

Dec. 20, 1927.

F. M. DAVIS

1,653,258

SELF OPENING DIE FOR PIPE THREADING MACHINES.

Filed Nov. 3, 1924

4 Sheets-Sheet 1

Fig. 1.

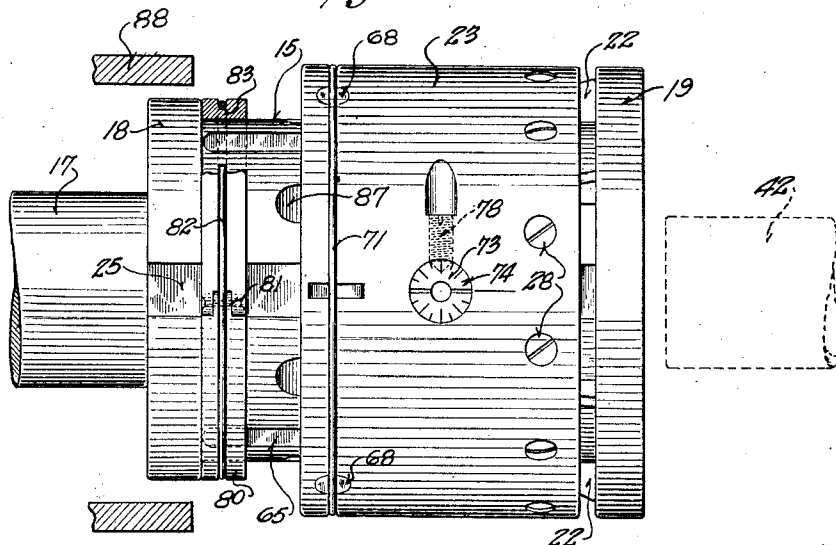


Fig. 2.

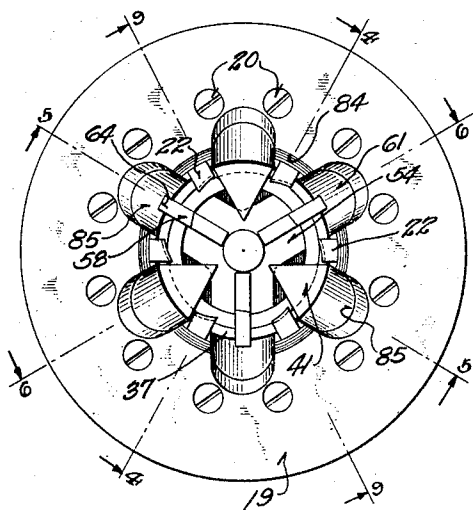
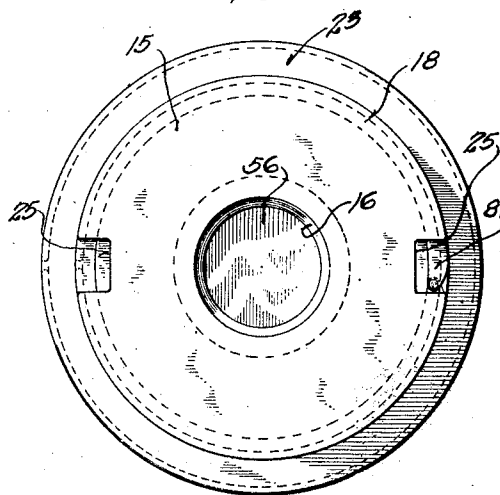


Fig. 3.



WITNESSES

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Fig. 4.

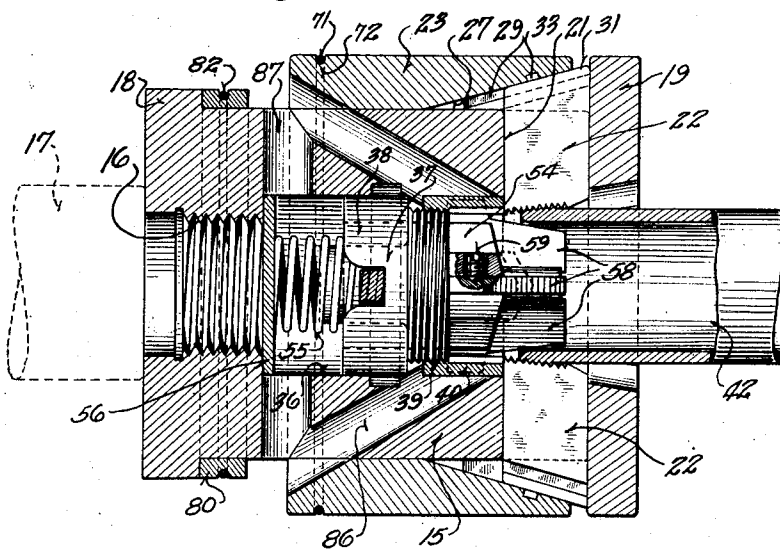
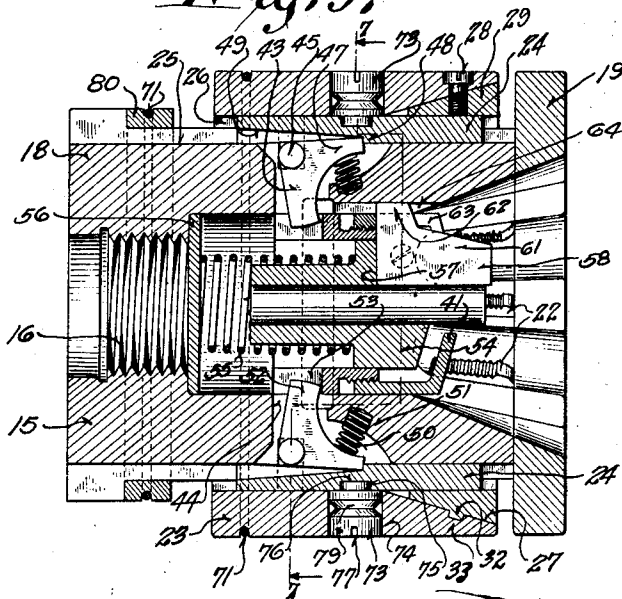


Fig. 5.



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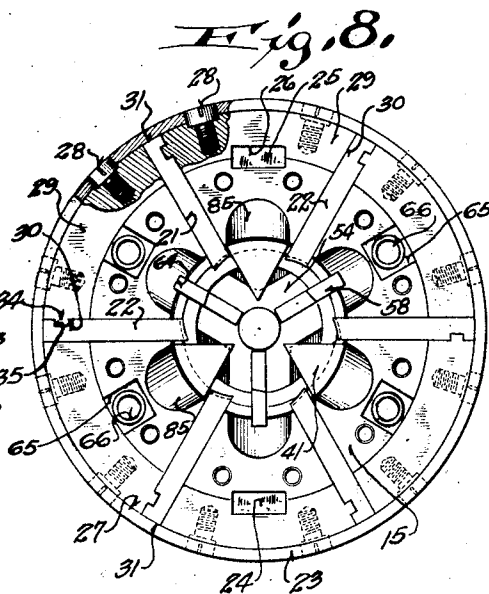
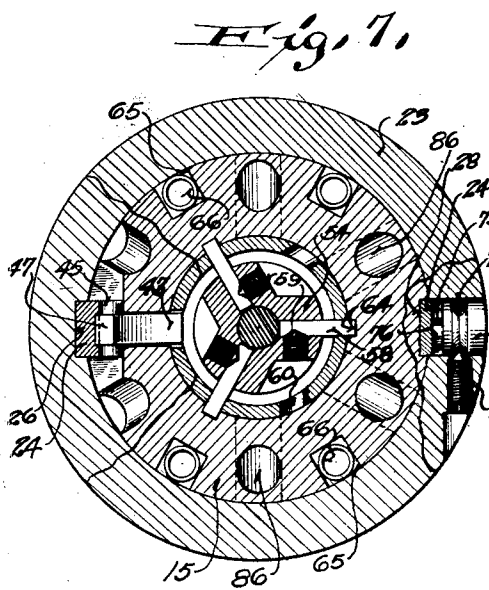
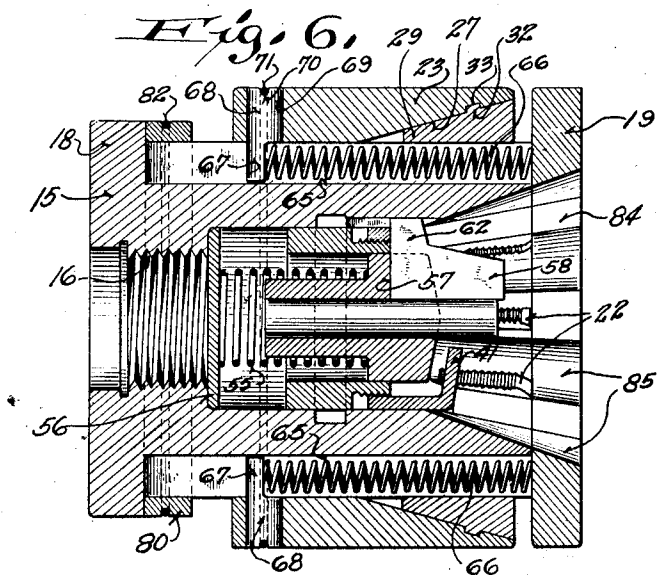
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4 Sheets-Sheet 3



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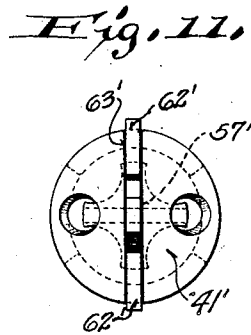
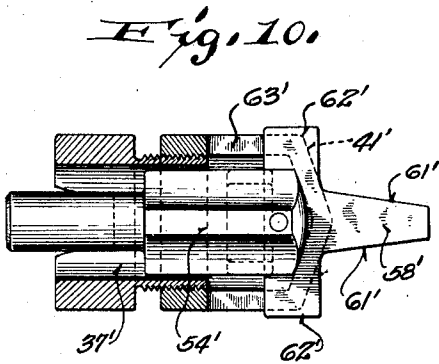
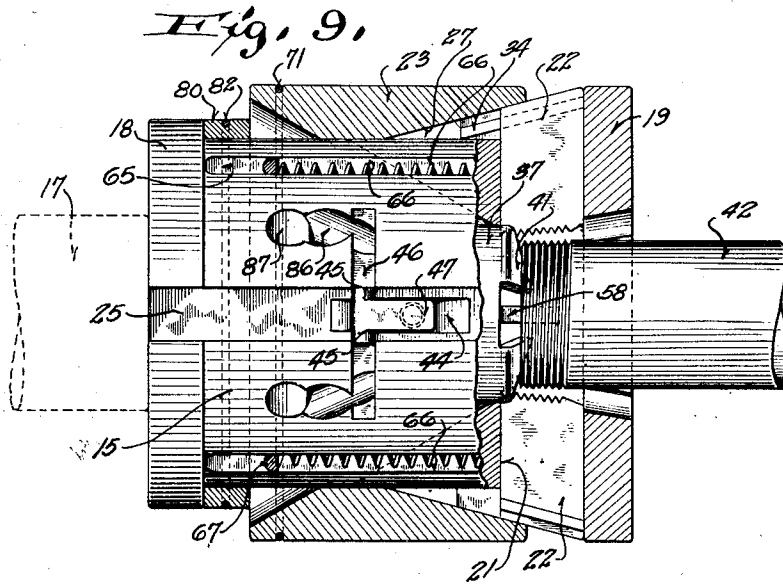
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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE.

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SELF-OPENING DIE FOR PIPE-THREADING MACHINES.

Application filed November 3, 1924. Serial No. 747,528.

The invention relates to thread cutting dies, more particularly for use on pipe-threading machines.

An object of the invention is to provide a thread-cutting die for pipe-threading machines and the like, which will open upon the completion of a predetermined length of thread on the work-piece to permit the work-piece to be withdrawn, and which will permit the cutting of different thread diameters.

Another object of the invention is to provide a thread cutting die of this character in which the chips cut from the work-piece are readily and continuously removed to prevent clogging which would render the device temporarily inoperative and unsuitable for use in quantity production machinery.

A further object of the invention is to perfect details of construction in a device of this character by which it may be readily assembled and dismantled, the parts being of rugged construction to insure reliable operation.

The invention further consists in the several features hereinafter set forth and more particularly defined by claims at the conclusion hereof.

In the accompanying drawings:

Fig. 1 is a side elevation of a device embodying the invention mounted on an arbor;

Fig. 2 is a front end view of the device;

Fig. 3 is a rear end view of the device;

Fig. 4 is a longitudinal section taken at the line 4—4 of Fig. 2, interior parts being shown in elevation;

Fig. 5 is a longitudinal section taken at the line 5—5 of Fig. 2;

Fig. 6 is a longitudinal section taken at the line 6—6 of Fig. 2;

Fig. 7 is a transverse section taken on line 7—7 of Fig. 5;

Fig. 8 is a front end view of the device with an end plate removed, parts being broken away and parts being shown in section;

Fig. 9 is a transverse section taken on the line 9—9 of Fig. 2, interior parts being shown in elevation;

Fig. 10 is a sectional detail view of a modified interior parts assembly; and

Fig. 11 is an end view thereof.

In these drawings 15 designates a rotatable die body of general cylindrical form having one end interiorly threaded at 16 to be

screwed onto an arbor 17 of a screw-cutting machine. The end of the die body adjacent the arbor is provided with an annular shoulder 18 and the forward end has secured to it a circular plate 19 by screws 20, the plate forming a shoulder at this end of the die body. The forward end of the die body is provided with radially extending slots 21 to receive thread-cutting chasers 22 slidably mounted therein, these being formed to cut pipe threads in the present instance, and the forward edges of the slots being defined by the front plate 19 to prevent other than radial movement of the chasers in their slots.

A sleeve member 23 is slidably mounted on the die body between the terminal shoulders and is splined thereto against rotation by longitudinally extending key members 24 disposed in registering grooves 25 and 26 at diametrically opposite portions of the die body and sleeve member, respectively. The forward portion of the sleeve member has a tapered bore 27 to the walls of which are secured by screws 28 spaced segmental members 29 which form guide slots 30 between them to receive the outer ends of the chasers 22, the outer edges 31 of which are inclined to lie adjacent the inclined edge of the slots formed by the tapered bore 27. The segmental members 29 are held in alignment by the engagement of circumferential ribs 32 with an annular groove 33 in the tapered bore and the inner walls of the segmental members form cylindrical surfaces engageable with the die body, as seen in Figs. 5 and 6. Ribs 34 are formed in one edge of each segmental member to project into the guide slots 30, where they enter grooves 35 in the chasers, as seen in Figs. 8 and 9, to form a cam connection effecting a radial movement of the chasers upon a longitudinal movement of the sleeve member, as hereinafter set forth.

The die body is provided with a central bore 36 in which a two-part tripping sleeve 37 is slidably mounted, the rear part 38 of the sleeve having a threaded connection 39 with the front part 40 to afford an adjustment in length and the front part having spaced inwardly extending inclined projections 41 adapted to engage the end of the pipe 42 being threaded.

A pair of trip levers 43 are disposed in apertures 44 connecting the central bore 36 and the diametrically opposite grooves 25

in the die body. These levers are in the form of bell cranks and are pivotally mounted by integral trunnions 45 disposed in slots 46 cut into the die body transversely of and projecting below the grooves 25. The forwardly projecting leg 47 of each lever is adapted to engage a shoulder 48 forming the end of a longitudinally extending groove 49 in the key member 24, into which the leg is urged by a coil spring 50 mounted in a recess 51 in the die body, and the inwardly extending leg 52 of each lever is adapted to engage the bottom of a slot 53 in the rear part of the tripping sleeve, the sleeve being limited in its forward movement by its abutment with the edges of the inwardly extending chasers 22.

For reaming the inner edge of the end of the pipe 42 to remove burrs therefrom and form a chamfer thereon, a blade-holder 54 is slidably mounted within the sleeve 37 and is urged forwardly by a spring 55 disposed within the bore 36 and abutting at its rear end against a circular plate 56 closing the end of the bore. At its forward end the blade-holder is provided with radially extending slots 57 to receive a number of reaming blades 58, three being used in the present instance, held therein by screws 59, and the sleeve being provided with openings 60 to afford access to the screws. The blades are provided with inclined cutting edges 61 for producing a chamfer and have radially extending projections 62 passing through slots 63 in the tripping sleeve and slidably mounted in grooves 64 in the die body so that the blades will rotate with the die body.

In the modified form of reaming device shown in Figs. 10 and 11, a single reaming blade 58' is provided which is riveted to the blade-holder 54' in a transverse slot 57'. The blade is provided with opposite inclined cutting edges 61' and has radially extending projections 62' adapted to be slidably mounted in the grooves of the die body to establish a driving connection. The tripping sleeve 37' is of two-part construction as above and has a conical forward end 41' for engagement with the pipe. The blade is disposed in a diametrically extending slot 63' in the tripping sleeve to permit relative movement between these parts. In each instance the two-part tripping sleeve is prevented from losing its longitudinal adjustment at the threaded connection by the trip levers and the blades retaining the rear and front parts, respectively, against rotation.

The sleeve member 23 is slidably mounted on the die body 15 for controlling the position of the chasers 22, as above described, and is under spring pressure urging it rearwardly. For this purpose longitudinally extending channels 65 are provided at the

periphery of the die body in which coil springs 66 are mounted having their forward ends abutting against the front plate 19 and their rear ends against the flattened inner ends 67 of radially extending pins 68 secured in bores 69 in the sleeve member and projecting into the grooves. For holding the pins in the sleeve member with their inner ends projecting properly into the grooves 65 the pins are provided with transversely extending slots 70 at their outer ends to receive a spring loop 71 extending around the sleeve member in an annular groove 72. Each key member 24 is adjustably secured to the sleeve member by an adjusting member 73 rotatably mounted in a radially extending bore 74 in the sleeve member and having an eccentrically disposed circular projection 75 which enters a transverse groove 76 in the key member. The outer end of the adjusting member is provided with a transverse slot 77 for receiving a screw driver or other tool, and suitable calibrations are placed at the periphery of the adjusting member for registry with a mark on the sleeve member to guide the operator in making an adjustment effecting variations in the cutting diameters of the chasers, by changing the normal forward position of the sleeve member. Each adjusting member is locked in position by a cone-point screw 78 threaded into the sleeve member at right angles to the adjusting member in a plane normal to the axis of the sleeve member and entering an annular groove 79 in the adjusting member.

When the sleeve member is urged forward against the action of the springs 66 to position the chasers for cutting the desired diameter of thread, the spring-urged trip levers 43 then engage the shoulders 48 in the key members 24 locked to the sleeve member 23 so that the latter is retained in its forward position. The rearward position of the sleeve member is determined by its abutment with an annular stop ring 80 engaging the shoulder of the die body and formed of two parts pivotally connected together at 81 to permit its ready removal after releasing a spring loop 82, which is disposed in an annular groove 83 in the two-part ring for holding it in place around the die body.

In order to prevent clogging of the die with chips, which would render the device inoperative and unsuitable for use in rapid work, provision is made for affording an outlet for the chips at various places on the device as they are flushed by the lubricant. The central opening 36 for receiving the end of the pipe at the forward end of the device merges with an outwardly flaring conical opening 84 which is provided with flutes 85 out of which the chips descend. Inclined bores 86 extend in the die body be-

tween central bore 36 just back of the chasers and continue outwardly across the rear edge of the sleeve member 23, and radial bores 87 extend through the die body from the rear portion of the central bore 36, so that no opportunity is given for the accumulation of chips.

In operation the pipe 42 is held against rotation, and the device is rotated and moved forward by its arbor to engage the chasers with the end of the pipe. The die then continues to move forward at a rate determined by the pitch of the thread being formed, the sleeve member taking the radial thrust of the chasers, which are held rigidly in place, and simultaneously the reaming blades 58 yieldingly engage the inner edge of the end of the pipe to clear it of burrs and form a chamfer thereon. When the pipe engages the forward conical end of the tripping sleeve 37 the latter is pushed backwardly to swing the trip levers 43 out of engagement with the shoulders 48 of the key members 24, the sleeve member 23 then being released and pushed rearwardly against the stop ring 80 by the springs 66. This movement of the sleeve brings the chasers clear of the pipe by the cam action of the ribs 34 in the grooves 35 of the chasers, so that the die may be withdrawn from the pipe to permit the latter to be removed from the machine. The die is placed in condition to thread the succeeding pipe by moving the sleeve member forwardly in position to have the key members 24 again engaged by the spring-urged trip levers 43. This movement of the sleeve member may be accomplished by a resetting member 88 adapted to be moved forwardly against it at the proper moment in the cycle of operation, or the die may be moved backwardly a sufficient distance to have the sleeve member engage a stationary abutment for this purpose. It is obvious that the die may be held stationary while the work rotates.

The chasers may be readily removed for sharpening or replaced by others for cutting different diameters after removing the stop ring 80, which permits the sleeve member to be moved back sufficiently to expose the outer edge of the chasers. The removal of the chasers permits the reamer and tripping sleeve assembly to be withdrawn from the bore 36 for attention to the blades when necessary, and when the front plate 19 is removed, the sleeve member 23 can be withdrawn, which exposes the trip levers 43, key member 24, and springs 50 and 66 for ready removal. The construction of the device likewise affords a rapid assembly and the parts are of rugged character for durability and strength, which enables the device to operate long periods of time without attention.

What I claim as new and desire to secure by Letters Patent is:

1. In a self-opening die for pipe-threading machines, the combination of a die body, chasers slidably mounted in said die body, a longitudinally shiftable sleeve member slidably mounted on said die body against relative rotation and having a conical bore at one end, an annular series of spaced wedge-shaped segmental members fixedly secured to said sleeve member within and abutting the conical bore and forming chaser-receiving cam slots between them for controlling the movement of said chasers in both directions, tongue-and-groove means for aligning said segmental members within said conical bore, spring means acting on said sleeve member for effecting a movement of said member to chaser-inoperative position, and tripping means retaining said sleeve member in chaser-operative position and controlling the movement of said sleeve member, whereby said chasers are moved to inoperative position to permit the release of the work after cutting thereon a predetermined length of thread.

2. In a self-opening die for pipe-threading machines, the combination of a die body, chasers slidably mounted in said die body, a longitudinally shiftable sleeve member slidably mounted on said die body and operatively connected to said chasers for controlling their movement in both directions, spring means acting on said sleeve member for effecting a rearward movement of said member to chaser-inoperative position, a removable stop member on said die body limiting the rearward movement of said sleeve member, and tripping means retaining said sleeve member in chaser-operative position and controlling the movement of said sleeve member, whereby said chasers are moved to inoperative position to permit the release of the work after cutting thereon a predetermined length of thread, and the removal of said stop member permitting an extended movement of said sleeve member to a chaser-inoperative position permitting the radial removal of said chasers from the die body.

3. In a self-opening die for pipe-threading machines, the combination of a die body, chasers slidably mounted in said die body, a longitudinally shiftable sleeve member slidably mounted on said die body and operatively connected to said chasers for controlling their movement in both directions, said die body and sleeve member having registering longitudinally extending grooves, key members in said grooves secured to said sleeve member and slidably disposed in the grooves of the die body, spring-urged trigger levers pivotally mounted in said die body and engageable with said key members for retaining said sleeve member in chaser-

operative position, spring means acting on said sleeve member for effecting a movement of said member to chaser-inoperative position, and a tripping member movably disposed within the die body and engageable with the work for swinging said trigger levers after a predetermined length of thread has been cut on the work, whereby said sleeve member is moved to chaser-inoperative position to permit the release of the work.

4. In a self-opening die for pipe-threading machines, the combination of a die body, chasers slidably mounted in said die body, a longitudinally shiftable sleeve member slidably mounted on said die body and operatively connected to said chasers for controlling their movement, said die body and sleeve member having registering longitudinally extending grooves, key members slidably mounted in said registering grooves and having transversely extending slots in their outer faces, adjusting members rotatably mounted in said sleeve member and having inwardly extending eccentric portions disposed in said transverse slots for varying the relative positions of said key members and sleeve member, means for locking said adjusting member in position, spring-urged trigger levers pivotally mounted in said die body and engageable with said key members for retaining said sleeve member in chaser-operative position, spring means acting on said sleeve member for effecting a movement of said member to chaser-inoperative position, a tripping member movably disposed within the die body and engageable with the work for swinging said trigger levers after a predetermined length of thread has been cut on the work whereby said sleeve member is moved to chaser-inoperative position to permit the release of the work.

5. In a self-opening die for pipe-threading machines, the combination of a die body, chasers slidably mounted in said die body, a longitudinally shiftable sleeve member mounted on said die body and operatively connected to said chasers for controlling their movement in both directions, spring means acting on said sleeve member for effecting a movement of said member to chaser-inoperative position, tripping means for controlling the movement of said sleeve member including a tubular member slidably mounted within the die body and having inturned parts adapted to engage the end of a pipe, a spring-urged blade-holder slidably mounted within said tubular member, cutting blades secured to said blade-holder for reaming the edge of the pipe by their yieldable engagement therewith and having radially-projecting parts passing through said tubular member and engaging said die body against relative rotation, the movement of said tubular

member by the work controlling the movement of said sleeve member to chaser-inoperative position to permit the release of the pipe after it has received a predetermined length of thread.

6. In a self-opening die for pipe-threading machines, the combination of a die body, chasers slidably mounted in said die body, said die body having a central conical fluted opening into which the chasers project and a central bore extending inwardly from said conical bore, a shiftable sleeve member mounted on said die body and operatively connected to said chasers for controlling their movement, spring means acting on said sleeve member for effecting a movement of said members to chaser-inoperative position, tripping means for controlling the movement of said sleeve member including a part slidably mounted in the central bore of the die body adjacent the inner ends of the chasers and engageable with the work for opening the chasers to permit the release of the work, and conduits connecting the central bore adjacent the chasers with the periphery of the die body, said conduits and said fluted conical central opening affording an outlet for the chips to prevent clogging of the die.

7. In a self-opening die for pipe-threading machines, the combination of a die body having a central opening, chasers slidably mounted in said die body, a longitudinally shiftable sleeve member slidably mounted on said die body and operatively connected to said chasers for controlling their movement in both directions, said die body and sleeve member having registering longitudinally extending grooves, key members slidably disposed in said grooves and secured to said sleeve member in longitudinally adjustable relation, spring means acting on said sleeve member for effecting a movement of said member to chaser-inoperative position, spring-urged trigger levers pivotally mounted in said die body by trunnions disposed in transversely extending slots in the periphery of said die body, said trigger levers having their outer portions engageable with said key members for retaining said sleeve member in chaser-operative position, spring means acting on said sleeve member for effecting a movement of said member to chaser-inoperative position, a tripping member axially movable within the die body and engageable with the work for swinging said trigger levers after a predetermined length of thread has been cut, whereby said sleeve member is moved to chaser-inoperative position to permit the release of the work.

8. In a self-opening die for pipe-threading machines, the combination of a die body having longitudinally extending spring-receiving channels in its periphery, chasers slidably

mounted in said die body, a longitudinally shiftable sleeve member splined to said die body and operatively connected to said chasers for controlling their movement in both
 5 directions, pins extending radially through said sleeve member and having flattened ends disposed within said channels, coil springs disposed in said channels and bearing against the flat end portions of said pins for effecting
 10 a movement of said sleeve member to chaser-operative position, a spring-loop surrounding said die body and engageable with the ends of said pins for retaining them in said sleeve member, and tripping means retaining said
 15 sleeve member in chaser-operative position and controlling the movement of said sleeve member whereby said chasers are moved to inoperative position to permit the release of the work after cutting thereon a predetermined length of thread.

9. In a self-opening die for pipe-threading machines, the combination of a cylindrical die body having an annular shoulder thereon adjacent its rear end and longitudinally extending channels open along the periphery
 25 of said body, chasers slidably mounted in said die body, a front-plate secured to said die body and forming the forward ends of said channels, a longitudinally shiftable
 30 sleeve member splined on said die body against relative rotation by parts extending into some of said channels, said sleeve member having cam connections with the outer ends of said chasers for controlling the move-
 35 ment of said chasers in both directions, projections secured to said sleeve member and extending inwardly into others of said channels, coil springs disposed in said last named channels between said projections and said
 40 front-plate for effecting a movement of said sleeve member to a chaser-inoperative position determined by the annular shoulder on said die body, and tripping means retaining said sleeve member in chaser-operative position
 45 and controlling the movement of said sleeve member, whereby said chasers are moved to inoperative position after cutting a predetermined length of thread to permit the release of the work.

10. In a self-opening die for pipe-threading machines, the combination of a die body, chasers slidably mounted therein, a shiftable sleeve member slidably mounted on the
 50 die body for controlling the movement of said chasers, spring means acting on said sleeve member for effecting movement of

said member to chaser-inoperative position, tripping means for controlling movement of said sleeve member including a two-part
 60 tubular member slidably mounted within the die body and adjustable in length by a threaded connection, the front part of said tubular member being adapted to engage the end of a pipe, a spring-urged blade-holder
 65 slidably mounted within said tubular member, and a cutting blade secured to said blade-holder for reaming the end of the pipe by its yieldable engagement therewith, said tubular member and die body having slots for receiving the cutting blade to prevent the relative
 70 rotation of the said several parts, and the movement of said tubular member by the work controlling the movement of said sleeve member to chaser-inoperative position to permit the release of the pipe after it has received a predetermined length of thread.

11. In a self-opening die for pipe threading machines, the combination of a die body having longitudinally-extending spring-receiving channels open along its periphery
 80 and at its forward end, chasers slidably mounted in said die body, a longitudinally shiftable sleeve member slidably mounted on said body and operatively connected to said chasers for controlling their radial movement, projections on said sleeve member extending inwardly into said channels for movement therein, a front plate detachably secured to said die body and enclosing the forward ends of said channels, coil springs
 85 disposed in said channels and acting between said front plate and said projections for effecting the rearward movement of said sleeve member to chaser-inoperative position, and means retaining said sleeve member in
 90 chaser-operative position and controlling the movement of said sleeve member to chaser-inoperative position.

12. In a self-opening die for pipe threading machines, the combination of a die body
 100 having a central recess including peripheral longitudinally-extending grooves, chasers movably mounted in said die body and retained in normally operative position, and spring-pressed cutting blades slidably mounted
 105 at their edges in said grooves against relative rotation with respect to said die body and adapted for reaming the end of a pipe received in the die body.

In testimony whereof, I affix my signature.

FRANK M. DAVIS.