Sept. 30, 1941. G. GOULD 2,257,234

MACHINE FOR ROLLING SCREW THREADS

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Fig. 1.

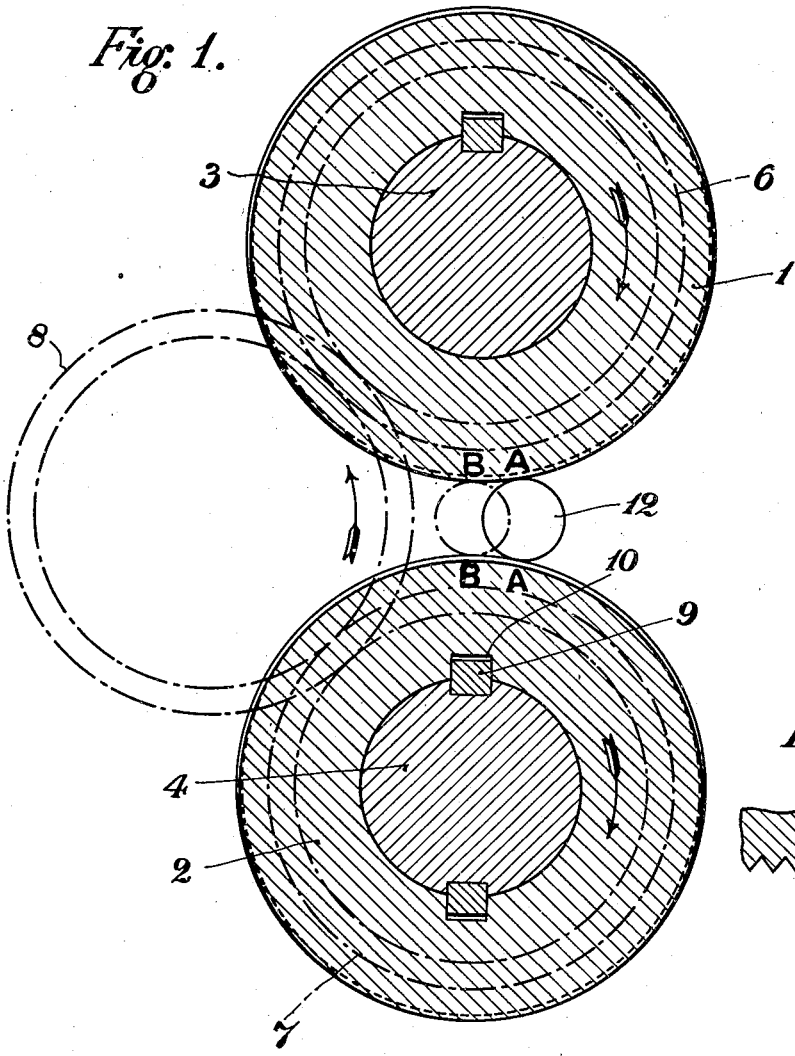

Fig. 2.

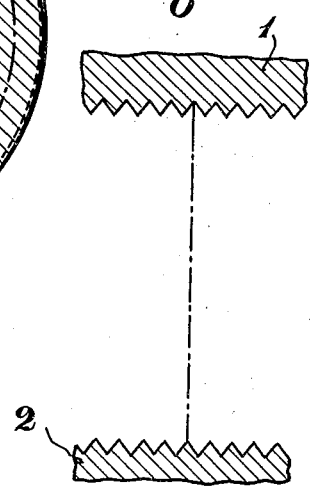

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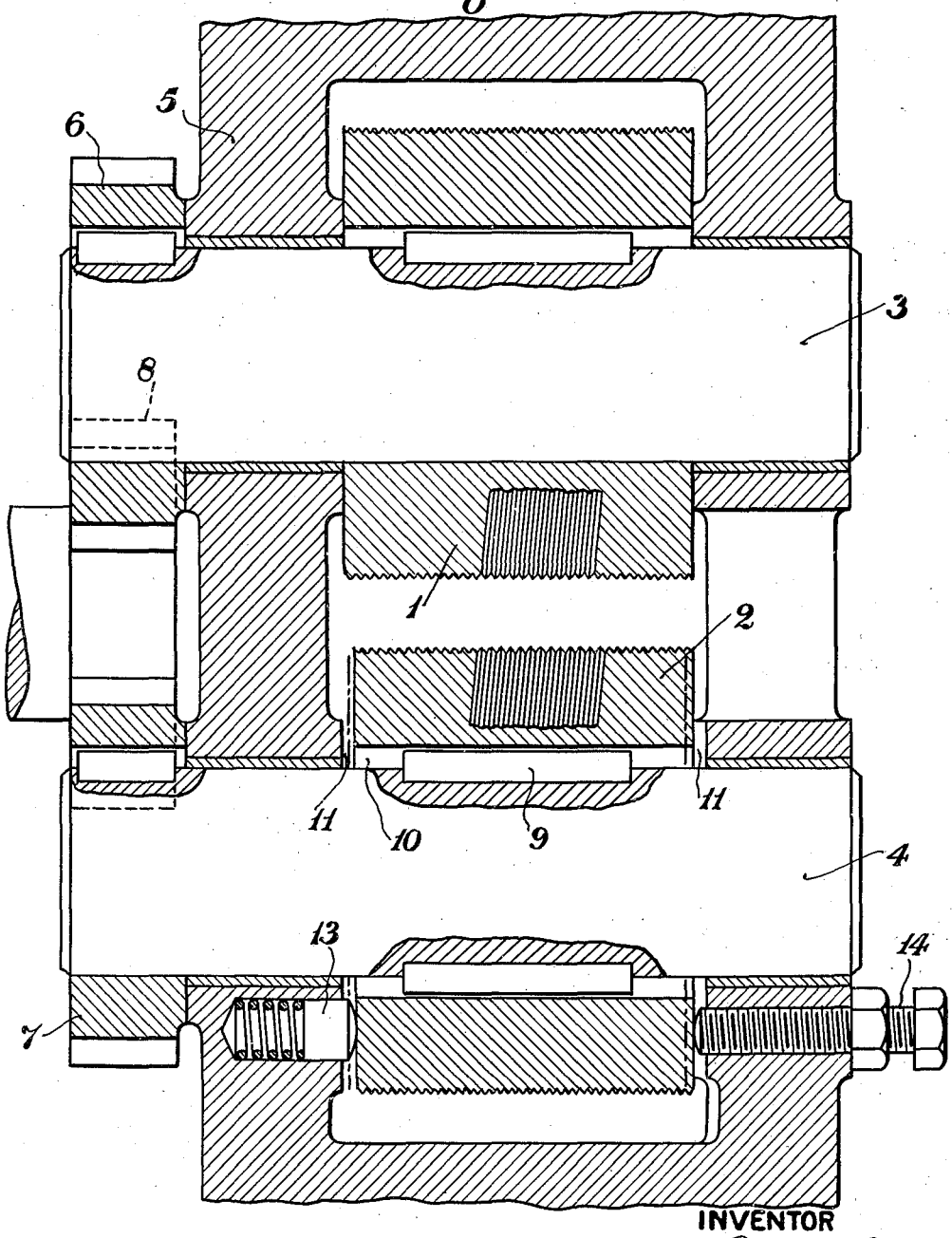
Fig. 3.



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MACHINE FOR ROLLING SCREW THREADS

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4 Claims. (Cl. 80—6)

This invention relates to machines for rolling screw-threads, said machines being of the kind comprising two geared-together power-driven threading rolls mounted to revolve about parallel axes, the work-piece being fed and rolled between them by being passed along a plane normal to that joining the axes of the rolls, and the said rolls being so spaced apart that the shortest distance between their adjacent peripheries is equal to the required finished diameter of the work-piece.

One of the objects of the present invention is to provide improved means for feeding the work-piece through the rolls which will allow of the said work-piece being inserted between the rolls at any instant.

A further object is to ensure that the correct tracking or angular relationship of the threads of the respective rolls is constantly maintained.

It is usual in thread-rolling appliances to make the pitch diameter of the rolls a whole number multiple of the diameter of the pitch diameter of the finished work-piece, and in order to produce the correct spiral angle the rolls are made with a plurality of threads or "starts" corresponding with the said multiple. It is known to employ rolls which are of exactly equal diameter and which are driven at different rotational speeds to cause the work-piece to be fed or traversed through the pass or space between the rolls, but with this known machine the threads of one roll are in correct relationship with those of the other roll at certain intervals only, and as the insertion of the work-piece must coincide with such intervals, successive work-pieces can only be inserted at definite predetermined intervals, which involves the employment of means for timing the supply of the work-pieces to the rolls. The present invention obviates the use of such timing means and enables successive work-pieces to be inserted at any moment.

In connection with the relationship of the threads of the two rolls, it should be explained that, for producing the normal single type of thread, the threads of one roller, on the plane passing through the axes of the two rolls, must be exactly opposite to the gaps between adjacent threads on the other roll, but owing to the spiral angle of the threads of the two rolls, this relationship of the threads alters as the plane of intersection is moved away from the central plane. In practice, that portion of the work-piece on which the thread is to be formed is initially made to a diameter appreciably greater than that at the root of the finished thread, this diameter being usually equal to the pitch diameter; and therefore, when the work-piece is in position for commencing the rolling operation, contact of the work-piece with the rollers is made at points situated in a plane at an appreciable distance from the central plane. Thus, as explained above, the thread and gap relationship of the threads on the two rolls cannot, at one and the same time, be correct at these points and also on the central plane. The present invention ensures that the threads of one roll are always opposite to the gaps between the threads of the other roll at all times during the rolling operation, namely, not only at the commencement of the operation, but also throughout the operation up to the finish of the threading.

According to the invention, a machine for rolling screw-threads, of the kind referred to, comprises two positively-driven threading rolls both driven at the same rotational speed and in the same direction, but having different diameters such as to cause the work-piece to be fed or drawn between the rolls.

Also, according to the invention, a machine for rolling screw-threads provided with positively-driven threading rolls having different peripheral speeds, has one of the rolls free to slide axially relatively to the other roll, whereby, at one end of its axial travel, it may have a correct thread-and-gap relationship with the other roll for the commencement of the rolling operation, and, as the work-piece progresses towards the centre plane of the rolls, it may slide endwise, due to the tracking of the threads, to maintain such correct relationship throughout the operation. The slidable roll may be acted upon by a spring which maintains it in an initial position for correct thread-and-gap relationship at the commencement of the operation, the roll moving axially against the action of the spring during the progression of the work-piece towards the centre plane of the rolls. The initial position of the slidable roll for the commencement of the operation may be determined by an adjustable stop with which one end of the roll co-operates.

Figure 1 of the accompanying drawings is a diagrammatic end view of a thread-rolling machine in accordance with this invention showing in full lines the work-piece at the commencement of the operation, and, in broken lines, the position of the said work-piece at the end of the operation.

Figure 2 is a diagram showing the maintained

relation between the threads and thread gaps of the two rolls.

Figure 3 is a longitudinal section through a convenient constructional embodiment of the invention.

Referring to the drawings, the thread-rolling machine therein shown comprises a pair of spaced threaded rolls 1, 2, mounted upon and driven in the same direction by spindles 3, 4, rotatably mounted at their ends in a frame 5. Corresponding ends of these spindles 3, 4, carry equal-diameter gear-wheels 6, 7, respectively, both these wheels meshing with a single driving gear-wheel 8 rotated from a suitable source of power, whereby both rolls 1, 2, are driven at similar rotational speeds. The roll 1 is fixed upon its spindle 3, but, for the purpose hereinafter described, the roll 2 is slidably keyed or feathered to the spindle 4, as by a key 9 engaging a key-way 10, with clearances at 11, 11, between the ends of the roll and the supporting parts of frame 5, so that the said roll can move axially on the spindle. The two rolls 1, 2, are not of exactly the same diameter, the diameter of one being slightly greater than that of the other, but the difference in the two diameters (which difference cannot very well be indicated in the drawings) need only be sufficient to ensure that the work-piece 12 will be drawn into the pass or space between the rolls, due to the slight difference in peripheral speeds of the rolls created by the difference in diameters. The time required for the threading operation on the work-piece, namely, while it is being drawn and rolled from the commencing position shown at A, A, Figure 1, to the finished position at B, B, is controlled by this difference in peripheral speeds. For a work piece of comparatively soft material, however, the difference may be greater than that for a harder material, thereby shortening the time required for the rolling operation.

The pitch diameters of the said rolls 1, 2, are approximately a whole number multiple of the pitch diameter of the thread to be rolled on the work-piece, and in order to produce the correct spiral angle the rolls are made with a number of threads or "starts" which is the same as said multiple.

For producing the normal single type of thread it is necessary that, on the plane passing through the axes of the rolls 1, 2, namely, at B, B, Figure 1, the threads of one roll should be exactly opposite to the gaps or spaces between adjacent threads on the other roll, as indicated in Figure 2. This relationship alters, however, as the plane of intersection is moved away from the central plane. In practice the portion of the work-piece on which the thread is to be formed is initially made of a diameter appreciably greater than that at the root of the thread, namely, equal to the pitch diameter of the finished thread. Therefore, when the work-piece is in position for commencing the rolling operation, as when at A, A, Figure 1, contact of the work-piece with the rolls is made at points situated at an appreciable distance from the central plane. Thus, the thread and gap relationship of the two rolls cannot, at one and the same time, be correct on the planes at A, A, and B, B. The correct relationship at the commencement of the operation, namely, when the work-piece is at A, A, can be obtained by setting the rolls in a suitable relative axial position. In the example shown in Figure 3, this may be achieved by moving the axially-slidable lower roll 2 endwise along its spindle 4, by means of a spring-loaded plunger 13, until it is arrested by an adjustable stop 14, the latter being adjusted so that, in the plane at A, A, the threads of one roll are exactly opposite to the gaps or spaces between the threads of the other roll. In the said plane through the points A, A, this correct thread and gap relationship is maintained continuously throughout the rotation of the rolls and over the entire length of their peripheries, since the rotational speed of the two rolls is the same. The work-piece can thus be inserted between the rolls at any instant. This constitutes an important advantage compared with the known threading rolls which are driven at differential speeds, as in that case the correct thread-and-gap relationship only occurs intermittently.

As hereinbefore explained, if the rolls had no relative axial movement permitted them, it would only be possible for correct tracking to be obtained at one position of the work-piece during its traverse between the rolls, for example, at position A, A. However, the fact that the roll 2 is capable of moving axially on its spindle under the control of the spring plunger 14, ensures the rolls being automatically maintained in correct tracking relation throughout the movement of the work-piece between them, that is to say, at every plane at which the work-piece is in contact with them at different stages of the rolling operation.

Thus, initially the roll 2 is pressed against the stop 14 by the spring plunger 13 and is thereby set in correct thread-and-gap relationship for the commencement of the rolling operation. On being inserted between the rolls the work-piece 12 is rolled towards the central plane (position B, B) and during the progressive formation of the thread the sliding roll 2 is moved axially on its spindle 4, due to the tracking of its thread with that on the work-piece, against the action of the spring plunger 13, until the rolling operation has been completed and the work-piece leaves the rolls. The roll 2 is then returned to its stop 14 by the plunger 13, ready for the insertion of the next piece. At each position of the roll 2 during this axial displacement the thread-and-gap relationship between the rolls is correct at the plane through the points of contact of the work-piece with the rolls.

I claim:

1. A machine for rolling screw-threads comprising two threading rolls having opposed peripheries spaced apart mounted to revolve at different peripheral speeds about parallel axes so as to cause a work-piece to be fed or drawn laterally between the rolls, and means for positively driving said rolls in the same direction: one of said rolls being rotatable in a fixed plane and the other one being free to slide axially relatively to the other to ensure a constantly-correct thread relationship between the rolls throughout the movement of the work-piece between them.

2. A machine for rolling screw-threads comprising two opposed threading rolls mounted to revolve about parallel axes at different peripheral speeds so as to cause a work-piece to be fed or drawn laterally between the rolls; one of said rolls being rotatable in a fixed plane and the other one being free to slide axially relatively to the other; means for positively driving said rolls in the same direction; and spring means for maintaining the slidable roll in an initial position for correct thread-and-gap relationship with the other roll at the commencement of the

rolling operation, the said slidable roll moving axially against the action of the spring during the progression of a work-piece towards the center plane of the rolls, so as to maintain a constantly-correct thread relationship between the rolls throughout the movement of the work-piece between them.

3. A machine for rolling screw-threads comprising two opposed threading rolls of different diameters; a pair of driving spindles for the rolls, one roll being rigid with its spindle and the other being freely slidably on its spindle; means for positively driving the spindles at the same rotational speed and in the same direction; and a spring acting on the slidable roll to maintain it in an initial position in which the thread-and-gap relationship between the two rolls is correct for the commencement of the rolling operation, the said slidable roll sliding axially against the action of the spring as a work-piece passes laterally between the rolls, so as to maintain a constantly-correct thread relationship between the rolls throughout the movement of the work-piece between them.

4. A machine for rolling screw-threads comprising two spaced threading rolls one of which is free to move axially in relation to the other; means for positively driving said rolls at different peripheral speeds and in the same direction; an adjustable stop device co-operating with one end of the roll for determining its initial position; and spring means acting on said roll and tending to move it towards the stop; the said slidable roll moving away from the stop and against the action or the spring during the rolling operation due to the tracking of its thread with that on a work-piece being rolled between the rolls.

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