July 7, 1936. L. ZELLER 2,046,991

THREADING DEVICE

Filed Aug. 2, 1935

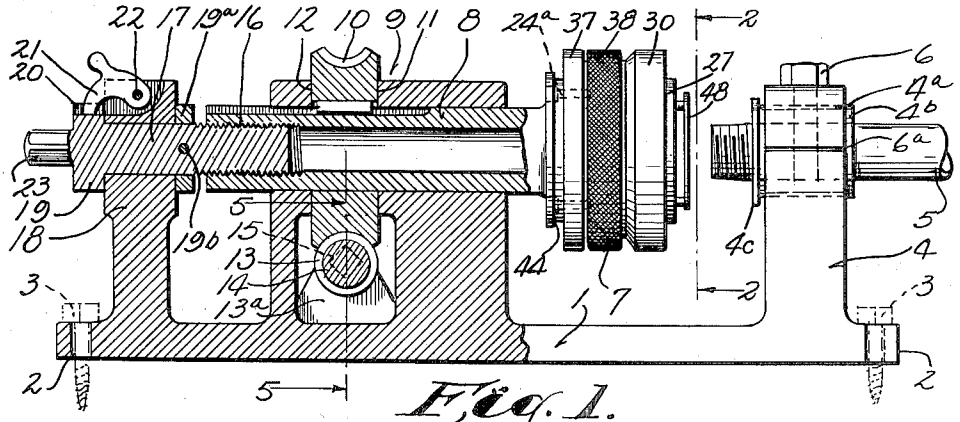


Fig. 1.

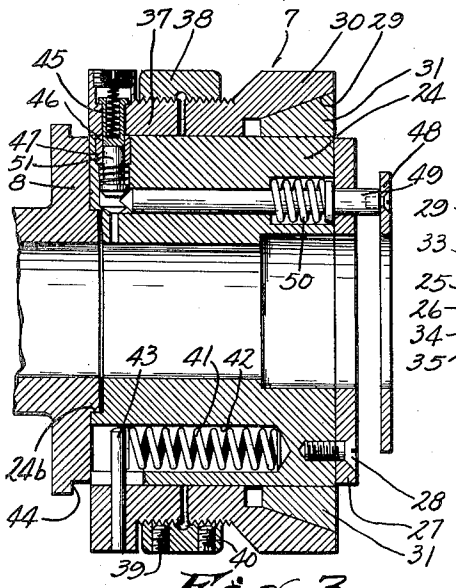


Fig. 3.

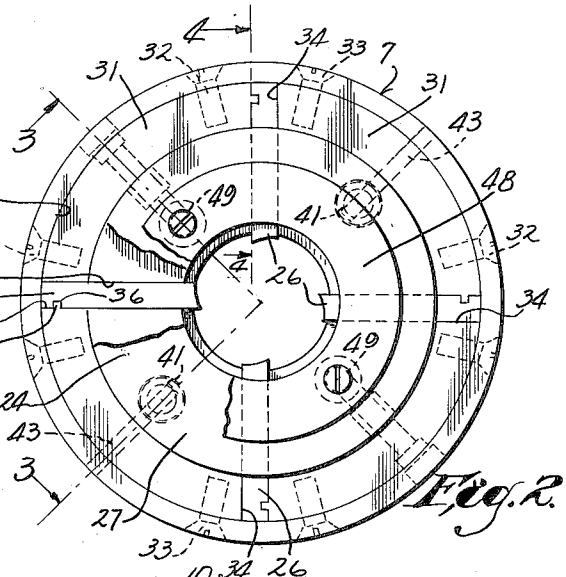


Fig. 2.

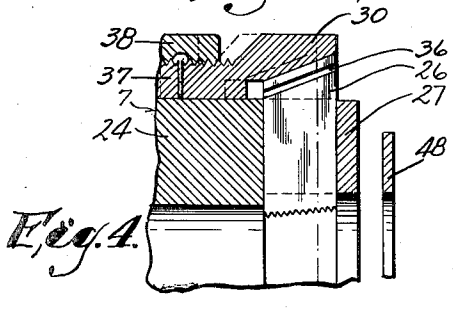


Fig. 4.

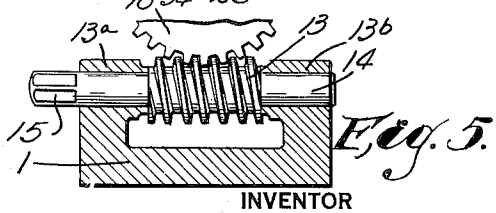


Fig. 5.

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THREADING DEVICE

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8 Claims. (Cl. 10—105)

This invention relates to pipe threading apparatus and particularly to a device which is self-contained and readily transportable.

An object of the invention is to provide a pipe threading mechanism which is readily manually operable, even for relatively large pipe diameters, and therefore adapted for use in locations where power is not available for the threading operation.

Another object is to provide an improved manually operable and self-contained pipe threading device having certain automatic and control features greatly improving the convenience, accuracy and certainty of operation of the device.

Another object is to provide improved threading means in which the threading tool is positively fed forward at a rate corresponding to the pitch of the threads to be cut and simultaneously rotated and in a form adapted for manual operation and to be used in a self-contained and easily transportable unit.

Another object is to provide improved means for the simultaneous forward and rotational movement while providing for reverse movement at relatively rapid rate without the rotation of the threading tool, and in a self-contained transportable and manually operable unit.

Another object is to provide a self-opening threading die of improved form and particularly adapted for use in a structure for one or more of the objects previously mentioned.

A further object is generally to simplify and improve the construction and operation of thread cutting machines and particularly of machines adapted for manual operation and unitarily transportable.

The invention consists in construction and combination of parts as herein illustrated, described and claimed and in such modifications of the structure illustrated and described as may be equivalent to the structure of the claims.

In the specification like reference characters denote the same parts throughout and in the drawing:

Figure 1 is a front elevation of a device incorporating the invention, partly in section along the axis of a threading tool spindle incorporated therein.

Figure 2 is a partial elevation of the same device viewed from the line 2—2 of Fig. 1 and enlarged.

Figure 3 is a sectional development taken along the line 3—3 of Fig. 2.

Figure 4 is a partial section taken approximately along the line 4—4 of Fig. 2.

Figure 5 is a partial section taken along line 5—5 of Fig. 1, in reduced scale.

The device includes a base 1 having slotted ears such as 2 adapted to receive holding bolts such as 3 by the means of which the unit may be attached to any convenient support such as for instance a bench. Fixed on base 1 is a pipe support generally denoted by the numeral 4, for a pipe 5 which is to be threaded. Support 4 includes a threaded bore 4a, adapted to interchangeably receive bushings such as 4b, respectively having different diametered bores to receive different sizes of pipe, the bushings 4b having a flange 4c, for purposes later described, and being threaded to engage the bore 4a to provide for axial adjustment as the bushing is rotated. Support 4 provides pipe clamp means, consisting of a screw 6 which may be operated by a suitable wrench, not shown, the support being slotted as at 6a, and the bushings 4b also being slotted to permit the contraction of the bores to clamp the pipe.

A die head generally denoted by the numeral 7 is carried by a spindle 8 rotatably mounted in a support generally denoted by the numeral 9 fixed on base 1 and providing spindle bearings in axial alignment with the pipe 5. Spindle 8 is slidably keyed in the bore of a worm wheel 10 which is prevented from axial movement by the bearing faces 11 and 12.

A worm 13 fixed on a shaft 14 engages worm wheel 10, and is supported from bearings 13a and 13b, fixed on base 1, which restrain the worm against axial movement. Worm 13 may be manually rotated by the means of a crank, not shown, applied to the squared end portion 15 of the worm shaft.

The rear end of the spindle 8 engages a threaded portion 16 of a member 17 carried on a bearing or support 18 fixed on base 1, the member 17 being restrained against axial movement by an enlarged portion 19 and a collar 19a, removably fixed on the member by a pin 19b. The enlarged portion 19 of the member 17 is provided with one or more notches such as 20. A manually operable latch 21 pivoted at 22 may be moved to the one position to engage notch 20, as shown in Fig. 1, thereby locking member 17 against rotation, or may be swung about pivot 22 to another position disengaged from the slot 20 to permit rotation of the member, which may be effected by applying a suitable crank, not shown, to a squared end 23 of the member.

The die head 7 includes a body portion 24 fixed on the spindle by the means of screws such as 24a, Fig. 1, there being a suitable spindle flange 24b, Fig. 3 engaging a complementary bore in the body 24 for co-axially aligning the spindle and body. The body 24 provides a plurality of slots such as 25 in which die blades or chasers 26 are radially movable and restrained against axial movement by a plate 27 fixed on the body 24 by the means of screws such as 28, the blades 26 slidably engaging the plate 27 on the one hand and the bottom of slots 25 on the other hand.

The outer portion of each of the blades **26** engages a conical bore **29** in a member **30** axially slidable on the cylindrical outer surface of the body **24**. Fixed with member **30** between each of the chasers **26** are spacing elements such as **31** which may be integrally formed or fixed in the bore **29** by the means of screws such as **32** and **33**, the adjacent ends of the members **31** providing a continuation of the slots **25** as at **34**, and also providing, for each of the chasers **26**, a tongue such as **35** engaging a tongue slot such as **36** in the chaser, the tongues **35** and slots **36** being disposed at an angle, as indicated in Fig. 4, corresponding to the cone angle of the bore **29**. As a result of the arrangement just described a movement of the member **30** axially of the body **24** will simultaneously equally move each of the chasers **36** inwardly or outwardly radially, while at any point in the movement the chasers will be rigidly held against either radial or axial movement.

Another member **37**, also mounted on the periphery of the body **24** for axial movement relative thereto, is connected for unitary axial movement with the member **30** by the means of a threaded nut **38**, the threaded portions on the members **30** and **37** being respectively of opposite pitch whereby a rotation of the nut **38** adjusts the one member relative to the other, the nut being lockable with the respective members by the means of screws such as **39** and **40**.

The members **30** and **37** are unitarily urged to the left in Figs. 1 and 3 by the means of springs such as **41** abutting in one direction against the bottom of the bores **42** and in the other direction against pins **43** which are fixed in the member **37**. Unless prevented the springs **41** will urge the members **30** and **37** to the left until the left hand end of the member **37** strikes a shoulder portion **44** on spindle **8**. The members **30** and **37** may, however, be manually shifted to the right in Figs. 1 and 3 until a spring pressed plunger **45** engages the bore **46** of a bushing **47** fixed in the body **24**, and when this occurs the engagement of the plunger in the bore holds the member **37** in a predetermined position, determined by the plunger engagement.

When the plunger **45** is engaged in the bore **46** as described the threading device is ready for operation. Assuming that the pipe **5** has been suitably clamped in the holder **4**, and that the latch **21** has been moved into engagement with the slot **20**, then manual rotation of the worm shaft **15** will simultaneously rotate the die head **7** in a cutting direction and advance the die head to the right in Fig. 1 at a rate corresponding to the pitch of the threads to be cut, and determined by the pitch of the threaded portion **16** of the member **17**. This simultaneous rotation and axial movement is continued until the die head **7** has advanced sufficiently far to the right to cut the desired thread on the end of the pipe. Ordinarily the thread to be cut is of tapered form, as shown in Fig. 1.

Various differently threaded spindles **8** and members **17** may be interchangeably used to provide for pipe threads of different pitch and various sets of chasers such as **26** may be used for cutting threads on different diameters of pipe, the chaser sets being interchangeable in the die head **7** merely by removing the plate **27**, when the chasers may be readily withdrawn and replaced.

When the die head has been advanced axially, as described, a sufficient distance to produce the desired thread on the pipe **5**, the chasers **36** are automatically withdrawn radially from contact with the threaded portions of the pipe. This is effected by the following means: A ring or plate **48** is supported on a plurality of plungers **49** which are guided in the body **24** and normally urged to the right in Fig. 3 by the means of springs **50**. Plungers **49** operate against radially movable plungers **51** which are urged outwardly as the plungers **49** move to the left in Fig. 3, and after sufficient of such left hand movement the plungers **45** are disengaged from the bores **46** and the springs **41** then immediately urge the members **30** and **37** to the left, thereby moving each of the chasers **26** outwardly. The movement of the plungers **49** to bring this about is effected by the contact of the plate or ring **48** with the flange **4c** on the bushing **4b**, from which it will be seen that at a predetermined point, corresponding to the point at which the pipe is threaded to the desired extent the chasers **26** will be expanded, clearing the threads on the pipe to permit withdrawal of the die head **7**.

The die head **7** and spindle **8** is then withdrawn in the following manner. The latch **21** is manually moved to disengage from the slot **20**, a crank is applied to the squared end **23** as previously mentioned, and the member **17** is rotated. Spindle **8** is prevented from rotation when member **17** is rotated by the self-locking engagement of the worm wheel **10** with its worm, and the spindle and die head **7** are non-rotatably moved axially to the left to the starting position at a relatively very rapid rate since the rates between the crank and spindle does not involve the reduction effected by the worm and wheel, this reduction being necessary in the forward movement in order to permit the manual operation of the threading die. At the end of the left hand movement the latch **21** is again moved to engage notch **20**, the members **30** and **37** are manually shifted to the right until plunger **45** again engages the bore **46**, and the device is then ready for another threading operation.

If the size of the thread cut by the chasers **26** on the pipe **5**, as determined by the point at which the chasers are opened by plate **48**, is slightly too large or too small in diameter, the desired correction in thread diameter may be readily effected by the adjustment of the nut **38**. Adjusting the nut in the one direction will increase the thread diameter while adjustment of the nut in the other direction will produce the opposite effect.

What is claimed is:

1. In a threading device of the nature disclosed the combination of a base, a pipe clamping means supported from said base, a threading tool rotatably supported from said base adjacent said clamping means and axially movable, means supported from said base for simultaneously manually rotating and axially advancing said threading tool in the direction of said clamping means including a primary manually operable element, means supported from said base for axially non-rotatably moving said threading tool in the other direction including a second primary manually operable element, a plurality of motion transmitting trains carried by said base and respectively connecting the different elements for the different movements recited, the train for said other direction being adapted for relatively fast axial movement, and means carried by said base for rendering said means for axially moving the

threading tool in the other direction operative or inoperative.

2. In a threading device of the nature disclosed the combination of a base, a pipe clamping means supported from said base, a threading tool rotatably supported from said base adjacent said clamping means and axially movable, means supported from said base for simultaneously rotating and axially advancing said threading tool in the direction of said clamping means including a primary manually operable element, means supported from said base for non-rotatably axially moving said threading tool in the other direction including a second primary manually operable element, said means including a screw and nut element and a plurality of motion transmitting trains carried by said base and respectively connecting the different manually operable elements through said screw and nut element for the different axial movements recited, the train for said second manually operable element being adapted for relatively fast axial movement of said threading tool, and means carried by said base and shiftable to alternative positions respectively locking and unlocking rotation of one of said screw and nut elements.

3. In a pipe threading device the combination of a pipe clamping means, a threading means rotatably supported adjacent said clamping means and axially movable, means for simultaneously rotating and axially advancing said threading means in the direction of said clamping means including a primary manually operable element, means for axially moving said threading means in the other direction including a second primary manually operable element, said elements being connected for said movements by different motion transmitting trains and said connection for said second element being adapted for relatively fast axial movement of said threading means, means locking said threading means against rotation during axial movement in said other direction and means adjustable for locking said second element against operation.

4. In a pipe threading device the combination of pipe clamping means, a rotatable spindle supported for axial movement toward and from said clamp means and co-axial with a pipe clamped therein, a tool head fixed with said spindle adjacent said clamp means, a manually operable screw thread device directly operative on said spindle for axial non-rotatable movement thereof in a direction away from said clamp means, and a manually operable device for simultaneous rotation and axial movement of said spindle in the other direction including gearing for a material reduction in the relative rate of both axial and rotary movement therefrom, said gearing being of a form and ratio to lock said spindle against rotation during axial movement from the first mentioned manual device.

5. In a pipe threading device the combination of pipe clamp means, a spindle rotatably supported in axial alignment with a pipe held in said clamp means and axially movable toward and from said clamp means, a threading tool fixed on said spindle adjacent said clamp means, a member rotatably journaled co-axially with said spindle adjacent the end opposite said threading tool, said member being fixed against axial movement and threadedly engaging said spindle, a locking device shiftable between alternative positions respectively disengaged from said member to permit rotation thereof and engaging said member to prevent rotation thereof, a worm wheel mounted on said spindle to permit relative axial movement therebetween, a worm engaging said worm wheel, a shaft for said worm, and a plurality of primary manually movable elements respectively fixed with said member and with said shaft.

6. In a pipe threading device the combination of pipe clamp means, a spindle rotatably supported in axial alignment with a pipe held in said clamp means, and axially movable toward and from said clamp means, a threading tool fixed on said spindle adjacent said clamp means, a member rotatably journaled co-axially with said spindle adjacent the end opposite said threading tool, said member being fixed against axial movement and threadedly engaging said spindle, a locking device shiftable between alternative positions respectively disengaged from said member to permit rotation thereof and engaging said member to prevent rotation thereof, a worm wheel mounted on said spindle to permit relative axial movement therebetween, a worm engaging said worm wheel, a shaft for said worm, a plurality of primary manually movable elements respectively fixed with said member and with said shaft, a base unitarily supporting said device and means associated with said base for removably unitarily attaching said device to a support.

7. In a threading device the combination of a base, a rotatable and axially movable spindle carried by said base, a threading tool co-axially fixed at one end of said spindle for rotation and axial movement therewith, engaged screw and nut elements co-axial with said spindle, one of said elements being fixed with said spindle for rotation and axial movement therewith and the other element being rotatably carried by said base, means carried by said base and manually shiftable for engaging said other element to prevent rotation thereof and alternatively shiftable to disengage from said element to permit element rotation, a first manually operable train for forward cutting operation of said spindle when said shiftable means is in engaged position and including a primary manually rotatable shaft, a worm fixed against axial movement and a worm wheel fixed against axial movement and slidably splined with said spindle, a second manually operable train including a primary manually operable member connected for rotation of said other element when said shiftable means is in disengaged position.

8. In a threading device of the nature disclosed the combination of a base, pipe clamping means fixed with said base, a rotatable spindle carried by said base and guided for bodily movement in axial alignment with a pipe fixed in said clamping means, a threading tool carried by said spindle adjacent said clamping means, means carried by said base for manually rotating said spindle, means carried by said base and operative simultaneously with the spindle rotation to advance said spindle and threading tool in the direction of said clamping means, means carried by said base for rendering said simultaneously operative means ineffective, means carried by said base for manually non-rotatably axially moving said spindle and threading tool in the other direction while said simultaneous means is ineffective and means carried by said base for unitarily removably attaching said device to a support.

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