D. C. WALTER & E. L. TROUP.

PIPE THREADING MACHINE.

APPLICATION FILED MAR. 18, 1908.

948,102. Patented Feb. 1, 1910.

7 SHEETS—SHEET 1.

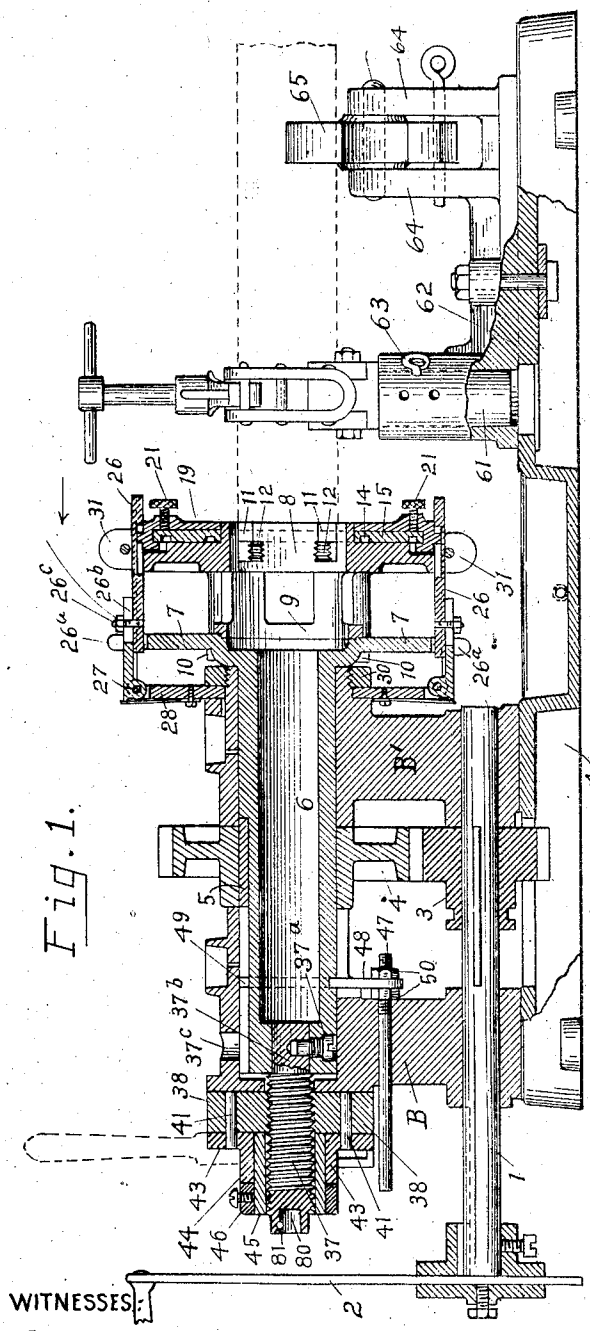

Fig. 1.

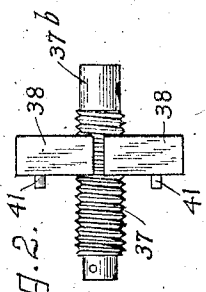

Fig. 2.

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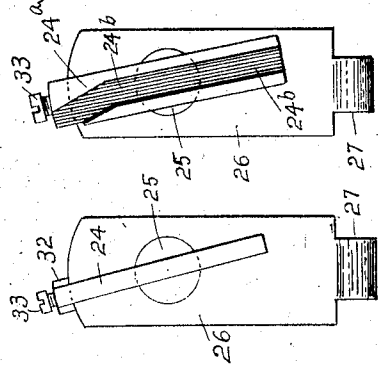

Fig. 5.

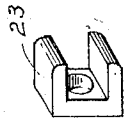

Fig. 6.

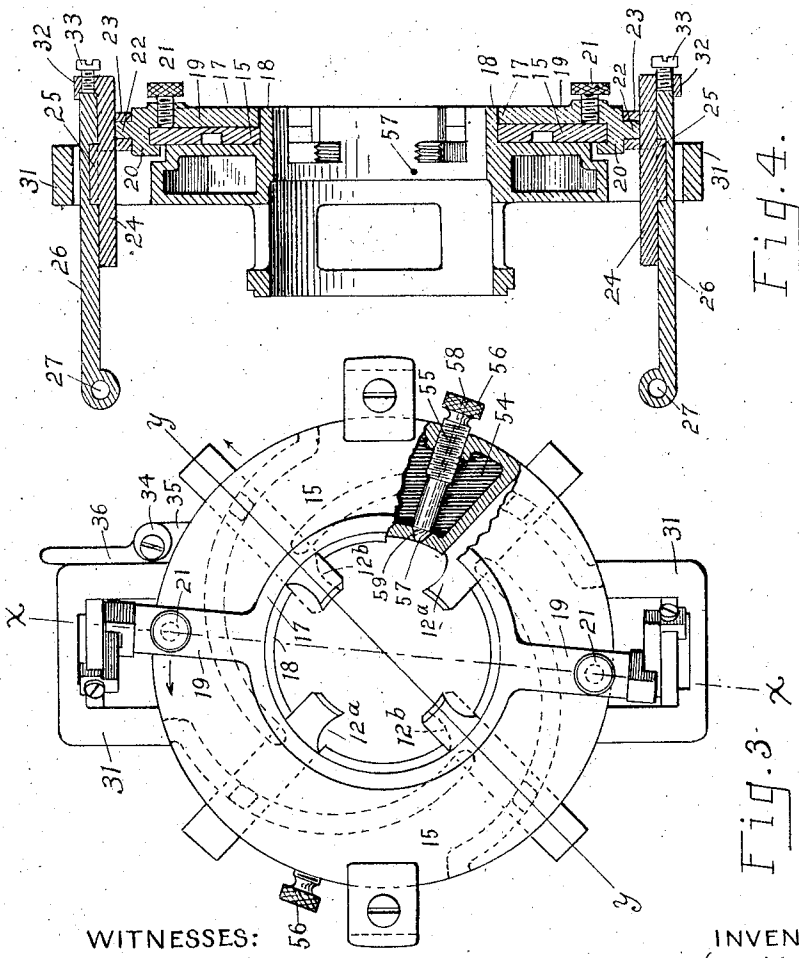

Fig. 4.

Fig. 3.

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7 SHEETS—SHEET 3.

Fig. 10.

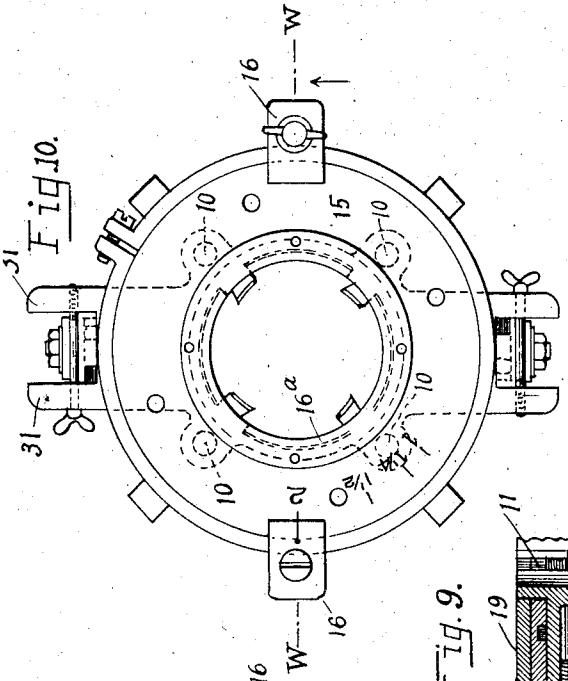


Fig. 11.

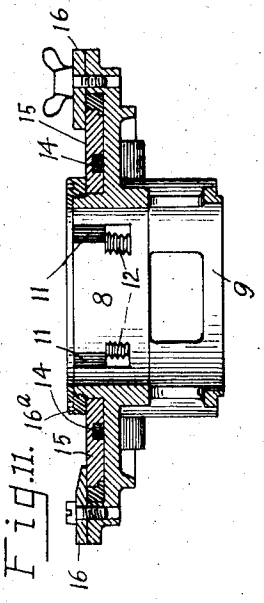


Fig. 9.

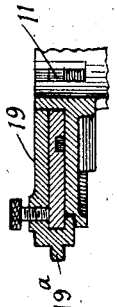


Fig. 8.

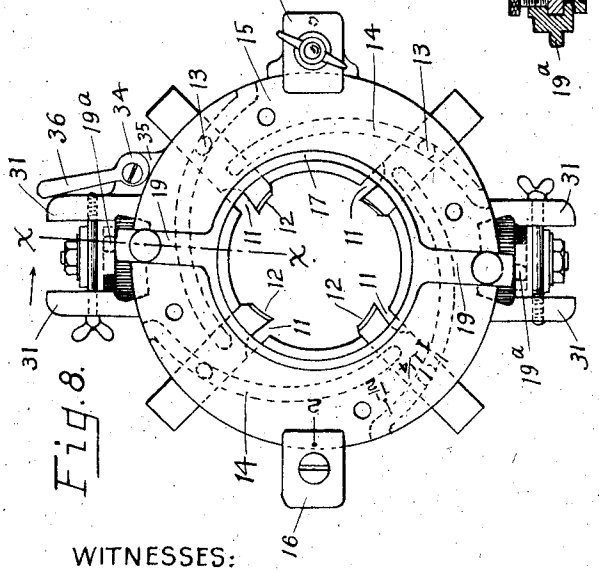
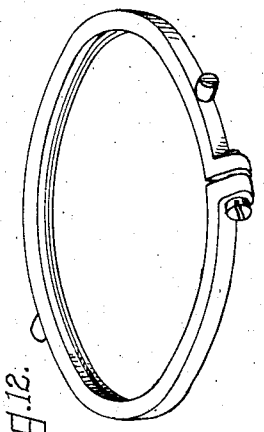


Fig. 12.



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7 SHEETS—SHEET 4.

Fig. 13.

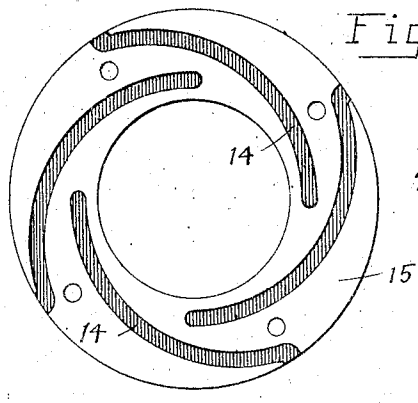


Fig. 14.

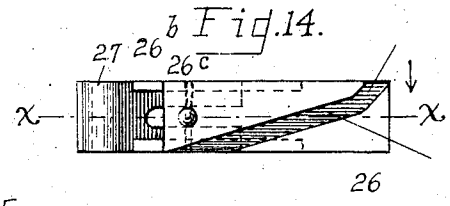


Fig. 15.

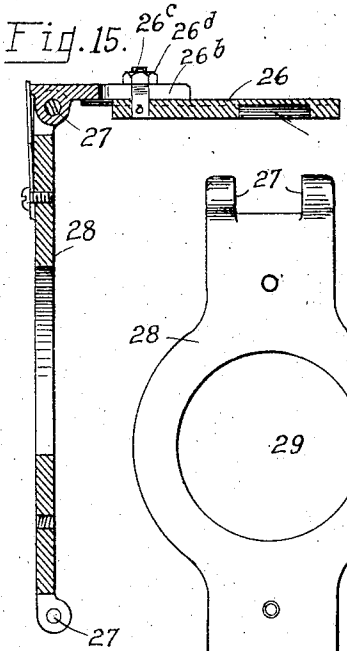


Fig. 16.

Fig. 17.

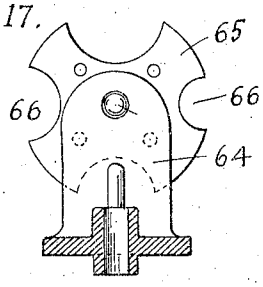
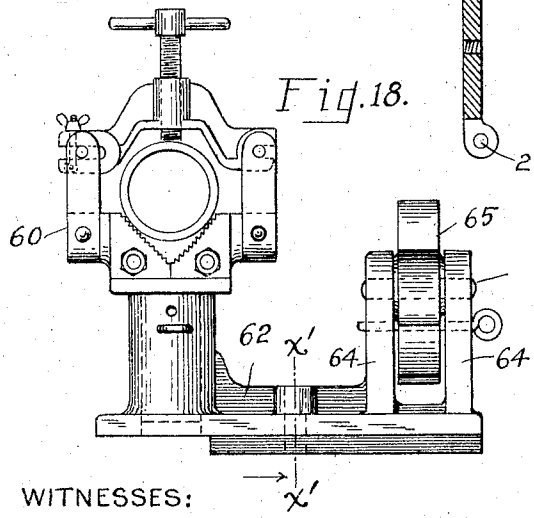


Fig. 18.



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7 SHEETS—SHEET 5.

Fig. 19.

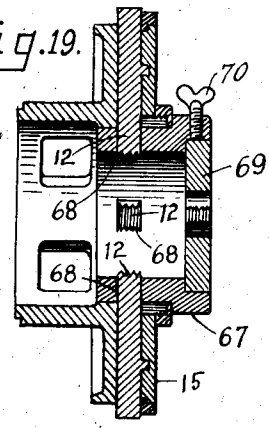


Fig. 20.

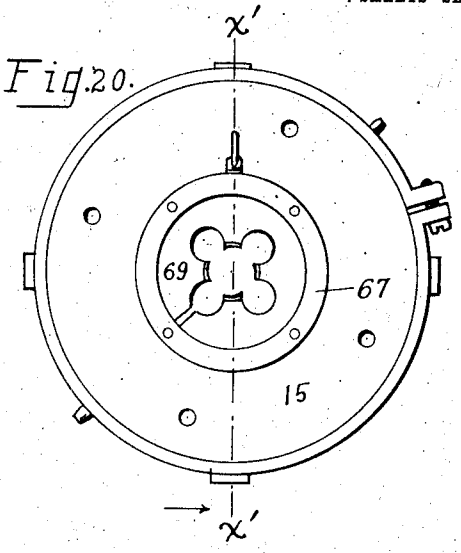


Fig. 21.

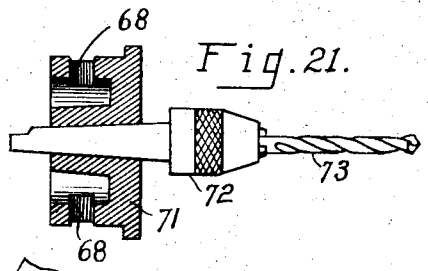


Fig. 22.

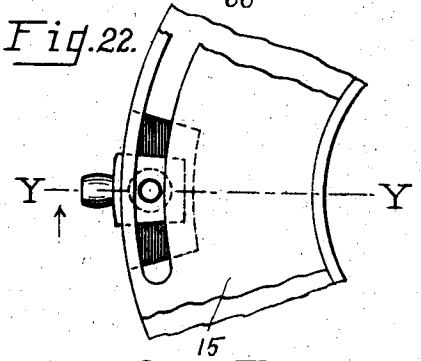


Fig. 23.

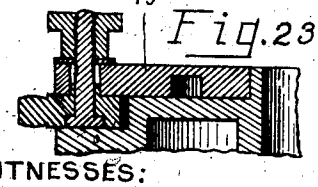
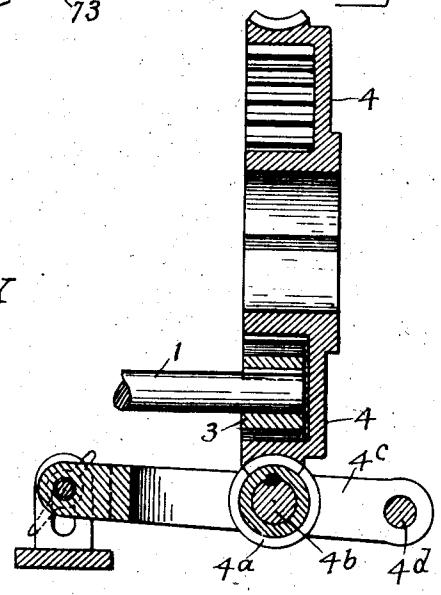


Fig. 24.



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APPLICATION FILED MAR. 18, 1908.

948,102.

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7 SHEETS—SHEET 6.

Fig. 25.

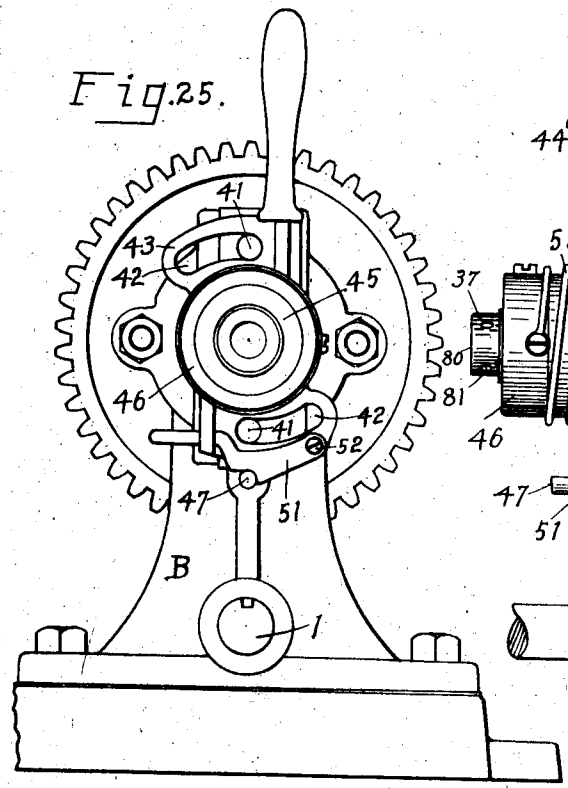


Fig. 26.

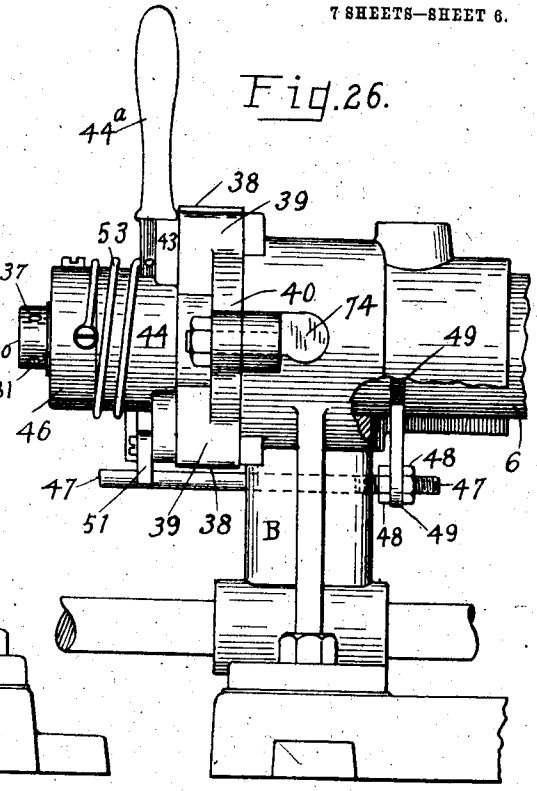


Fig. 27.

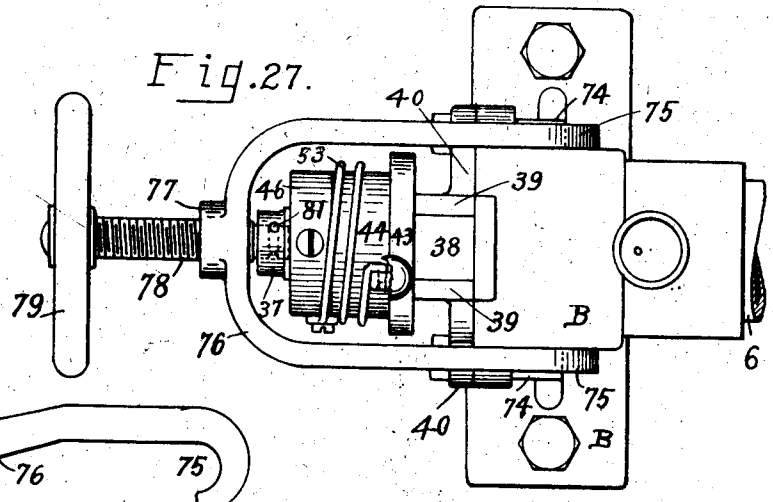
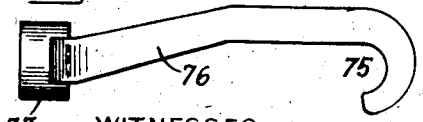


Fig. 28.



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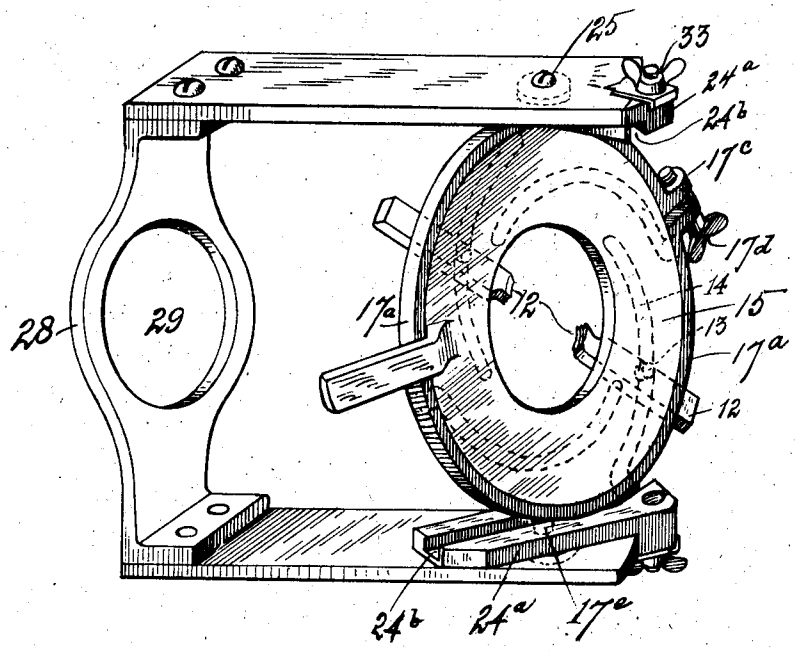
APPLICATION FILED MAR. 18, 1908.

948,102. **Patented Feb. 1, 1910.**

7 SHEETS—SHEET 7.

Fig. 29.



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Marie Hahn

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Edward L. Troup.

by Newton Hall Fair Atty.

UNITED STATES PATENT OFFICE.

DAVID C. WALTER AND EDWARD L. TROUP, OF TOLEDO, OHIO.

PIPE-THREADING MACHINE.

948,102. Specification of Letters Patent. Patented Feb. 1, 1910.

Application filed March 18, 1908. Serial No. 421,919.

To all whom it may concern:

Be it known that we, DAVID C. WALTER and EDWARD L. TROUP, citizens of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Pipe-Threading Machines; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

Our invention relates to a machine for threading pipes, bolts, nipples, and the like, and is designed to furnish a construction by means of which the work may be threaded with either a straight or tapered thread and, of any desired taper.

Our machine is also designed to cut either right or left hand threads. Also to insure the quick and complete withdrawal of the cutting instruments from the work at the end of the cut, thus permitting and facilitating the movement of the die-head,—when disengaged from the lead-screw as hereinafter explained,—back to its starting point.

A further object of our invention is to furnish convenient means for quickly placing and holding the object to be threaded in exact central alinement with the die-head which carries the threading tools or chasers.

Our device is also designed to furnish a construction by means of which the threading operation may be performed either with chasing tools or with the ordinary threading die.

Our machine is likewise intended for use, when desired, as a drill-press.

We also provide in our machine novel means for lubricating the work as the cutting proceeds.

Our invention also relates to certain details of construction hereinafter described and pointed out in the claims.

We attain these objects by means of the devices and construction and arrangement of parts hereinafter described and shown, and illustrated in the accompanying drawings, in which,—

Figure 1 is a central sectional side-elevation of our device; Fig. 2, a side-elevation of a left-hand lead-screw and nuts which, when occasion requires, are substituted for the corresponding right-hand parts shown in Fig. 1; Fig. 3, a front-end elevation of the die-head of our machine hereinafter referred to; Fig. 4, a central sectional view seen from the right and taken on line x—x, Fig. 3; Fig. 5, a plan-view of the inner side of one of the plates which governs the disk which controls the movement of the chasers hereinafter referred to; Fig. 6, a perspective view of the member which connects the plate shown in Fig. 5 with the disk which controls the radial movement of the chasers; Fig. 7, a modified form of the plate illustrated in Fig. 5; Fig. 8, a front-elevation of our die-head in modified form; Fig. 9, a sectional view on line x—x, Fig. 8; Fig. 10, a front-elevation of a die-head showing a modified form of driving mechanism for the plate which controls the radial movement of the chasers; Fig. 11, a transverse sectional view of the device illustrated in Fig. 10; Fig. 12, a perspective view of the frictional driving ring for the chaser-controlling disk hereinafter referred to; Fig. 13, a rear-elevation of the chaser-controlling disk hereinafter referred to, showing its eccentric grooves; Fig. 14, a plan-view of the guide-plate illustrated in Figs. 5 and 7, provided with means for the adjustment of the length of the plate and designed for varying the point at which the chasers are withdrawn from the work; Fig. 15, a sectional elevation of the same taken on line x—x, Fig. 14, showing the plate upon which it is pivotally supported; Fig. 16, a front-elevation of the supporting plate last above referred to; Fig. 17, a rear-elevation, partly in section, taken on line x'—x', Fig. 18, of the pipe-support and centering device hereinafter referred to; Fig. 18, a side-elevation of said pipe-support and centering device together with the pipe-vise hereinafter referred to, said vise being shown turned upon its swivel at a right angle to the work, as when used as a support for one end of the pipe while placing it in position to receive the disk or chasers, or utilized as a vise for connecting threaded pipe-sections; Fig. 19, a longitudinal sectional view of our die-head provided with a detachable device for threading ordinary bolts or rods; Fig. 20, a front-elevation of the same; Fig. 21, a similar detachable device adapted for use in connection with a drill or drill-chuck; Fig. 22, a front-elevation showing a modified means of connecting the chaser-controlling

disk with the guide-plate hereinafter referred to; Fig. 23, a sectional view of the same on line *y—y*, Fig. 22; Fig. 24, a sectional view of a modified form of driving-gear for the die-head, showing alternative means for actuating the driving-gear either by a spur-pinion or by a worm-gear thus providing for a considerable diversity of speed and power; Fig. 25, a rear-end elevation of our machine; Fig. 26, a side-elevation of the rear-end of our machine, on an enlarged scale; Fig. 27, a top-plan view of the same, showing the drill-press attachment hereinafter referred to in place, Fig. 28, a side-elevation of the yoke of the drill-press attachment, hereinafter referred to, detached and Fig. 29 a perspective detached view of the ring 28 and the guide-plate 26 pivotally connected therewith, as hereinafter described, showing the manner of adjustably connecting the disk 15, hereinafter referred to, with the guide-plate 26.

Like letters and numerals of reference indicate like parts throughout the drawings.

In the drawings, A is a bed-plate or base from which, at its rear-end, spring two bearing-posts or brackets B—B′ in which is journaled a shaft 1 driven by a crank 2 or other suitable driving device. Upon the shaft 1 is a pinion 3 engaged with a gear-wheel 4 slidably secured by a key 5 on a hollow shaft 6. If preferred, the gear-wheel 4 may be formed as an internal gear engaged by the pinion 3, as illustrated in Fig. 24, and in this case the gear 4 may be furnished with an external worm-gear engaged by worm 4^a on a shaft 4^b journaled in a yoke 4^c, pivoted, as at 4^d, and arranged to be thrown into and out of gear with the worm-wheel at will. This alternative arrangement is provided only where the machine is to be driven either manually or by power. The shaft 6 is longitudinally movable in its bearings. The shaft 6 at its forward end is flanged, as at 7. To the flange is secured the die-head 8 having a hollow hub 9 bolted, as at 10, to the flange 7. In the outer face of the die-head 8 are radial grooves 11 for the reception of the chasers 12. Each of the cutters or chasers 12 is provided with a forwardly projecting pin or lug 13 which engages an eccentric groove 14 in the inner face of a circular plate 15. This plate or ring is rotatably secured in place upon the die-head by means of overlapping fingers 16 secured by screws to the die-head. (See Figs. 8, 10, and 11.) If preferred, the plate 15 may be secured revolubly upon the die-head by means of screw-ring 16^a the fingers 16 being omitted.

In our device it is necessary to give the plate 15 a rotary movement independent of the movement of the die-head in order to impart to the chasers a radial movement through their connection with the eccentric grooves 14. This we accomplish as follows: As shown, in Figs. 3 and 4, 17 is a ring which turns loosely upon a forwardly projecting flange 18 on the die-head and having radial arms 19 which at their extremities are turned backwardly to form a hook 20 which engages the margin of the plate 15, the plate 15 and the arms 19 being held in rigid relation by the set-screws 21. Projecting radially from the outer extremities of the arms 19 are pins or lugs 22 upon which are swiveled bifurcated guide-blocks 23 (see Fig. 63). The slot of the box 23 engages a guide-bar 24 swiveled near its center, as at 25, upon plate 26. This plate is, at its inner end, pivoted, as at 27, upon a plate 28 having a central opening, as at 29 (see Fig. 16), which fits loosely upon a bearing formed upon the forward part of the forward bracket B′. The pivoted plate 26 also engages a notch 26^a in the flange or arm 7 of shaft 6, and is thus braced and given rigidity. One side of the plate 28 rests against a shoulder on the bracket B′ and the plate is held against lateral movement by a threaded ring 30. Projecting radially from the die-head are lugs or hooks 31 through which pass the plates 26. It will be seen that as the die-head revolves and as it is moved forward upon the work by the lead-screw hereinafter referred to and by the engagement of the chasers with the thread which is being cut, the plate 14 is caused to revolve with the die-head by the engagement of the plate 26 with the lugs 31 and that the plate 15 is given a rotary motion independent of the revolving die-head due to the engagement of the ring 17 to which it is clamped with the diagonal guide-bar 24 on the plate 26. This plate 26 is held against forward movement through pivotal connection 27 with the plate 28 which, while it is free to revolve with the die-head, is held against forward movement by the ring 30 on the forward end of the bracket B′.

In Figs. 10, 11, and 12 is illustrated a modified and preferred form of device for connecting the eccentrically slotted disk 15 with the guide-plate 26, which governs the rotation of the disk 15 independently of the rotation of the die-head. In this modified form, the forwardly projecting flange 18, the ring 17 journaled thereon and the radial arms (Figs. 3 and 4) are dispensed with, and in their stead is employed a friction-band 17^a, cleft as at 17^b, the adjacent ends of the cleft portion having radial lugs or ears 17^c correspondingly tapped for the reception of a clamping screw 17^d. Projecting radially from the ring 17^a at diametrically opposite points are lugs or pins 17^e. The ring 17^a is adjustably clamped directly upon the margin of the disk 15, and the pins 17^e are slidably connected with the guide-bars 24 or equivalent guide-channels or slots formed in the plates 26, as above described and illus-

trated, and with the same effect, as explained in the last preceding paragraph.

Since the guide-bar 24 is swiveled, as at 25, its angle to the axis of rotation of the plate 15 may be adjusted as may be desired, thus controlling the movement of the plate 15 upon its bearings and regulating the radial movement of the chasers and the resulting taper of the object to be threaded. The adjustment of the guide-bar 24 is preserved by means of a hook 32 formed on the end of the bar and engaging the end of the plate 26 and having a set-screw 33 by means of which the bar may be secured in any desired adjusted position. By means of the adjustment here described, it will be seen that the guide-bar 24 may be set and adjusted exactly parallel with the axis of the die-head and so that the plate 15 will not be given any motion at all upon its bearings and that hence the chasers will not have any radial movement and that the consequent thread formed will be straight instead of tapering. The same result may be obtained by loosening the set-screws 21 so that the plate 15 is disengaged from the control of the angular guide bar 24. To now insure the rotation of the plate 15 in harmony with the die-head we provide a lock 34 consisting of a cam pivoted upon a lug 35 on the die-head and provided with a lever 36 by means of which the cam 34 may be thrown into binding contact with the edge of the plate 15 thus holding it against independent rotation.

In Fig. 5 we have shown the swiveled guide-bar 24 arranged to engage the plate 15 through the interposed bifurcated block 23. In Fig. 7 is illustrated a modification of this device in which for the bar 24 is substituted a swiveled plate 24^a having therein a channel or groove 24^b. This channel or groove is engaged by a pin 19^a projecting from the extremity of arm 19. Motion is communicated to the arm 19 and to the guide-plate 15 by the angular channel 24^b in the manner above described with reference to the guide-bar 24. The channel or groove 24^b, at its outer extremity, is deflected at an abrupt angle, as shown, the object of this deflection being to give the lug or pin 19^a and the plate 15 a sudden throw by means of which the chasing tools are withdrawn rapidly and completely from the work, preparatory to the return of the die-head to its starting position.

A still further modification of the guide-plate is illustrated in Figs. 1, 14, and 15 in which the adjustment of the angle of the guide which controls the independent rotation of the plate 15 is predetermined and fixed, the swiveled adjustable feature of the guide-bar or guide-slot being omitted. In these figures, however, is illustrated a longitudinal adjustment of the guide-plate 26. This adjustment is obtained by forming the plate 26 in two parts the end of one of the parts overlapping the other, one of the parts having a slot 26^b through which passes a bolt 26^c engaging the other part and having a set-nut 26^d, the arrangement being such that one of the plates may be slipped lengthwise upon the other and secured in adjusted relation at any desired point. The moving of the guide-plate toward and away from its pivotal support 27—28 permits any desired change, within certain limits, of the length of the thread to be cut and determines the point at which the chasers are withdrawn from the work.

To insure the forward movement of the die-head and chasers upon and into engagement with the work, we connect to the rear end of the hollow shaft 6 a lead-screw 37, as clearly illustrated in Fig. 1. 38—38 are the two halves of a divided nut adapted to move into and out of engagement with the lead-screw. These nut-halves reciprocate toward and away from each other in a housing 39 having flanges 40 rigidly bolted to the bracket B. Projecting rearwardly from each of the nut-halves is a pin 41 which projects into an eccentric slot 42 in the flange 43 of a sleeve 44 journaled upon a bearing 45 formed as part of the housing 39. Upon the bearing portion of the housing 39 is secured a collar 46 which holds the sleeve 44 operatively secured upon its bearing. Projecting radially from the sleeve 44 is a handle 44^a by means of which the sleeve may be given a part turn upon its bearings thus giving a reciprocatory movement to the parts of the divided nut, which are thus thrown into and out of engagement with the lead-screw. When the divided nut is disengaged from the lead-screw, the shaft 6 with its die-head may, after the thread has been completed on the work, be moved back to its original position ready for a new operation. This arrangement obviates the necessity for revolving the die-head in order to screw its back to its original position as is usually done.

The lead-screw is secured in place by means of a set-screw 37^a which engages a cylindrical part 37^b formed on the forward end of the lead-screw and socketed in a corresponding hole in the end of the shaft 6. In the top of the bracket B which forms the rear bearing for the shaft 6 is an opening 37^c through which the set-screw 37^a may be introduced and removed. This arrangement permits the convenient removal and introduction of screws having different leads to accommodate the various dies and the different threads to be cut. The divided lead-nut is in like manner removable and interchangeable by first removing the sleeve 44 and the collar 46, (see Fig. 1,) in a manner which will be readily apparent.

It is found desirable to automatically release the divided nut from the lead-screw and to stop the forward movement of the die-head the instant after the chasers are automatically disengaged from the work as above described. To accomplish this we provide a rod 47 from which projects upwardly a bar 48 having in its upper end a crotch which loosely engages a circumferential groove 49 in the shaft 6. The bar 48 is adjustably secured upon the threaded end of the rod 47 between two nuts 50. The rod 47 between two nuts 50. The rod 47 passes through and is supported in a hole in the rear bracket B and its rear end projects into the path of and forms a detent for a dog or pawl 51 pivoted, as at 52, upon the flange 43 of the sleeve 44. Around the sleeve 44 is coiled a stout spiral spring 53 one end of which is secured to the sleeve 44 the other end being secured to the collar 46. The tension on the spring is such that it normally throws the sleeve 44 into such position that the divided nut is disengaged from the lead-screw. When the shaft 6 moves longitudinally along the work to such posititon that the chasers are disengaged from the work, as above described, the rear end of the rod 47 which has moved forward with the shaft 6 now slips out of engagement with the dog or pawl 51 which immediately releases the sleeve 44 and permits the spring 53 to instantly throw the divided nut out of engagement with the lead-screw so that the shaft 6 with its die-head may be now returned to its original position, either by hand or by any suitable automatic device.

It will be seen by reference to Fig. 3 that the central lines of the radial grooves in which the chasers 12 are moved toward and away from the axis of the cutter-head, form true radii of such axis, as is illustrated by the line *y*—*y*, Fig. 3. In practice it is found important to dispose the cutting edges of the chasers slightly in advance of a radial line, since this largely relieves the strain upon the cutting instrument and facilitates its action by giving the point of the instrument a shearing action instead of scraping action. Usually this cut in advance of the radial line is obtained by placing the larger portion of the chaser, which is necessarily of considerable thickness, somewhat back of the radial line so that its forward edge shall engage the work slightly in advance of such line. This arrangement, however, will not answer for our device because the machine here described is designed to cut either right hand threads or left hand threads. For this reason we arrange the chasers so that their central lines correspond with true radii of the die-head and we obtain the desired cut slightly in advance of the radial line by means of the indentation 12^a in the cutting portion of the chaser. When it is desired to cut a left hand thread the chaser will have the indentation 12^a formed at its opposite side as indicated by the dotted lines 12^b in Fig. 3. It will be seen that with the machines hefetofore in use, in which the chasers are not disposed on true radial lines, similar chasing tools could not be used for cutting both right and left hand threads as in our improved device. Of course it will be understood that when the left hand chasers here referred to are employed a corresponding lead-screw and lead-nut will be employed as illustrated in Fig. 2.

To insure the proper lubrication of the cutting tools and the work as the cutting process proceeds, we form our die-head hollow thus forming an oil receptacle of large capacity, as illustrated in Fig. 3. The outer wall of the oil-chamber 54 has a threaded aperture 55 through which oil is supplied to the chamber and which is closed by a threaded pin-valve 56 the point of which closes an aperture 57 on the inner periphery of the die-head. Through the pin-valve 56, lengthwise, is an air-conduit 58, indicated by dotted lines, leading from the outer end of the valve to the point where it is seated, as at 59. By slightly unscrewing and withdrawing the valve, the aperture 59 is opened and air is at the same time supplied through the air-inlet 58 so that the vacuum in the oil-chamber is broken thus permitting the oil to exude upon the work. When the valve is closed the air-conduit is also, by the same operation, closed.

To provide for properly supporting the pipe or other object to be threaded and to hold the same rigidly and centrally during the cutting operation, we provide a pipe-vise 60, (see Figs. 1 and 18,) having a cylindrical leg 61 swiveled in a socket formed in a frame or housing 62. The vise is vertically adjustable by means of pins and holes 63 so that the vise may be made to support any standard size of pipe in axial alinement with the die-head. It will be seen that the vise may be turned horizontally upon its swiveled support and that it may be readily adjusted at any desired height. In addition to the use here indicated the swiveled vise is found extremely convenient in supporting one end of heavy pipes when they are lifted and swung into place in the machine as well as for other purposes,—especially in portable machines. Between two brackets 64 springing from the housing 62 is journaled a plate 65 having in its margin a series of segmental notches 66 (see Fig. 17), which conform to the outer circumference of the standard sizes of pipes. The center of each circle of which the indentations 66 are segments coincides with the axial line of the shaft 6 and the die-head. By the rotation of the plate the bottoms of the indentations are brought successively

into such position that the pipe of the corresponding size will be supported in the notch or indentation in central axial alinement with the die-head. The housing or frame 62, upon which the vise and the centering plate 65 are mounted, is clamped upon the bed-plate of the machine and this housing is adjustable, as shown, toward and away from the die-head, to furnish a longitudinal adjustment for the support of the different articles to be cut.

As above stated, our machine is also designed for cutting, when necessary, threads on bolts and rods. To accomplish this, we insert into the circular opening of the die-head a collet 67 (see Figs. 19 and 20), having in its wall openings 68 which coincide with the inner ends of the chasers 12. When the chasers are moved inwardly by the rotation of the plate 15 they engage the openings 68, and thus securely fasten the collet in place so that it revolves with the die-head. In the forward rim of the collet is a recess into which exactly fits a die 69 which is secured in place by a set-screw 70 or other suitable means. A bolt secured in the vise 60 and presented to the die 69 will be threaded as will be readily understood without further explanation. It will be understood that by obvious manipulation of the lead-screw the vise and the longitudinally movable die-head, the thread may, if desired, be cut upon a bolt or rod the full length of the hollow shaft 6.

As above stated our machine is also designed to be employed as a drilling machine. When so employed a collet 71 (see Fig. 21), is secured in place as just described with reference to the collet 67, this collet being provided with means for holding a drill-chuck 72 adapted to receive and to hold a drill 73. When the machine is used for drilling purposes it becomes necessary to force the drill forward as the work proceeds. To accomplish this there are formed at opposite sides of the rear bearing of the shaft 6 lugs 74 (see Figs. 26–27,) adapted to receive hooks 75 on a yoke 76 the central part of which curves back of the end of the lead-screw 37. At the meeting point of the arms of the yoke is a threaded boss or hub 77 through which passes a feed-screw 78 carrying at its outer end a hand-wheel 79. The inner end of the feed-screw enters a counter-bore 80 (see Fig. 1) in the rear end of the lead-screw 37 and is detachably connected with the lead-screw by means of a cross-pin 81 passing through the outer end of the lead-screw and engaging a circumferential channel on the inner end of the feed-screw. The divided lead-nut being thrown out of operative position, the gears 3—4 and the shaft 6 and die-head being put in motion and the drill 73 being engaged with the object to be drilled, the drill is pressed forward as the bore is formed by means of the feed-screw and hand-wheel 78—79. When the drill-work is completed, it is the work of but a moment to detach the drill-press here described, together with the drill and its chuck and collet, and the machine is again ready for any of the other uses herein described.

Having described our invention, what we claim and desire to secure by Letters Patent is,—

1. In a machine of the described character, a fixed support, a shaft journaled and longitudinally movable upon such support, a die-head carried by the shaft, radially disposed chasers in the die-head, a disk in the die-head having eccentric guides engaged with the chasers,—the arrangement being such that the independent rotation of the disk imparts radial movement to the chasers to give taper to the work,—connections between said disk and said fixed support, said connections including a guide which governs the rotation of the disk, and means for the angular adjustment of said guide upon its support.

2. In a machine of the described character, a revoluble longitudinally movable shaft, a die-head carried by the shaft, a fixed support on which the shaft is journaled, radially disposed chasers in the die-head, a disk in the die-head having eccentric guides engaged with the chasers, a ring mounted and revoluble upon said fixed support, a plate connected with said ring, a guide upon said plate slidably engaged with said disk, and means for the angular adjustment of said guide upon said plate.

3. In a machine of the described character, a revoluble longitudinally-movable die-head, a radially disposed chaser in the die-head the chaser being adapted by its radial movement to give taper to the work, a guide operatively connected with and adapted to control the radial movement of the chaser, a support for the guide, pivotal connections between the guide and the support which permits the adjustment of the guide upon the support to vary the taper, and means for securing the guide in adjusted position on its support.

4. In a machine of the described character, a die-head, a chaser therein adapted by its radial movement to give taper to the work, a guide operatively connected with and adapted to control the radial movement of the chaser, said guide having a deflection adapted to accelerate the radial movement of the chaser at the end of its cut, a support for the guide which permits the adjustment of the guide, to vary the position of said deflection, and means for securing the guide in adjusted position on such support.

5. In a machine of the described character, a shaft, a support upon which the shaft is journaled and is longitudinally mov-

able, a die-head carried by and revoluble with the shaft, radially disposed chasers in the die-head, a disk in the die-head having eccentric guides engaged with the chasers and arranged for rotation independently of the die-head, a ring journaled on the shaft-support, an arm carried by the ring, a guide carried by the arm, and connections between the disk and the guide, combined with means for the longitudinal adjustment of the guide upon the arm.

6. In a machine of the described character, a shaft, a support upon which the shaft is journaled and is longitudinally movable, a die-head carried by and revoluble with the shaft, radially disposed chasers in the die-head, a disk in the die-head having eccentric guides engaged with the chasers and arranged for rotation independently of the die-head, a ring journaled on the shaft-support, an arm carried by the ring, a guide carried by the arm, connections between the disk and the guide, and means for the angular adjustment of said guide on said arm.

7. In a machine of the character described, a rotary die-head, chasers in the die-head adapted by their radial movement to give taper to the work, a disk having eccentric guides adapted for engagement with the chasers, a friction-band adapted for engagement with the margin of said disk, and means connected with the friction-band for imparting a rotary movement to the disk independently of the rotation of the die-head.

8. In a machine of the described character, a die-head having a central opening, and radially movable chasers in said head, in combination with a collet having in its periphery apertures which coincide with and receive the cutting ends of the chasers and having, centrally, means for operatively holding a tool for cutting screw-threads.

9. A machine of the described character comprising a base having upright brackets, a hollow shaft journaled on the brackets, a gear for revolving the shaft, a lead-screw and nut detachably engaged with the rear end of the shaft and adapted to impart a longitudinal motion to the shaft, a die-head secured to the forward end of the shaft and having an axial opening corresponding with the open end of the hollow shaft, chasers radially disposed in the die-head, a disk in and revoluble with the die-head and capable of rotation independently of the die-head, eccentric guides on the disk engaged with the chasers, connections intermediate the disk and the shaft-support, guides on said connections adapted to govern the independent rotation of the disk, and a work support mounted upon the base and adapted to rigidly hold the work in axial alinement with the hollow shaft.

In testimony whereof we affix our signatures in presence of two witnesses.

DAVID C. WALTER.
EDWARD L. TROUP.

Witnesses:
CLEM V. WAGNER,
ADA E. CAMERON.