No. 738,067. PATENTED SEPT. 1, 1903.

J. REIMANN.

MACHINE FOR PROFILING NON-CIRCULAR TUBES OR RODS.

APPLICATION FILED JAN. 27, 1903.

NO MODEL.

Fig. 1.

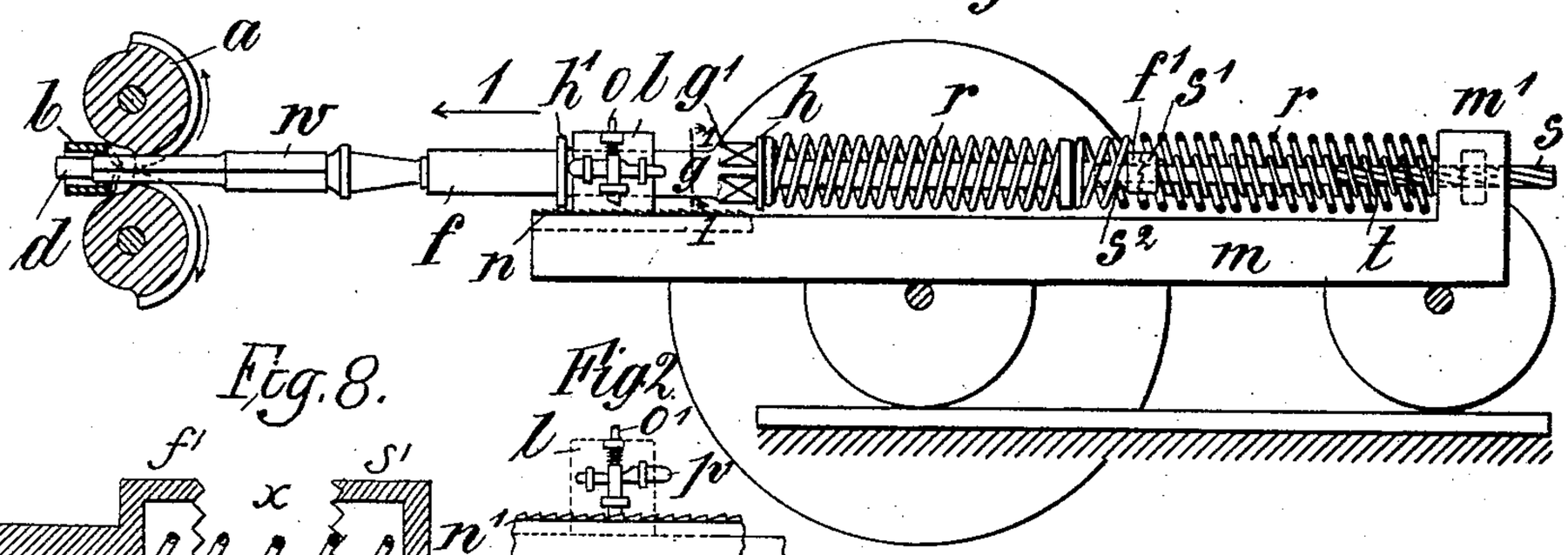


Fig. 8.

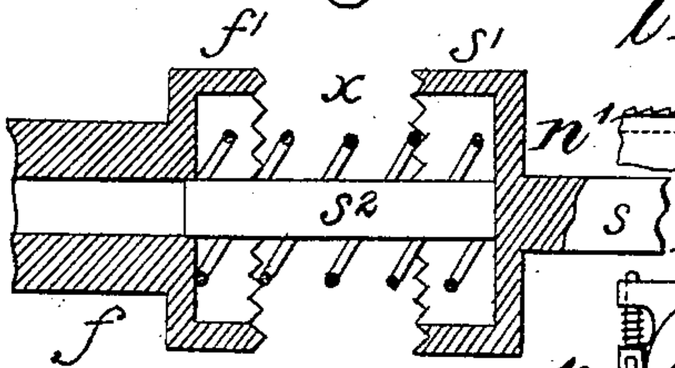


Fig. 2.

Fig. 3

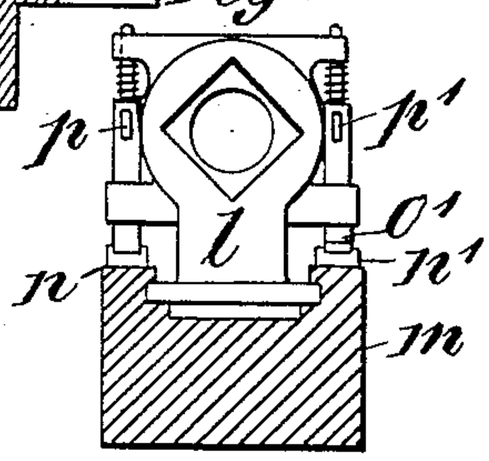


Fig. 4

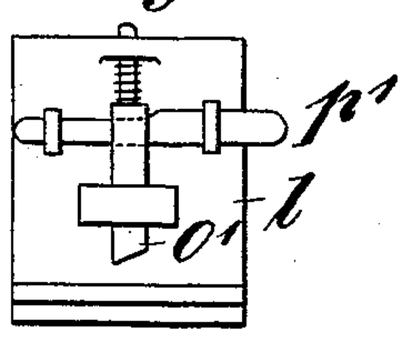


Fig. 9.

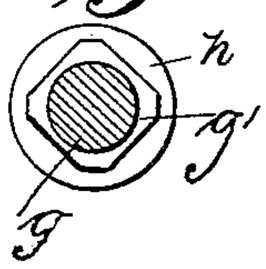


Fig. 7.

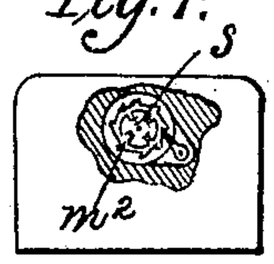


Fig. 5

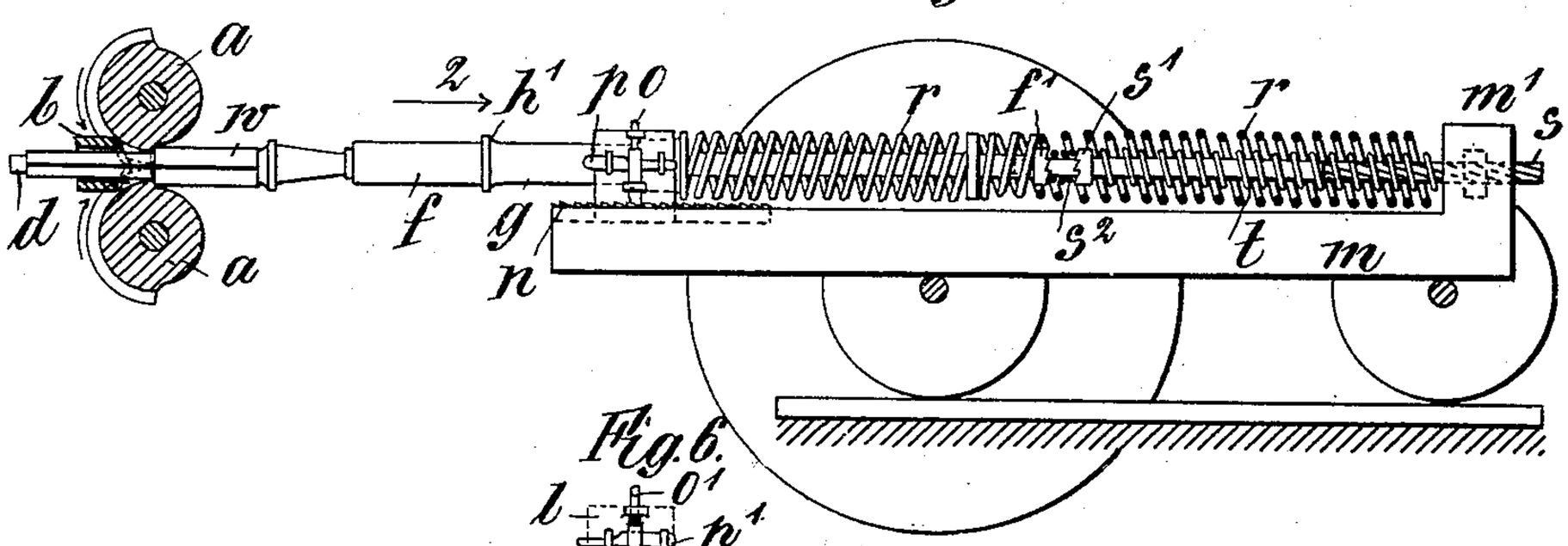
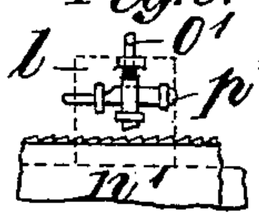


Fig. 6.



Witnesses:
M. O. Miley.
T. H. Birckhead.

Inventor
Jacques Reimann
by Howson and Howson
his attys.

No. 738,037. Patented September 1, 1903.

UNITED STATES PATENT OFFICE.

JAQUES REIMANN, OF PLASMARL, NEAR SWANSEA, ENGLAND.

MACHINE FOR PROFILING NON-CIRCULAR TUBES OR RODS.

SPECIFICATION forming part of Letters Patent No. 738,067, dated September 1, 1903.

Application filed January 27, 1903. Serial No. 140,733. (No model.)

To all whom it may concern:

Be it known that I, JAQUES REIMANN, foreman, a citizen of the Republic of Switzerland, residing at Plasmarl, near Swansea, England, have invented certain new and useful Improvements in Machines for Profiling Non-Circular Tubes or Rods; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to that class of machines for profiling non-circular—as, for example, elliptical or four-sided—rods or tubes by a step-by-step motion, in which profiling-rolls operate in connection with a carriage or slide which draws through them the non-circular tube or rod to which a desired lengthwise profile is to be imparted; and the objects of my invention are, first, to insure the proper presentation of the non-circular work-piece to the rolls, and, second, to enable the work-piece to be drawn through the rolls without rotation while being profiled. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 shows the device in side elevation with the rolls partly in section at the end of a pass; Fig. 2, details of a ratchet-rack with latch engaged and a wedge for throwing the latch in or out; Fig. 3, a cross-section of the guide-slide; Fig. 4, an enlarged view of the latch and corresponding actuating-wedge; Fig. 5, the entire device in side elevation with the rolls in part section at the beginning of a profiling pass; Fig. 6, a rack with its corresponding latch disengaged. Fig. 7 is a partial end view, partly in section, showing the ratchet-controlled nut of the rotatable spindle. Fig. 8 is a detail in section, drawn to an enlarged scale, of the toothed clutches. Fig. 9 is a sectional view of the cylindrical guide-piece on line 1 1, Fig. 1, showing the angular shouldered portion to fit within a recess in the slide.

In order to give a desired profile to tubes or rods that are non-circular—as, for instance, four-sided or elliptic—in cross-section by a step-by-step motion, care must always be taken that the work-piece is always fed in at a certain definite angle between the rolls. The hitherto-employed device for rotating the mandrel in thus profiling tubes (consisting of a prolongation of such mandrel provided with a steep-pitched screw and a corresponding nut prevented from rotating when the tube is advanced in the axial direction) did not permit such accurate guiding in feeding, as the rotation of the mandrel depended upon the amount of endwise motion. The amount of this advance is, however, dependent on a number of different conditions and may vary, especially when the rolls are turned off, and therefore the length of the development of the caliber may be diminished. In rolling out round tubes these differences are unimportant, as it is no matter if the pipe is turned each time a little more or less than ninety degrees. If, however, for example, four-sided tubes or rods are to be rolled in the said manner, the work-piece must at each successive pass through the rolls be given a partial rotation of exactly ninety degrees about its axis when fed in. Further precautions must be taken that the work-piece is prevented from axial rotation at the moment of being grasped by the rolls. As soon as this is done further rotation need not be feared, as the form of the roll-grooves themselves prevents such partial axial rotation. As is well known in the art, in manufacturing hollow tubes a mandrel is used as a work-piece holder, passing through the bore of the tube, while in manufacturing rods other well-known means for holding the work-piece are substituted. In this description I will use the term "mandrel" to describe the work-piece holder; but it will be understood that any other means known in the art may be substituted for holding the work-piece. This guidance of the work-piece is effected in the case of the herein-described invention in that in the operation of rolling the mandrel is in such manner connected with the rotation-spindle that at the conclusion of the rotation the connection is broken and the mandrel can be so grasped by a guide that it can move endwise, but not rotate axially. As soon as the rolls have grasped the work-piece the mandrel will be moved endwise and so con-

nected with the rotation-spindle that it can in the ensuing advance motion be further partially rotated.

The drawings show an arrangement for profiling four-sided tubes.

The mandrel *d*, Fig. 1, which bears the work-piece *w*, is united with the mandrel-rod *f*, which bears at its right-hand end one-half of a coupling or toothed clutch *f'*, which can clutch in and out of the other toothed coupling, *s'*, on the rotation-spindle *s*. The nut corresponding to the rotation-spindle is in the usual way attached to the rear end of the carriage or slide *m* at *m'*. This nut is prevented by a ratchet m^2, Fig. 7, from rotating when the shaft is moved axially to the left in the direction of the arrow 1. The rotation-spindle *s* is guided by a pin s^2, Fig. 5, in the bore of the mandrel-rod *f*. The spiral spring *t*, lying within the spiral spring *r*, tends to hold in clutch the two parts *f'* and *s'* of the coupling.

At the front end of the mandrel-rod *f* there is a cylindrical guide-piece *g*, which is provided with two collars *h* and *h'* and an angular shoulder or clutch *g'*, which fits exactly in a similarly-shaped recess at one end of the guide-slide *l*. This slide *l* is movable endwise in the carriage *m*, but, as is seen on a larger scale in the cross-section, Fig. 3, is prevented from rotation. On both sides of the guide-slide *l* there are on the carriage-bed two ratchet-racks *n n'* with teeth pointing in opposite directions, Figs. 1, 2, 3. In the teeth of these racks *n n'* there can engage the vertically-moving bolts or latches *o o'* of the slide *l*, which bolts are pressed down by springs, but may be raised by the wedges, Fig. 4. These two wedges project so far that they may be moved endwise by the collars *h h'* of the guide *g*. In order better to recognize the position and operation of the bolts *o'* and the wedge *p'*, these parts and the ratchet-rack *n'* are specially shown in Figs. 2 and 6 by dotting the lines of the guide-slide *l*. Fig. 4 shows on a larger scale a side view of these parts.

At the beginning of the profiling process all parts have the positions shown in Fig. 5. The guide-piece *g* has entered with its angular shoulder *g'* the corresponding angular recess or groove in the guide-slide *l*, preventing rotation of the mandrel-rod *f* and insuring the proper presentation of the work-piece *w* between the rolls *a*. The wedge *p* is so moved that the bolt or latch *o* engages with the ratchet-rack *n*, while the bolt or latch *o'* is raised by the wedge *p'*, so that it cannot engage with the teeth of the rack *n'*, Fig. 6. In the same way the two half-couplings *f'* and *s'* are not in clutch with each other, as the spring *t* is not in tension. As soon as the rolls *a* grasp the work-piece *w* they press to the right the mandrel-rod *f*, as shown by the arrow 2, and press together the springs *r*. The slide *l* can have no part in this endwise motion, as it is held fast by the bolt or latch *o* and the ratchet-rack *n*. In consequence the toothed clutch *g'* of the guide-piece *g* of the mandrel-rod *f* leaves the toothed recess of the guide *l* and promptly thereafter the two half-couplings *f'* and *s'* come into clutch, so that the rotation-spindle *s* is, in case of further motion of the mandrel-rod *f*, carried along by compression of the inner spiral spring *t* without any rotation of the spindle *s* and the mandrel-rod *f* resulting therefrom, because of the ratchet m^2. As soon as the collar *h'* touches the ends of the two wedges *p p'* it presses these endwise, so that the bolt or latch *o* is raised, but the bolt or latch *o'* pressed down and made to engage with the ratchet-rack *n'*, Figs. 1 and 2. With further endwise motion to the right of the work-piece the guide-piece *l* can be pushed in front of the collar *h'* as the bolt or latch *o* is disengaged from the ratchet-rack *n* and the lower end of the bolt or latch *o'* can slide along the teeth of the ratchet-rack *n'*. As soon as the rolls *a* cease to grasp the work-piece, the latter, together with the mandrel and mandrel-rod, are again moved forward in the direction of the arrow 1 by the outer spiral spring *r*. The guide-slide *l* has, however, no part in this movement, as the bolt or latch *o'*, that is engaged with the ratchet-rack *n'*, Fig. 2, prevents motion of the slide *l* in the direction of the arrow 1. During this part of the advance movement the nut of the rotation-spindle *s* is held fast by its ratchet, so that the spindle rotates, and by means of the coupling-halves *s' f'* compels the mandrel-rod *f* to take part in this rotation. This being the case, the cylindrical part of the guide-piece *g* slips through the bore of the now stationary guide-slide *l*. The dimensions of this guide-piece are such that after ninety degrees rotation of the mandrel-rod *f* the angular shoulder *g'* of the guide-piece *g* enters the corresponding angular recess of the guide-slide *l* and prevents further rotation of the mandrel-rod in either direction. In this position the inner spiral spring *t* is not in tension, and with further endwise motion of the mandrel-rod *f* and by means of the outer spiral spring *r* the coupling-halves *s' f'* are disengaged—a result which in certain cases may be aided by a small auxiliary spring X between them. With this endwise motion of the mandrel-rod *f* in the direction of the arrow 1 the collar *h* strikes the two wedges *p p'*, so that the bolt or latch *o'* is raised and disengaged from the ratchet-rack *n'*, but the bolt or latch *o* is depressed. The guide-slide *l* can now participate in the advance of the mandrel-rod *f*, during which the bolt or latch *o* slides on the teeth of the ratchet-rack *n*, Fig. 5. Finally, the advance of the mandrel-rod and its appurtenances is limited in any convenient manner—as, for example, by the dog or striking-piece *b* between the rolls.

Instead of a movable guide-slide *l* there can be used a guide solidly united to the carriage if when this carriage advances the feed is

regulated to correspond with the rate of reduction.

The toothed clutch-like guide-piece g' and the corresponding recess of the guide-slide l must always be so chosen that they permit the partial rotation of the work-piece through exactly the required angle, be it sixty degrees, ninety degrees, one hundred and eighty degrees, or what not.

I claim as my invention—

1. A feed device for profiling non-circular tubes or rods by step-by-step motion, comprising a work-piece holder, a spindle for rotating the holder and a releasable connection between the holder and the rotation-spindle, in order to break the connection between the rotation-spindle and the holder at the completion of the partial rotation of the holder after each reduction pass and means for preventing further rotation, substantially as set forth.

2. A feed device for profiling non-circular tubes or rods by step-by-step motion, comprising a work-piece holder, a spindle for rotating the holder, a releasable connection between the holder and the rotation-spindle, and a guide for the holder and means on said holder to engage within the guide to prevent further rotation at the completion of the aforesaid rotation, substantially as described.

3. A feed device for profiling non-circular tubes or rods by step-by-step motion, comprising a work-piece holder, a spindle for rotating the holder, a releasable connection between the holder and the rotation-spindle, a slidable carriage having a clutch-like recess, and a projection on the holder which at the completion of the partial rotation engages with the clutch-like carriage-recess to prevent the holder from further rotation, substantially as described.

4. A feed device for profiling non-circular tubes or rods by step-by-step motion, comprising a work-piece holder, a rotation-spindle for rotating the holder, a releasable connection between the holder and the rotation-spindle, a movable guide-carriage with a clutch-like recess, a projection on the holder adapted, at the conclusion of the rotation, to engage with the recess of the guide to prevent the holder from further rotation, bolts or latches on the guide-slide, wedges to operate the bolts or latches, and fixed ratchet-racks for the teeth, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAQ. REIMANN.

Witnesses:

WILLIAM D. REES,

HERBERT LLEWELLYN SMITH.