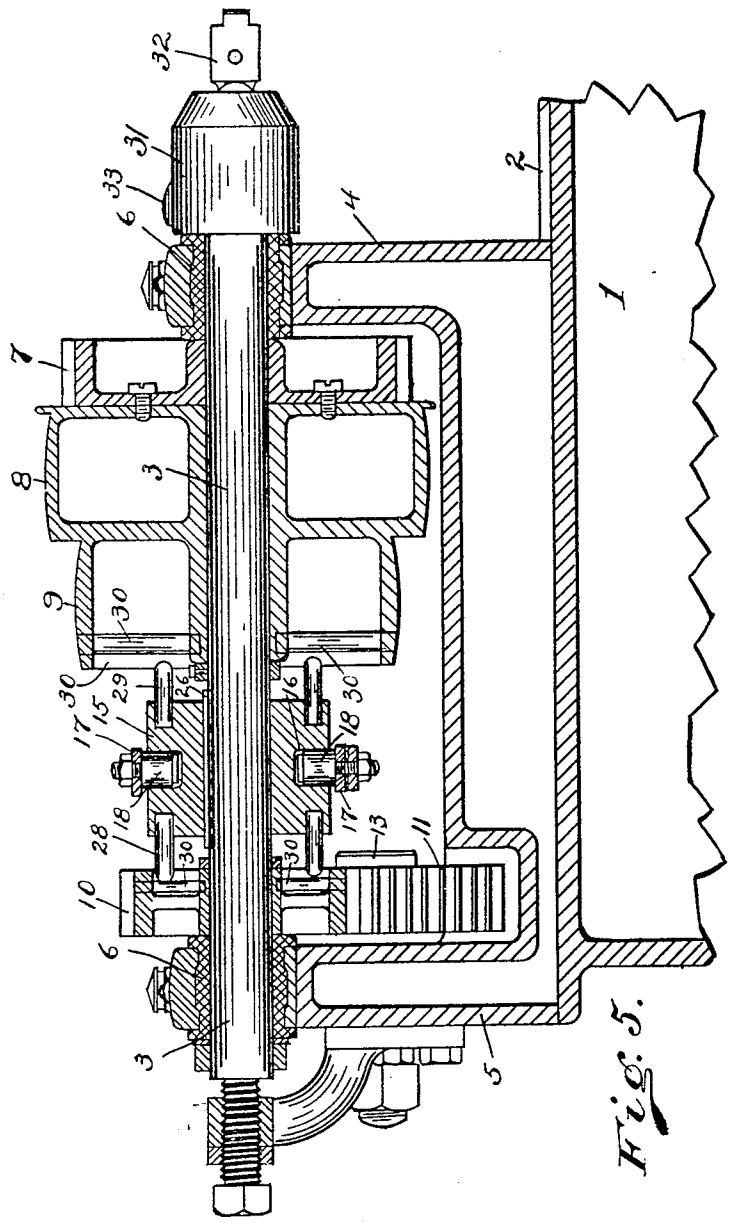


Fig. 5.

Witnesses
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No. 867,076. PATENTED SEPT. 24, 1907.

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HORIZONTAL REAMING, TAPPING, AND FACING MACHINE.

APPLICATION FILED SEPT. 11, 1905.

8 SHEETS—SHEET 6.

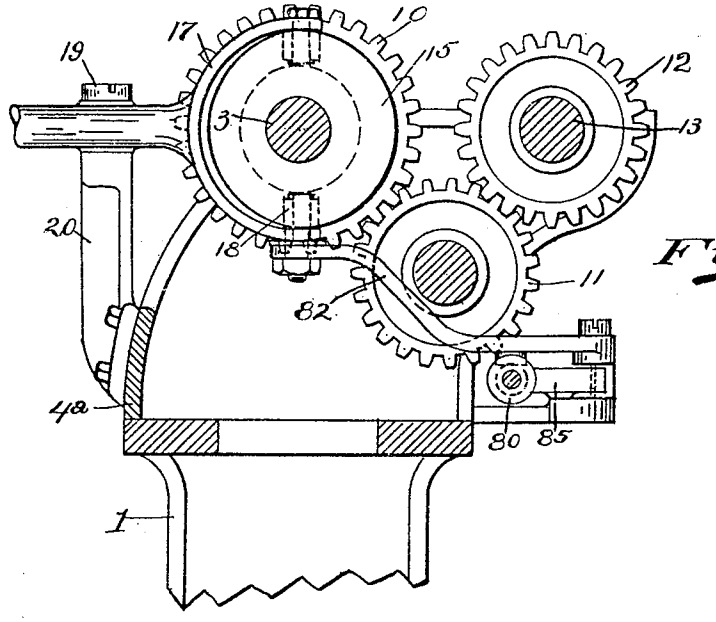


Fig. 6.

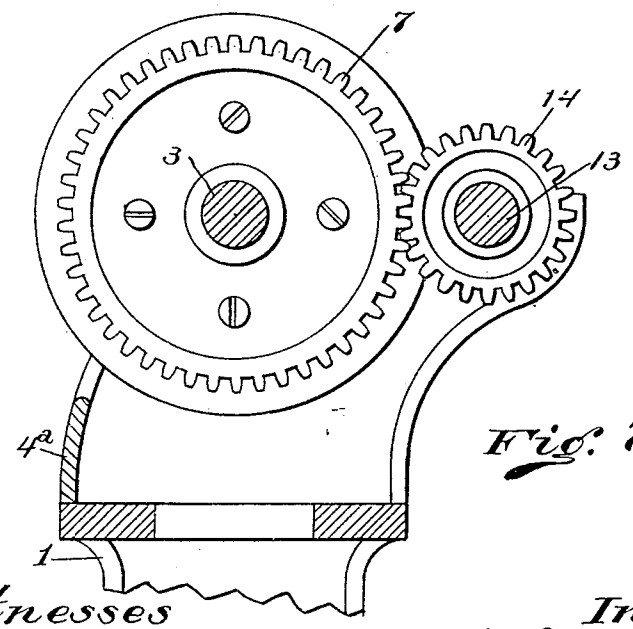


Fig. 7

Witnesses
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No. 867,076. PATENTED SEPT. 24, 1907.

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HORIZONTAL REAMING, TAPPING, AND FACING MACHINE.

APPLICATION FILED SEPT. 11, 1905.

6 SHEETS—SHEET 7.

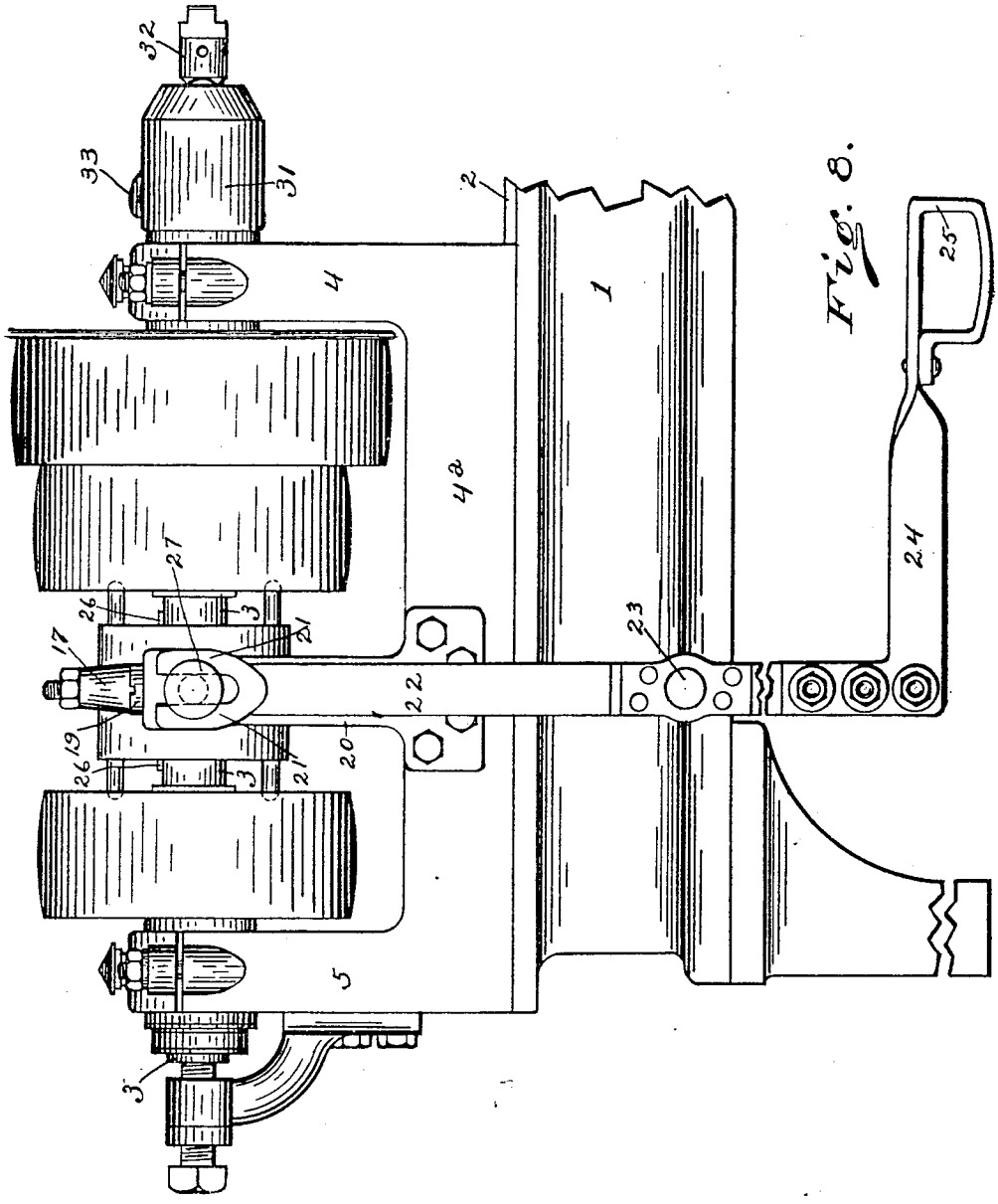


Fig. 8.

Witnesses
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Examiner.

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APPLICATION FILED SEPT. 11, 1905.

8 SHEETS—SHEET 8.

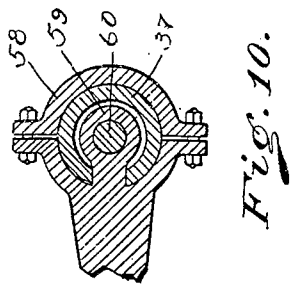


Fig. 10.

Fig. 9.

Witnesses
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by Chas. Peck
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UNITED STATES PATENT OFFICE.

WILLIAM PORTEOUS, OF COLLEGE HILL, OHIO.

HORIZONTAL REAMING, TAPPING, AND FACING MACHINE.

No. 867,076. Specification of Letters Patent. Patented Sept. 24, 1907.

Application filed September 11, 1905. Serial No. 278,015.

To all whom it may concern:

Be it known that I, WILLIAM PORTEOUS, a citizen of the United States, residing at College Hill, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Horizontal Reaming, Tapping, and Facing Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to a time-saving, speedy action and accurate operating reaming tapping and facing machine, designed especially for valve bodies and pipe fittings, whether the same be of the simple straight-way form:—of three way form, including bonnet connections as for a straight-way valve, or for a tee, or of four way form as for a double tee, or any other forms, such for instance as a straight-way valve with an angular stem and bonnet connection, or for ells or most any form of valve body or pipe fitting that is now in commercial use, and it has for its object, the production of a machine which shall be simple and novel in its construction and thoroughly accurate and efficient in action.

The novelty of my invention will be hereinafter set forth and specifically pointed out in the claims.

In the accompanying drawings:—Figure 1, Sheet 1 is a side elevation of the tool carrying end of the machine. Fig. 2, Sheet 2 is a corresponding view of the work carrying end of the machine or tail stock and intended as a continuation of Fig. 1. Fig. 3, Sheet 3 is a plan view of Fig. 1. Fig. 4, Sheet 4 is a plan view of Fig. 2. Fig. 5, Sheet 5 is a central sectional side elevation on the dotted line *x*—*x* of Fig. 3. Fig. 6, Sheet 6 is a sectional end elevation on the dotted line *y*—*y* of Fig. 3, looking to the left. Fig. 7, Sheet 6 is a sectional end elevation on the dotted line *z*—*z* of Fig. 3, looking to the left. Fig. 8, Sheet 7 is a view corresponding to Fig. 1, but representing a modification in the driving mechanism. Fig. 9 Sheet 8 is a view corresponding to Fig. 2 representing a modification in the chuck mechanism. Fig. 10 Sheet 8 is a detail, vertical section, on the dotted line *w*—*w* of Fig. 9. Fig. 11 Sheet 2 is a vertical section on the dotted line *v*—*v* of Fig. 2 looking to the right. Fig. 12 Sheet 3 is a vertical section on the dotted line U—U of Fig. 4.

The same numerals of reference are used to indicate identical parts in all the figures.

1 represents a suitable base or stand, the same being shown in continuation by placing together Figs. 5 and 9, with the horizontal ways 2 in alinement, or Figs. 3 and 4, which are plan views, in the same position, or Figs. 8 and 2, the former figure representing a side elevation of the head stock under one modification of construction.

The head stock 4^a under my preferred form of construction, is best illustrated in Figs. 1, 3 and 5, where 3 is the live spindle or tool carrier, having loose thereon, next to the forward head block 4 in which and in the rear head block 5 it is horizontally journaled by Babbitt metal boxes 6, first a pinion 7 bolted or otherwise secured to a pair of cone pulleys 8 and 9.

Next to the rear head block 5 is loosely journaled upon the spindle 3, a pinion 10 (Figs. 3 and 6) which meshes with an idle pinion 11, which in turn meshes with a pinion 12 (Figs. 3 and 6) fast upon a rear counter shaft 13, journaled in brackets forming rear continuations of the front and rear blocks 4 and 5 of the head stock as clearly seen in Figs. 3 and 6. The forward end of the spindle 13 has fast upon it a pinion 14, which meshes with the pinion 7 and the whole construction thus far described is similar to the ordinary head stock of a back geared lathe and needs no further description here.

Feathered upon the spindle 3 between the pulley 9 and gear 10 (Figs. 1, 3 and 5) is a blank disk 15 with a circumferential groove 16, Fig. 3, in which is confined the forked ends of a lever 17 provided with friction rollers 18 extending in to the circumferential groove 16 and which lever is pivoted as at 19 to the side of the head stock 4^a or rather to a bracket arm 20 secured to and extending up from the head stock 4^a. The outward extension of the lever 17 passes between forked arms 21 on the upper end of a vertical lever 22, which is pivoted as at 23 to the body 1 and has a right angular extension 24 provided with a foot stirrup 25 so that the operator may, by inserting his foot therein, shift the clutch blank or disk 15 on its feather or key 26 to the right or to the left. The extension of the lever 17 beyond the forks 21 is provided with a handle 27 (Fig. 3) by which the clutch block, can be shifted by hand instead of by foot as will be readily understood, or both hand and foot can be used if desired.

Projecting from the ends of the clutch block are clutch engaging means in this instance pins 28 and 29, of which any number desired may be employed. When the clutch block 15 is thrown to the right, the pins 29 are thrown into engagement with spokes 30 in the pulley 9 and thereby lock the spindle 3 to the pulleys 9—8 and gear 7 and give rotation to the tool carrying spindle 3 in one direction.

Upon reversing the clutch movement to the left, the pins 29 are disengaged from the pulley 9 and are engaged with the spokes of the gear 10, and thus through the medium of the idle pinion 11, the pinion 12, the counter shaft 13 and pinions 14 and 7, impart an opposite direction of rotation to the tool carrying spindle, all as will be readily understood. When the chuck disk is in the position shown in Fig. 5 with its sets of pins out of engagement with both of the pulleys 9 and 10, the tool carrying spindle is at rest.

Upon the end of the tool carrying spindle is a chuck 31 of the usual or any suitable construction adapted to hold and center a tool 32, which may be a facing tool

alone, or as seen in Fig. 5, a combined reaming and facing tool or may be a tap or a die, or any other suitable tool to suit the requirements of the work to be done, and the chuck is provided with centering means and a quick releasing thumb piece 33 pivoted on the chuck and carrying a pin 34, which passes through an aperture in the chuck and engages the tool to hold it in place, as seen in Fig. 3. There is also an automatic chuck shifter for reversing the tool carrier and tool which will be hereinafter described in connection with the work carrying table and its mechanism.

Referring now to Figs. 2, 4, 9 and 11, I will describe the work carrying and operating mechanism. Upon the ways 2 is secured and locked from tilting or upward movement, a horizontally movable table 35 gibbed to a transverse table 36, which rests upon a horizontally movable table 39, guided on the ways 2, upon the bed 1. Upon the top of the table 35 is bolted a cylindrical standard 37, within which is secured from endwise movement, a screw operated by a hand wheel 38 at its top. From this construction it will be seen that the table 35 carrying the cylindrical standard 37 has a forward and backward movement on the table 36 towards and from the rotating tool 32 by means of a screw 40 with a handle 41, which screw has its bearing in a pendent nut 42 upon the under side of the table 35, and which screw, as it extends rearward, is confined in a sleeve 43, Figs. 2 and 4, and the rear end of the screw is provided with the handle 41 before referred to. The table 36 is given its transverse motion by a screw 44 passing through an elongated nut 45 (Fig. 11) upon the under side of the table 36 and is operated by a handle 47, the screw and handle being fixed so that their rotation imparts a transverse movement to the table 36, which is gibbed upon the table 39.

Fulcrumed as at 50 (Fig. 4 and Fig. 11) to a bracket arm 51 is a link 52, pivoted as at 53 (Fig. 11) to a lever arm 54, which in turn is pivoted as at 55 (Fig. 4) to the top slide 35, and has an extending operating handle 56, by which the table 35 can be operated by hand to advance the cylindrical standard 37, with its work carried between jaws to be presently described, to the tool 32 or any other tool substituted therefor, to be acted upon. This operation by hand of advancing and retracting the work carrying table can only take place when the clamp screw 57 (Fig. 12) and (Fig. 4) is loosened to permit the sleeve 43 to slide freely through its bearings in the table 36.

To operate the work carrying table 35 and the work carried thereon to the operating tool by screw power, it is only necessary to clamp the sleeve 43 by means of the clamp screw 57 which eliminates the hand feed and brings into play the screw feed, which is operated by the handle 41: whereupon the table 35, carrying the standard 37 will be advanced.

Surrounding the standard 37 is a chuck carrying collar 58 which has, as seen in Fig. 10, an inwardly projecting nut 59 engaging the screw 60, which has rotation but no longitudinal movement within the standard 37, and is operated by the hand wheel 38. The nut 59 passes through a vertical slot in the front face of the standard so that the bracket sleeve can be raised and lowered on the standard as desired. The forward arm of the bracket sleeve is a perforated bearing 61, directly over a perforated bearing 62 resting upon a ball bearing plate 63 upon the table 35 and it has confined in it a spindle 64 operated by a hand wheel 65 and carrying at its lower end a die or saddle piece 66 adapted to fit over and snugly embrace the work, in this instance a globe valve body 67 being shown, with its ends projecting far enough from the saddle or die to permit the action of the tool without the latter coming in contact with the saddle. The lower part of the work 67 rests in a similar saddle or die 68 secured to the spindle 64 and pins 69 passing through the carriers and projecting from the dies serve to lock the dies in place. Upon the bearing 61 are perforated lugs 70 between which is pivoted a spring latch 71, whose lower engaging end fits between lugs 72 on the lower face of the carrier so as to lock the work, when adjusted and clamped down, from turning. The work is then advanced to the tool by either of the before described methods and the reaming and facing is accomplished if the tool of Fig. 5 is employed, or it may be faced and tapped by substituting another tool or any particular kind of work can be done upon it as desired according to the kind of tool employed.

By reference to Fig. 9 it will be seen that I have employed an elongated standard 37^a and a pair of work carrying bracket jaws with the same means heretofore employed for clamping the work between them. They are operated towards and from each other by means of a right and left hand screw 60, the construction being substantially that of my chuck Patent No. 487,292 of Dec. 6, 1892, to which reference is made for the details, the only exception being that I have placed a hand wheel 38^a on the right and left hand screw for operating it and a hand wheel 65^a on the upper spindle in the work carrying jaw for revolving the work. The interior construction of the standard 37^a is illustrated in Fig. 10, which is taken on the dotted line W—W of Fig. 9.

I will now describe the automatic shifting mechanism for changing the direction of rotation of the tool carrying spindle of the head stock, which is best illustrated in Figs. 3 and 4. Guided in brackets 73, which is rigidly secured to the bed 1 (Fig. 4) and passing through the shifting bracket 74, attached to the table 35, is a shifting rod 75 provided with adjustable collars 76, 77 on opposite sides of the bracket 74, and these collars serve to move the rod 75 one way or the other when the bracket 74 is brought against either of them by the movement of the table 35, and these collars 76 and 77 being adjustable, the reversing of the tool can be accomplished at any point in the travel of the table 35 that may be desired. Referring to Fig. 3 it will be seen that the rod 75 passes through a shifting arm 82 which is journaled on a bracket 86, attached to the bed 1. Collars 80, one of which only being visible, are secured on this rod 75 and form the abutments for coiled springs 78 and 79, which springs bear against collars 81 located on opposite sides of the shifting arm 82. The shifting arm 82 is provided, at its fulcrumed end, with a cross piece 83 which carries at each of its outer ends a small ell shaped block 84, the purpose of which will be presently described. Pawls or dogs 85 are pivoted to the bracket 86 and have one end adjacent to the blocks 84 and normally held against the same by small coiled springs 87. The free ends of these dogs 85 lie in the path of travel of the collars 80 on the rod 75. The parts in this figure (Fig. 3) are shown in a neutral position and to describe their operation we will assume that the clutch body 15 is shifted to the

right and into engagement with the cone pulley 9, which will drive the tool or tap in a right hand direction for cutting. By shifting the clutch body 15 to this position, the shifting arm 82 will be partially revolved on its pivot and the cross-piece 83 will recede from the dog 85 so that the same, being forced by its spring 87, will engage the block 84 and thus lock the shifter 82 and consequently the clutch body 15, whereupon the operator will cause the work, carried by table 35 (Fig. 4) to approach the tool and be operated upon until such time as the table 35, carrying the bracket 74 will bring the same against the collar 77 and cause the shifting of the rod 75. The first part of the shifting of this rod will compress the spring 78 (Fig. 3) and apply spring pressure to the shifter 82 and a further movement of this rod 75 will bring the collar 80 against the dog 85 and trip the same out of engagement with the block 84, carried by the cross-piece 83, and release the same, at which instant the spring pressure exerted by the spring 78 against the shifter 82, will become effective and cause the instantaneous shifting of the clutch body 15 out of engagement with the cone pulley 9 and into engagement with the reversing gear 10, which of course will reverse the direction of rotation of the tool or tap. The same movements and actions of parts occur when the work carrying table 35 (Fig. 4) and the work carried thereby is pulled backward away from the cutting tool and the bracket 74 brought against the collar 76 on the rod 75 as will be readily understood, it being also understood that, when the table 35 is drawn away from the cutting tool, the work carried thereby is partially revolved thereon to present a new surface for the next operation.

In cases of rather large work, where facing only is to be done at one operation, the reaming having been already done, and the machine not being provided with a tool of broad enough face to cover the entire surface of the work, the work may be faced by means of shifting the table 35 transversely across the face of the tool, which would face say one half of it or a trifle more, then by turning the work over in its holder and re-clamping it, the other half could be faced, both of these operations being performed through the medium of the screw 47 in shifting the table 35 transversely. The main purpose however of the screw 47 is to aid in centering the work in true alinement with the tool, also in cases of irregular work, where two or more bosses on the fitting have to be reamed, tapped and faced, in which case the said bosses can be brought in alinement with the tool by operating the hand wheel 47 and shifting the tables 36 and 35 transversely to center the parts, as will be readily understood.

Having thus fully described my invention, I claim:—

In a machine of the character described, a movable table having guideways, a work slide movable thereon and carrying chuck jaws, a nut on the slide, an adjusting screw engaging the nut, a sleeve rotatably mounted on the screw and a split clamp surrounding the sleeve and connected to the table.

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