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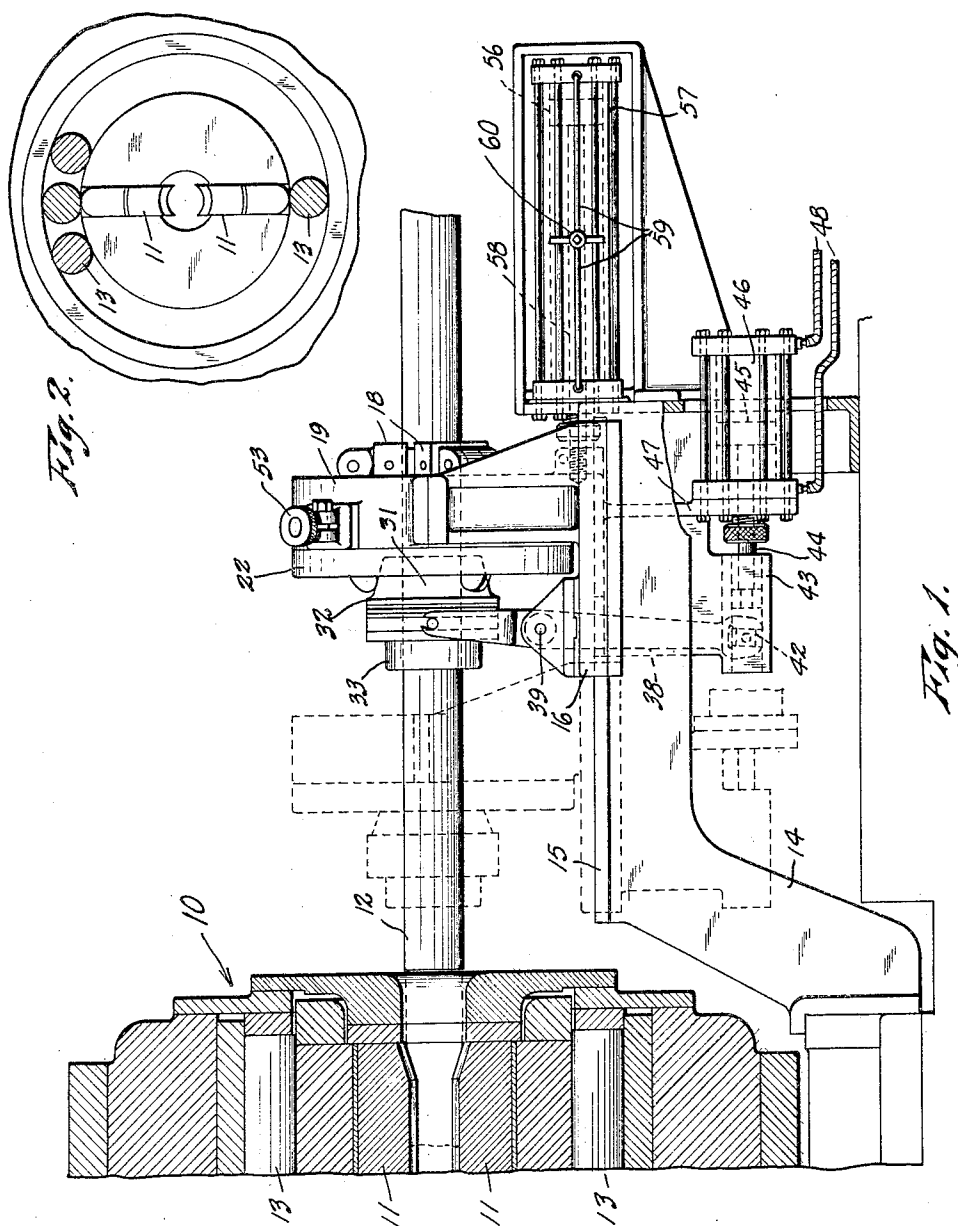
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FEED MECHANISM FOR SWAGING MACHINES

Filed March 27, 1930

3 Sheets-Sheet 1



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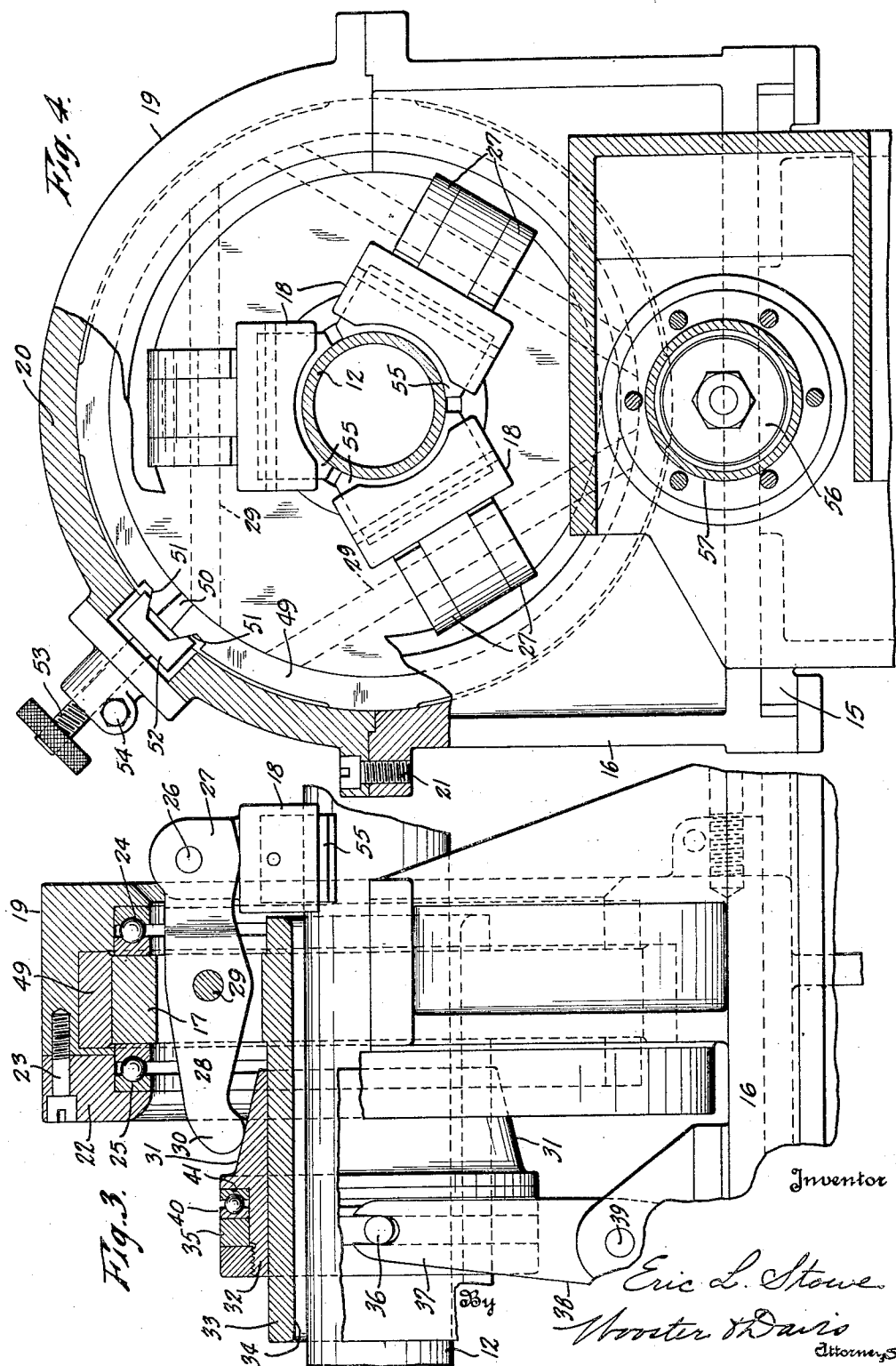
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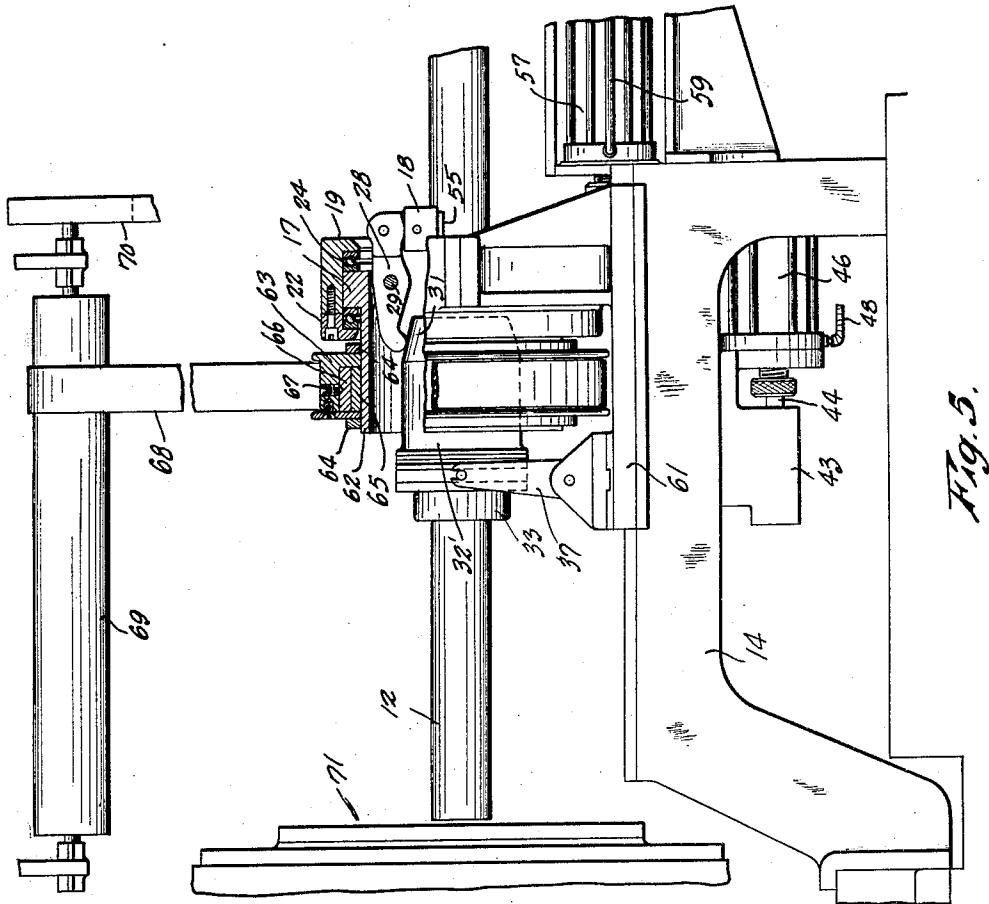


Fig. 3.

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FEED MECHANISM FOR SWAGING MACHINES

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This invention relates to a work holding and feeding means for use in connection with swaging machines for pointing tubes, bars and the like. At the present time, in the use of these swaging machines which comprise a series of small hammers or jaws so manipulated as to rapidly apply blows or pressure to the end of the tube or bar to reduce or point it for insertion in drawing dies and the like, it is common practice for the workman to grip or hold the tube or bar while inserting the end into the swaging machine. This, however, is a difficult operation and is very fatiguing to the operator and requires skill in holding it in proper position particularly when swaging large tubes and the like. Also considerable strength is required to properly hold and manipulate the work. It is, therefore, an object of the present invention to provide an easily operable mechanism for properly and securely holding the work such as a tube or bar in its proper relation to the swaging mechanism and to force it into this mechanism to secure the swaging operation.

During the swaging operation, there should be a relative rotary movement between the swaging mechanism and the work in order to produce a uniform and even swaging operation on all sides of the tube or bar. Ordinarily, the swaging mechanism includes a pair of swaging jaws which are rapidly forced against and removed from the work by suitable mechanism in such a manner as to impart blows by the jaws to the work, and in order to prevent the formation of fins on the work and to give a uniform and smooth surface it will be evident that there should be no relative turning movement between the swaging jaws and the work while the jaws are in engagement with or gripping the work, but there should be relative turning movement between the work and the jaws when the jaws are moved away from or have released the work between blows, so that the next blow will be against a different portion of the work.

It is, therefore, another object of the invention to provide an improved feed mechanism in which this desired relative turning

movement between the swaging jaws and the work is automatically produced and automatically regulated to give a uniform, smooth finished surface to the pointed or swaged end of the tube or bar.

With the foregoing and other objects in view, this invention consists in certain novel features of construction, combinations and arrangements of parts as will be more fully disclosed in connection with the accompanying drawings forming a part of this specification. In these drawings

Fig. 1 is a side elevation of one form of my improved mechanism shown as applied to a swaging machine having a rotating head, a portion of this head being shown in section and somewhat diagrammatically.

Fig. 2 is a section showing somewhat diagrammatically one form of swaging mechanism.

Fig. 3 is a partial side elevation and a partial vertical section of the supporting head and associated parts for carrying the work.

Fig. 4 is a partial transverse section and a partial elevation thereof looking from the right of Fig. 3, and

Fig. 5 is a side elevation, with certain parts shown in section, of a somewhat modified form of feed mechanism which may be used with a swaging machine in which the swaging head does not rotate.

The invention consists generally of a means for properly gripping the work, such as a tube or bar, holding it in alignment with the swaging mechanism, automatically advancing the work into the swaging mechanism as the swaging operation proceeds, and either causing or permitting regulated relative rotation between the work and the swaging mechanism when the jaws are released from the work and prevent relative rotation between the work and the swaging mechanism when the jaws are in engagement with the work. There are several arrangements whereby this relative rotation and control can be secured. At the present time there are two general types of swaging machines used for this type of work. In this first type the swaging mechanism or head carrying the

swaging jaws rotates about the axis of the for this type of work. In the first type the head and jaws do not have any rotary movement about the axis of the tube being swaged. Therefore, in feeding the work to these different types of swaging machines, somewhat different types of feed mechanism should be used to secure the relative turning movements between the swaging jaws and the work. In the first instance where the swaging head rotates, I prefer to use means for frictionally holding the work, such as the tube being swaged, so that it will not turn when the swaging jaws are released from the work, but will turn against this friction when the swaging jaws are clamped on the work.

In the second type where the swaging jaws do not rotate with respect to the work, means is provided for turning the work through a friction drive so that the tube is held stationary against this friction when the swaging jaws are clamped onto the work and is rotated by this friction when the swaging jaws are released from the work. I have illustrated forms of feed devices in the accompanying drawings which operate according to both of these arrangements.

Referring first to the form shown in Figs. 1 to 4 inclusive, the swaging mechanism is represented as a whole by numeral 10 and is of the type in which the swaging head carrying the swaging jaws indicated at 11 rotates about the axis of the tube or bar being swaged or pointed indicated at 12. I have not shown this swaging mechanism in detail as it of itself forms no part of my invention and it may comprise any of the usual types in which relative rotation of the head carrying the jaws 11 and a plurality of rollers 13 cause the jaws to reciprocate in and out by camming action on the rollers on the outer ends of the jaws or driving means connected therewith so as to reciprocate them toward and from the work, indicated at 12, to impart the requisite blows to the tube or bar to swage the end of the tube and reduce its diameter or point it for the proper length desired. It will be evident that the feeding mechanism must be capable of advancing the work into the swaging mechanism and to the proper position between the jaws at the correct speed to secure the required swaging operation, and also for a round pointed end there must be relative turning movement between the swaging jaws and the work so there will be a uniform swaging operation on all sides of the work. In the present arrangement, a supporting bracket 14 is connected to the swaging machine and has a guide way 15 running parallel to the axis about which the swaging mechanism rotates. Mounted on this guide-way is a sliding block 16 carrying a rotating head or support 17 for suitable holding jaws 18 for gripping the work, such

as the tube or bar 12. The head 17 is mounted to rotate in a suitable housing 19 carried by the block 16, and this housing may comprise several sections. As shown, the present construction includes an upper or cap section 20 secured to the lower section by suitable screws 21 in such a manner that it may be removed to permit easy mounting and removal of the rotating head or support 17 and associated elements. The housing 19 is closed on one side by the ring 22 secured thereto by any suitable means such as the screws 23 to retain the various elements in the housing 19.

The head or support 17 rotates in the housing between suitable ball thrust bearings 24 and 25 and carries any desired number of the holding or gripping jaws 18 for the work 12. In the present construction, there are three of the jaws shown and they are pivotally mounted at 26 between the forks 27 on levers 28, these levers being pivotally mounted in the head 17 on transverse pins 29. The opposite ends 30 of these levers are rounded and engage the inclined cam surface 31 of the block 32 slidably mounted on the tubular extension 33 of the block 17. This extension and block has a central passage 34 through which the work 12 passes. Mounted on the block 32 is a collar 35 having trunnions 36 engaged in forked arms 37 of a lever 38 pivoted in the block 16 at 39. The block 32 may rotate in the collar 35 and there is a ball thrust bearing 40 between this collar and a shoulder 41 on the block 32. The block 32 is reciprocable on the extension 33 through the action of lever 38. At its lower end, this lever is forked to straddle the reciprocable block 42 mounted in an extension 43 of the block 16 and connected to the piston rod 44, which in turn is connected to the fluid operated piston 45 in a cylinder 46 also mounted to move with the block 16, it being shown as mounted on the downwardly extending portion 47 of this block. Suitable flexible pipes 48 communicate with the cylinder on opposite sides of the piston 45 to supply suitable fluid such as compressed air for operating the piston, and controlled by suitable valve mechanism not shown.

Surrounding the rotatable head or support 17 is a friction ring 49 which is split at one or more points 50 and associated with suitable means for adjusting the friction of this ring on the head 17. Thus, it may have inclined cam surface 51 cooperating with similar cam surfaces on a movable block 52 operated by an adjusting screw 53. By adjusting screw 53, the friction between the ring 49 and the head 17 may be adjusted as desired. After adjustment the screw may be clamped in adjusted position by clamping screw 54. If desired, friction ring 49 may be lined with fibrous brake lining material. The holding jaws 18 may clamp the work 12

direct, but it is preferred to make these jaws recessed to carry gripping blocks 55 of some such material as wood, bakelite or fibre to grip the work 12 as they are less likely to mar the surface. These blocks can also provide the friction between the holding mechanism and the work 12 to permit the slipping of the tube or rod while this work is held by the swaging or pointer jaws as will be more fully described later.

The block 16 is shifted along the guide 15 by suitable power mechanism. In the present instance, a fluid operated piston 56 in a cylinder 57 is connected to any suitable support as the bracket 14. The piston is connected by a piston rod 58 to the block 16 whereby to reciprocate this block and the mechanism carried thereby along the guide 15 toward and from swaging or pointing mechanism. This piston 56 is preferably hydraulically operated as by water or oil under suitable pressure supplied through suitable pipes 59 connected to opposite ends of the cylinder from a suitable pump or other supply means, not shown, and controlled by any suitable valve 60.

In operation, the work such as a tube or bar 12 is inserted through the head 17 between the jaws 18 as indicated in full lines, Fig. 1, the block 16 being retracted to the outer end of the guide 15. Air pressure is then applied to the piston 45 causing it to move to the left and shift the block 32 to the right. Action of the cam surface 31 of this block on the curved ends 30 of the levers 28 will clamp the jaws 18 and the gripping blocks 55 onto the work with a pressure depending on the pressure applied to the piston. Pressure is now applied to the piston 56 which shifts the block 16 with other mechanism and the work carried thereby toward the swaging or pointer head 10. The piston 56 feeds the end of the tube 12 into the pointer mechanism at the proper speed and holds it against being forced out by the pressure of the swaging jaws. As indicated above, while the swaging jaws are clamped onto the work, this work should be permitted to turn with them. This is permitted by the friction ring 49, but as soon as the pointer jaws release the work, this friction ring 49 holds the head 17 against rotation and, therefore, during this time the swaging jaws rotate a small amount relative to the work and on their next operation grip the work at a different position about its periphery. These operations are carried on continuously during the swaging or pointing operation, the tube alternately turning a small amount with the head 17 in the friction ring 49 and being held by this friction ring against rotation. Thus, there is no relative movement of the swaging jaws while they are clamped against the work, but their relative movement is secured entirely between blows. This prevents forma-

tion of burrs on the tube and gives a uniform smooth surface on all sides. The desired friction between the tube and the holding means may be secured at the gripping blocks 55. Thus, by controlling the gripping pressure the tube may turn relative to these jaws while gripped by the swaging jaws and be held by these jaws against turning when the swaging jaws release the work, but it is preferred to have the head 17 turn in the friction ring 49 as this action is less likely to mar the surface of the tube. After the tube is properly pointed, it is retracted away from the swaging mechanism by the piston 56 and then can be released by shifting the piston 56 to the right to permit its removal, and the insertion of a new tube.

In Fig. 5 is shown a modified construction for use with a swaging machine in which the swaging head and jaws do not rotate about the axis of the work. In this construction, the tube holding means is mounted on a slidable block 61 similar to the block 16 carrying the housing 19 and a rotatable head or support 17 for the jaws 18 and levers 28. In this construction, the head or support 17 may have a cylindrical extension 62 on which is rotatably mounted a flanged pulley 63, the pulley being held on this extension by suitable collars 64 which may be pinned or otherwise secured to the extension. The pulley 63 embraces a friction ring 65 similar to the ring 49 of the first form engaging the extension 62. This may be adjusted by a cam block 66 similar to the cam block in the first form, the adjustment being secured through an adjusting screw 67. Pulley 63 is driven by a belt 68 from a long cylindrical pulley or drum 69 driven from any suitable source of power as by a belt 70. In the use of this device, the work 12 is gripped by the jaws 18 the same as in the first device through action of the cam surface 31 on the block 32' operated by the piston 45 the same as in the first form. However, as the swaging head indicated at 71 does not rotate, about the axis of the work 12, relative rotation between this work and the swaging mechanism is secured through the pulley 63 and its driving mechanism. Thus, when the work 12 is gripped by the jaws of the swaging mechanism 71, it will be held against rotation as the pulley 63 may rotate against the friction of the friction ring 65, or the belt 68 may be sufficiently loose to slip on the pulleys or the blocks 55 in jaws 18 can slip on the tube 12. When the tube is released by the swaging jaws it is given a certain rotation through the drive belt 68, pulley 63, friction ring 65 and jaws 18, and so giving in effect the same operation as in the first form of the device. In this form the tube is advanced into the swaging mechanism by a piston in the cylinder 57 advancing the block 61 and with it the gripping jaws and

pulley mechanism 63 toward the swaging mechanism, the belt 68 moving along the drum 69 during these movements of the block 61 and the mechanism carried thereby. It will be apparent that while I have shown and described my invention in the preferred forms, many changes and modifications may be made in the structures disclosed without departing from the spirit of the invention defined in the following claims.

Having thus set forth the nature of my invention, what I claim is:

1. A feed mechanism for a swaging machine including jaws for swaging the end of a tube or the like, comprising means for gripping the tube, means for advancing the gripping means toward the swaging jaws to feed the tube forwardly, and means operating through friction for causing relative turning movement between the swaging means and the tube when the swaging jaws are not gripping the tube and adapted to slip against said friction to permit them to maintain the same relative position when the jaws grip the tube.

2. A feed mechanism for a swaging machine for tubes and the like having a swaging means rotatable about the axis of the tube, comprising a support for the tube movable toward and from said swaging means, rotatable means on the support for gripping the tube, and means operating through friction to resist turning movement of said means and adapted to slip against said friction to permit turning movement.

3. A feed mechanism for a swaging machine for tubes and the like having a swaging means rotatable about the axis of the tube, comprising a guide means extending longitudinally of the tube, a support mounted to slide on said guide, jaws on the support for gripping the tube, a mounting for the jaws rotatable on the support, means operating through friction to resist rotation of the mounting and adapted to slip against said friction to permit rotation of the mounting, and means for advancing the support toward the swaging means.

4. A feed mechanism for a swaging machine for tubes and the like having a swaging means, comprising a guide means extending longitudinally of the tube, a support mounted to slide on said guide, jaws on the support for gripping the tube, a mounting for the jaws rotatable on the support, means operating through friction and adapted to slip against said friction for controlling the rotation of said mounting, and means for advancing the support toward the swaging means.

5. A feed mechanism for a swaging machine for pointing tubes and the like having a swaging means, comprising a movable support, jaws on the support for gripping the tube, a mounting for the jaws rotatable on

the support, means operating through friction and adapted to slip against said friction for controlling the rotation of said mounting, and means for shifting the support toward and from the swaging means.

6. A feed mechanism for a swaging machine for pointing tubes and the like having a swaging means, comprising a movable support, jaws on the support for gripping the tube, a mounting for the jaws rotatable on the support, means operating through friction and adapted to slip against said friction for controlling the rotation of said mounting, means for operating said jaws, and a fluid operated piston for shifting the support toward and from the swaging means.

7. A feed mechanism for a swaging machine for pointing tubes and the like having a swaging means, comprising a movable support, a rotatable mounting on the support, means operating through friction and adapted to slip against said friction for controlling the rotation of said mounting, jaws in said mounting for gripping the tube, a fluid operated piston for operating said jaws, and power means for shifting said support toward the swaging means to feed the tube to said latter means.

8. A feed mechanism for a swaging machine for pointing tubes and the like having a swaging means, comprising a movable support, a rotatable mounting on the support, means operating through friction and adapted to slip against said friction for controlling the rotation of said mounting, jaws in said mounting for gripping the tube, a slidable cam means in said mounting for operating the jaws, a fluid operated means for shifting the cam, and a power means for shifting the support toward the swaging means to feed the tube to said latter means.

9. A feed mechanism for a swaging machine for pointing tubes and the like having a swaging means, comprising a movable support, jaws on the support for gripping the tube, a mounting for the jaws rotatable on the support, means operating through friction and adapted to slip against said friction for controlling the rotation of said mounting, means for adjusting the friction to vary its effect on the rotation of the mounting, and power means for shifting said support toward the swaging means to feed the tube to said latter means.

10. A feed mechanism for swaging or pointing machines for tubes or bars including jaws movable laterally toward and from the tube or bar and also rotatable about the axis of the tube or bar, comprising means for gripping the tube or bar, means for advancing said gripping means toward the jaws, and means operating through friction to hold the gripping means against turning when the tube or bar is released by the jaws and adapted to slip against said friction to permit turn-

ing of the gripping means when the tube or bar is gripped by the jaws.

11. A feed mechanism for a swaging machine having means for swaging the end of a tube or the like including jaws rotatable about the axis of the tube or bar, comprising a support for the tube movable toward and from the swaging means, means for advancing said support toward the swaging means, means on the support for gripping the tube, means operating through friction for preventing turning movement of the tube when the swaging means is not in engagement with the tube and adapted to slip against said friction to permit turning movement of the tube or bar when the swaging means engages the tube.

12. A feed mechanism for a swaging machine for pointing tubes and the like having a swaging means, comprising means operating through friction for turning the tube relative to the swaging means when the latter means is not gripping the tube and adapted to slip against said friction to permit them to maintain the same relative positions when it is gripping the tube, and means for feeding the tube into the swaging means.

In testimony whereof I affix my signature.

ERIC L. STÖWE.

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