Fig. 1
UNITED STATES PATENT OFFICE

2,422,849

SCREW THREADING MACHINE

Werner Plagemann, Berlin, Germany: vested in the Attorney General of the United States

Application October 7, 1940, Serial No. 308,152
In Germany October 11, 1939

4 Claims. (Cl. 80—6)

1

My invention relates to improvements in screw-threading machines, and more particularly in screw-threading machines of the type comprising externally screw-threaded roller dies placed one beside the other, and adapted to be rotated in the same direction for rolling a screw thread into a blank placed between the same. A machine of this type has been described in the copending application for patent of Wemhöner and Plagemann, Ser. No. 214,733, filed June 20, 1938, now Patent No. 2,257,253, issued September 30, 1941. In machines of this type the diameter of the screw threads of the roller dies is in such relation to the diameter of the threads to be rolled, the pitch of the said threads and the number of the threads, that there is no axial displacement of the blank being rolled. Further, in the said machine means are provided for advancing the roller dies relatively to each other while the blank is being rolled.

One of the objects of the improvements is to provide a machine in which non-threaded supporting means for the blank being rolled are dispensed with. Another object of the improvements is to provide a machine which is capable of heavy work, and by means of which blanks of a diameter of more than 60 millimeters may be rolled, and by means of which the threads may be rolled in a material having a strength of about 130 kg. per square millimeter. With these objects in view my invention consists in providing more than two externally screw-threaded rollers simultaneously engaging the blank, one or more of the said rollers being provided with means for advancing the same towards the blank while the said blank is being rolled.

For the purpose of explaining the invention an example embodying the same has been illustrated in the accompanying drawings in which the same reference characters have been used in all the views to indicate corresponding parts. In said drawings.

Fig. 1 is a top plan view of the machine partly in section and
Fig. 2 is a sectional elevation taken on the line of Fig. 1.

In the machine shown in the said application for patent, the roller dies are disposed with their axes horizontal. In the machine shown in the annexed drawing, the roller dies are disposed with their axes vertical. But I wish it to be understood that my invention is not limited to this feature. Further, in the aforesaid machine mechanism has been described for driving the roller dies, the said mechanism being constructed so that the roller dies may be advanced towards the blank being rolled without interfering with the transmission of the rotary movement. Further, means have been described for adjusting the roller dies relatively to each other in axial direction and also angularly of each other. It will be understood that also in the improved machine driving mechanism and adjusting means of similar construction are provided.

In the example shown in the drawing a machine has been illustrated which is provided with three roller dies 1 mounted on vertical axes 2 and disposed so as to be able to act on a blank 3 placed between the same. The said axes are connected with driving mechanism for rotating the same in the same direction, and the said driving means are constructed so as to permit radial displacement of the roller dies towards and away from one another.

In the example shown in the drawings my improved machine comprises a frame 21 carrying a bed plate 10. Near its bottom the said frame is cast integral with a horizontal plate 23. In the said plate a shaft 26 is rotatable which has a gear wheel 27 fixed thereto. The said gear wheel is in mesh with three gear wheels 28 each fixed to a vertical shaft 29. To the shaft 26 a bevel-gear 30 is keyed which is in mesh with a bevel-gear 31 keyed to a horizontal driving shaft 32 mounted in bearings 33 connected to a suitable source of power.

The axes 2 are connected with the vertical shafts 29 by any known or preferred mechanism permitting the said movements of the axes 2. As shown, the shafts 2 and 29 are connected each to a disk 35 and 36 having a disk 38 located between the same. The disks 36, 37 and 38 are provided respectively with interengaging diametrical ribs and slots 39 and 40, the ribs and slots at the opposite sides of the disk 37 being disposed transversely of each other. As shown, the said disks have a certain clearance between the same permitting slight angular movements of the axes 2.

The roller dies are rotatably mounted in slides 5 which are vertically adjustable in blocks 6, screws 8 being provided for thus adjusting the said slides within the blocks 6. The blocks 8 are pivotally mounted on shafts 7 fixed in eyes 8 rising from a slide 9 guided in suitable guide ways provided on a bed plate 10. The blocks 4 are adapted to be slightly pivoted about the axes 7 for setting the same into positions with the axes 2 parallel to each other, and after being set they are fixed in position on the slides 9. As shown, setting screw bolts 11 are passed through bores
made in the slide 3 and the said bolts are formed with heads 12 engaging in sockets of the block 5. On the screw bolts 11 indicating collars 13 are located. After the blocks 5 have been set they are fixed in position by means of screws 14 to the heads of which engage in sockets made in the blocks 5.

The slides 9 are adapted to be moved towards the blank 2 by means of pistons 16 which are slidable in cylinders 18 fixed to the bed 10 and having a supply of a suitable non-elastic fluid under pressure through supply pipes 17 and 18. The rods 19 of the pistons are fixed to the slide 9, and within the cylinders springs 20 are located which tend to retract the slides 9 outwardly and away from the blank 2.

The pipe 16 includes a valve 18' which controls the supply of pressure fluid to all the cylinders 16.

The operation of the machine is as follows:

The roller dies are set in the proper positions by means of the screws 6 and 11, 12, 14, whereupon a blank 2 is placed between the same. Fluid is supplied to the cylinders 16 through the pipes 17, 18 until the dies engage the blank 2 with their screw threads. Now the driving mechanism is set into operation for rotating the roller dies 1, while the pressure of the fluid acts on the slides 9. Thus the screw threads of the roller dies are gradually forced into the blank being rotated. When the threads have been made in the blank to the desired depth the operation of the machine is interrupted, for which purpose automatic means are preferably provided such as have been described in the aforesaid application for patent of Wemhöner and Plagemann.

From the above description it will be understood that all the roller dies are advanced towards one another and towards the blank while they are in rolling operation. But I wish it to be understood that my invention is not limited to the method of operation described herein and that the machine may also be operated in such a way that only one of the roller dies is movable, while the bearings of the other roller dies are stationary, or that two roller dies are movable towards and away from the blank, while the bearing of the third roller die is stationary. To illustrate this method of operation additional valves 22 have been shown, by means of which one or two sets of cylinders 16 mounted on the slides 9 may be disconnected from the supply of pressure fluid after they have been brought into positions with the threads of their roller dies into engagement with the blank.

I claim:

1. In a screw threading machine, the combination of a plurality of rotary thread rolling dies adapted to thread a blank received between the same; a bed plate; a mounting for each of said dies comprising a supporting member slidable on said plate, a carrier member pivoted on said supporting member, a yoke adjustable on said carrier member, and a shaft journaled in said yoke, on which the die is mounted; means to slide each of said supporting members; and means to rotate said shafts.

2. A thread rolling machine comprising three rotatable roll dies arranged to roll simultaneously the entire thread length on a work blank rotatably supported therebetween and to hold the blank axially immovable relative to the dies during the thread rolling operation, mechanism for rotating the dies positively and in synchronism, mechanism for moving each die progressively toward the work axis to cause a controlled rate of penetration as the work rotates and means for tilting each die axially to roll tapered work and to control the straightness thereof.

3. A thread rolling machine comprising three rotatable roll dies arranged to roll a thread on and to hold axially immovable a work blank rotatably supported therebetween, mechanism for rotating the dies positively and in synchronism, mechanism for moving all of the dies progressively and directly towards the work axis through equal distances and at a controlled rate to cause a progressive and gradual penetration of the entire thread length of the work as it rotates through a multiplicity of turns, precision mechanism for adjusting the innermost positions of die movement so as to roll threads on work blanks of different diameters and means for moving each of the dies axially for matching the threads thereof.

4. A thread rolling machine comprising three rotatable roll dies arranged to roll simultaneously the entire thread length on a work blank rotatably supported therebetween and to hold the blank axially immovable relative to the dies during the thread rolling operation, mechanism for rotating the dies positively and in synchronism, mechanism for moving each die progressively toward the work axis to cause a progressive penetration of the work as the work rotates and means for tilting each die axially to roll tapered work and to control the straightness thereof.

WERNER PLAGEMANN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>182,796</td>
<td>Suff</td>
<td>July 3, 1877</td>
</tr>
<tr>
<td>412,082</td>
<td>Forsyth</td>
<td>Oct. 1, 1889</td>
</tr>
<tr>
<td>568,994</td>
<td>Zolot</td>
<td>Sept. 29, 1896</td>
</tr>
</tbody>
</table>

FOREIGN PATENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Country</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>11,153</td>
<td>Great Britain</td>
<td>May 15, 1902</td>
</tr>
<tr>
<td>2,171</td>
<td>Great Britain</td>
<td>July 31, 1862</td>
</tr>
<tr>
<td>100,458</td>
<td>Germany</td>
<td>Dec. 20, 1888</td>
</tr>
<tr>
<td>731</td>
<td>Great Britain</td>
<td>Jan. 11, 1905</td>
</tr>
<tr>
<td>2,150</td>
<td>Great Britain</td>
<td>Jan. 27, 1902</td>
</tr>
<tr>
<td>474</td>
<td>Great Britain</td>
<td>Feb. 3, 1877</td>
</tr>
<tr>
<td>479,973</td>
<td>Germany</td>
<td>Jan. 13, 1930</td>
</tr>
</tbody>
</table>