N° 5355 A.D. 1901

Date of Application, 13th Mar., 1901—Accepted, 27th Apr., 1901

COMPLETE SPECIFICATION.

"Improvements relating to Tube Tapering Machines".

I, ALFRED MILWARD REYNOLDS, of The Patent Butted Tube Company Limited, of Newtown Row, in the City of Birmingham, Seamless Steel Tube Manufacturers, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention consists of improvements relating to machines for tapering tubes for the production of cycle steering forks and for other purposes, my object being to construct simple and convenient machines that shall perform the said work in a very expeditious, economical and effective manner.

Referring to the four accompanying sheets of explanatory drawings;—

Figure 1 is a front elevation of a machine constructed in accordance with my invention.

Figures 2 to 5 inclusive show, to a larger scale, various parts of the said machine as follows;—

Figure 2 is a front elevation of the automatically controlled feed mechanism and Fig. 3 a plan of the same.

Figure 4 is a front elevation of the tapering mechanism whilst Figure 5 is an end elevation of the same.

Figures 6 and 7 are respectively front and end elevations showing, to a larger scale, the chuck or tube holder which is shown in position at Figures 2 and 3.

The same reference letters in the different views indicate the same parts.

In carrying my invention into effect I mount on the side of the machine framing A, in alignment with the central axis of the dies B, an arm or bracket A^1 which carries the feed mechanism. Such mechanism consists primarily of a tube carrying sliding and rotating spindle C which is operated in the advance direction by a rack and pinion, and rapidly withdrawn under the influence of a falling weight D. The spindle C is preferably carried in a long sleeve or bush E which is free to slide through a bearing F, and has fixed or formed on its under side a rack *e*, as shown at Figure 2 of the drawings.

The tube to be operated upon is attached to the said spindle C by means of the spring chuck G and rotation is imparted to the spindle and hence to the tube by the pulley H; the said rotation is not however imparted to the bush E.

In conjunction with the rack *e* I arrange within the bearing F, a pinion J which is clutch controlled, and rotated by any suitable gearing, but preferably by worm and worm wheel j j^3, driven by belting working upon the pulleys j^2 j^3 as shown in Figures 2 and 3. On the end of the pinion shaft J^1 and on the operators side of the machine, I attach a hand wheel K, whereby the sleeve with the tube may be rapidly advanced to the dies before the automatic feed is put into gear, and adjacent to such hand wheel I arrange the clutch lever L which passes through the bearing F, and immediately under the rack of the sleeve E.

The action of the feeding mechanism is as follows. A tube M is placed in the spring chuck G and advanced to the dies B by means of the hand wheel K. By a movement of the lever L the clutch J^2 is engaged with the worm wheel j^1 and the automatic progression of the tube M with the spindle C and the sleeve E is thus commenced. Such forward movement is arranged to shift the belt from the loose pulley H^1 to the fast pulley H whereby the rotation of the parts is effected. The belt shifting gear is preferably arranged so that the aforesaid

movement of the lever L is imparted against the action of the spring N to the rod O thereby operating the lever O^1 for the purpose of raising the catch P from the notch or recess q in the belt shifting bar Q. Under the action of the spring Q^1 the driving belt is then shifted from the loose pulley H^1 on to the fast pulley H and the sleeve E and the spindle C carrying the tube M are thus set in rotation. Towards the end of the longitudinal movement of the tube M through the dies B a striking piece e^1 projecting from the rear end of the sleeve E comes in contact with the lever L and disengages the clutch, thus permitting the sleeve and spindle to be withdrawn by the action of the weight D, which is connected to the sleeve by the cord or chain d. Towards the end of such return movement the striking piece e^1 engages the lever Q^2 thereby effecting the shifting of the belt from the fast pulley H to the loose pulley H^1 against the action of the aforesaid spring Q^1.

With the aforesaid arrangement of the belt shifting gear the belt is retained on the loose pulley by the catch P until the said catch is moved by the action of the feed lever L through the rod O and lever O^1 so that rotation shall only commence when the automatic feed is started, and the tube has entered the tapering tools B. The withdrawal of the sleeve and spindle by the weight D does not bring them to the limit of their movement, provision being made for a slight additional backward movement under the action of the hand wheel K, the object of this additional movement being to liberate the finished tube from the spring chuck G hereinafter described.

Referring to Figures 7 and 8 of the drawings, the spring chuck G therein shown is comprised by a pair of gripping jaws g and g^1 which are contained within an outer casing fixed to or formed with the spindle C, and are caused to grip the tube M by the action of the spiral springs g^2 and g^3. Between the two jaws I arrange within suitable grooves wedge pieces g^4 g^5 having extremities projecting from the rear of the chuck and embraced by a loose ring G^1. When it is required to release the tube from the chuck, the sleeve E (together with the spindle C) is moved slightly in a backward direction by means of the hand wheel K, and the pressure of the ring G^1 against the face of the bearing F then forces the jaws g and g^1 apart; thus permitting the tube to be readily withdrawn from the chuck.

During the feeding of the tube through the dies or swaging tools B of the machine in the manner hereinbefore described, the upper die is rapidly reciprocated and the tube is thereby swaged to the required taper form, the said dies being themselves made to such form. The said reciprocation is effected by the rotation of the shaft R which has its axis parallel with the axis of the tools B, and is driven by belting running on the fast and loose pulleys r and r^1 respectively.

Upon the driving shaft R I form two eccentric portions as r^2 of short throw and connect them with the upper die slide b by the connecting pieces S and T respectively. The said slide b is arranged to reciprocate between the vertical standards of the machine and is retained in contact with the ball ends s and t of the connecting pieces, by the strong spiral spring U. The ball ends s and t are screwed into the lower part of the respective connecting pieces S and T and can thus be readily adjusted as required.

By arranging the driving shaft R with the die slide and duplex connections as aforesaid I provide an effective resistance to the tilting action set up when the tube is first fed between the dies, and ensure a uniform pressure from end to end of the dies.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1.—In a tube tapering machine, the arrangement of the dies or tapering tools parallel with the tool operating or driving shaft, and the combination with the

aforesaid of duplex connections substantially as and for the purpose described and as illustrated.

2.—In a tube tapering machine, means for automatically feeding the tube through the dies or tools whereby the required tapering is effected, substantially as described and as illustrated.

3.—In a tube tapering machine, the combination with the non-rotatable sleeve E sliding with the rotatable spindle C of means whereby the said sleeve during its movement in the one direction disconnects the tube feed driving mechanism, and during its movement in the reverse direction effects the stoppage of the tube rotating mechanism, substantially as described and as illustrated.

4.—In a tube tapering machine, the combination with the rotatable and sliding spindle C and the non-rotatable sliding sleeve E, of a chuck G having spring operated jaws with wedge pieces arranged between them, the said wedge pieces having extremities projecting beyond the rear of the clutch body or casing, substantially as and for the purpose described and as illustrated.

5. In a tube tapering machine, the combination with the belt shifting bar Q and the operating spring Q^1 of the catch P, lever O^1 rod O, spring N, and clutch lever L, substantially as and for the purpose described and as illustrated.

6. An improved tube tapering machine comprised by the arrangement and general combination of parts substantially as described and as illustrated.

Dated this 12th. day of March. 1901.

MARKS & CLERK
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Agents for the Applicant.—

Redhill: Printed for His Majesty's Stationery Office, by Malcomson & Co., Ltd.—1901.

SHEET 1.

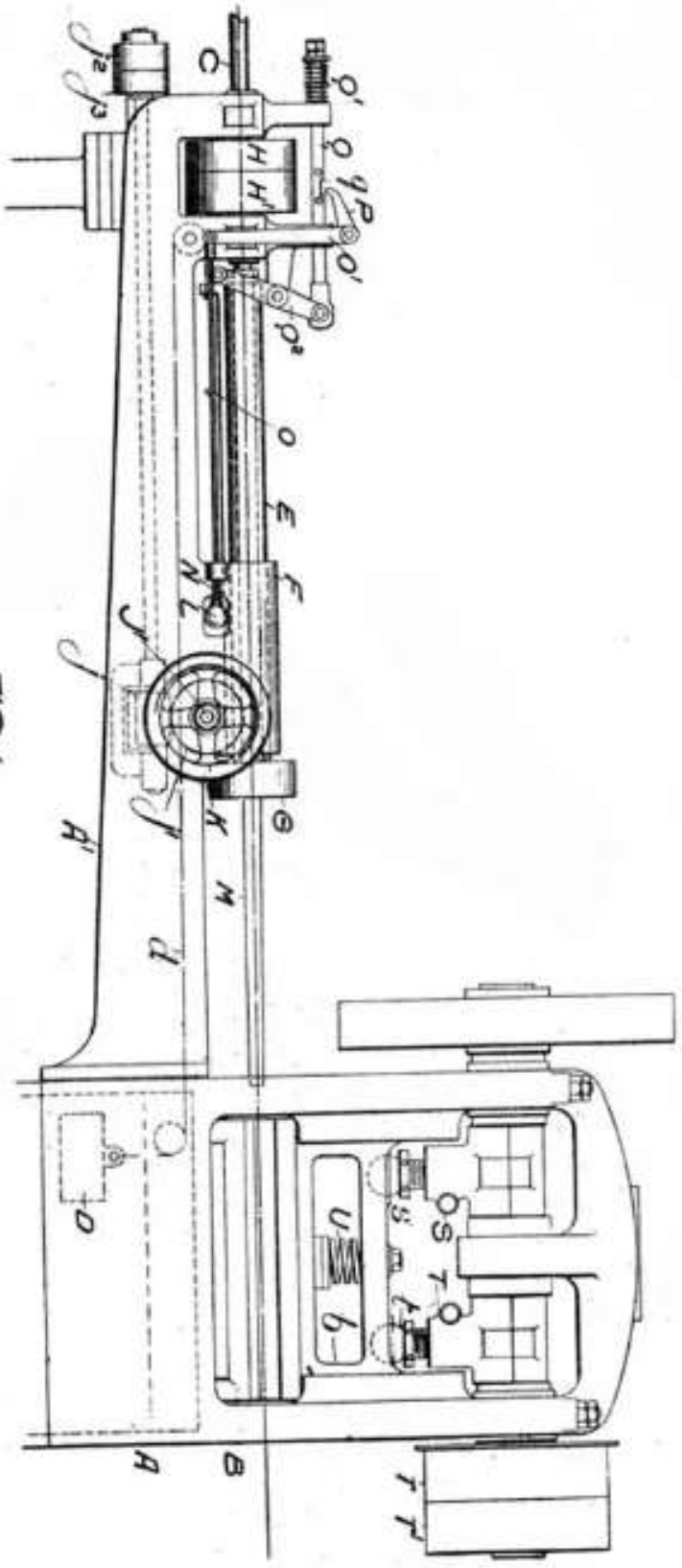
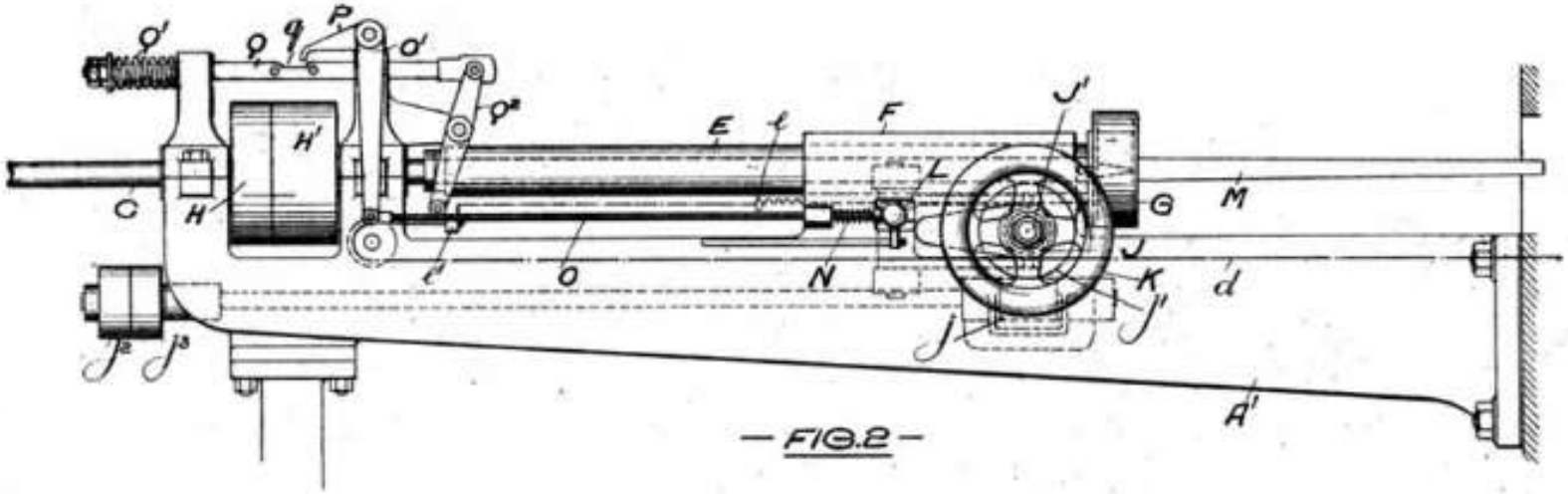


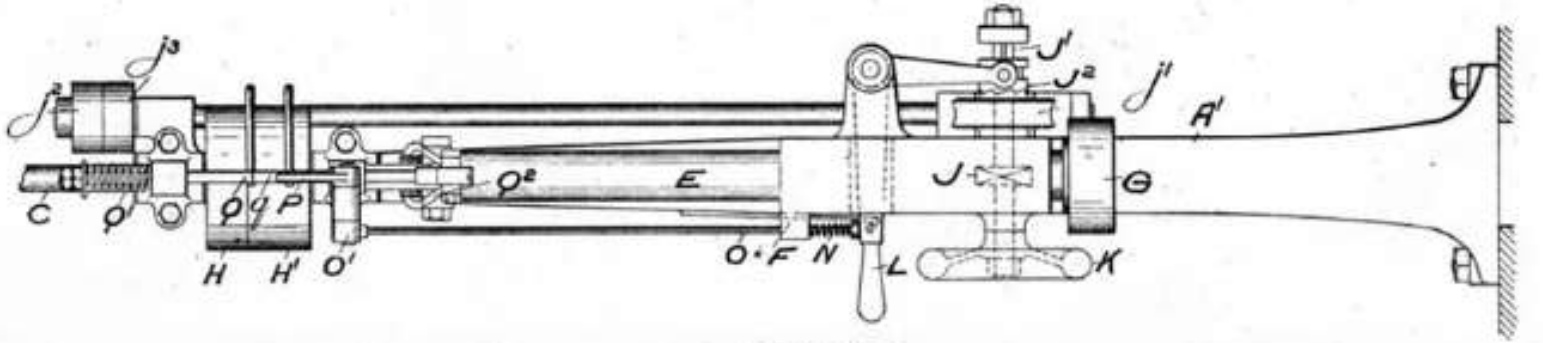
FIG. 1.

[This Drawing is a reproduction of the Original on a reduced scale]

(4 SHEETS)
SHEET 2

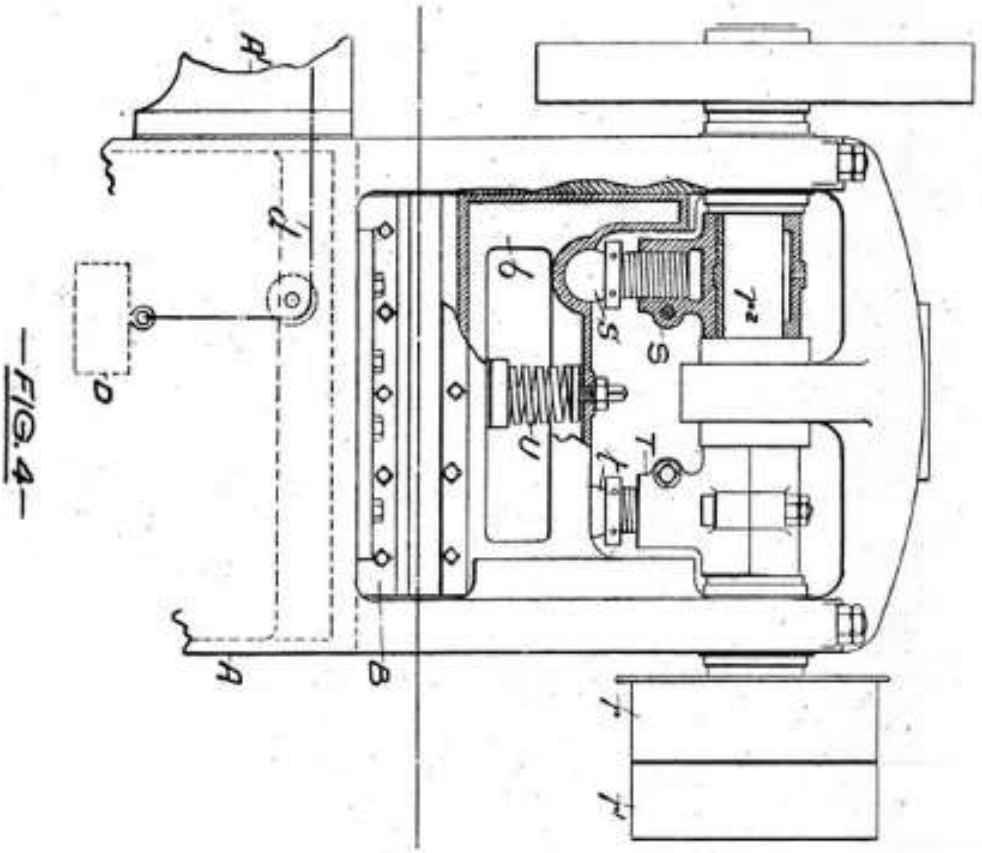


— FIG. 2 —

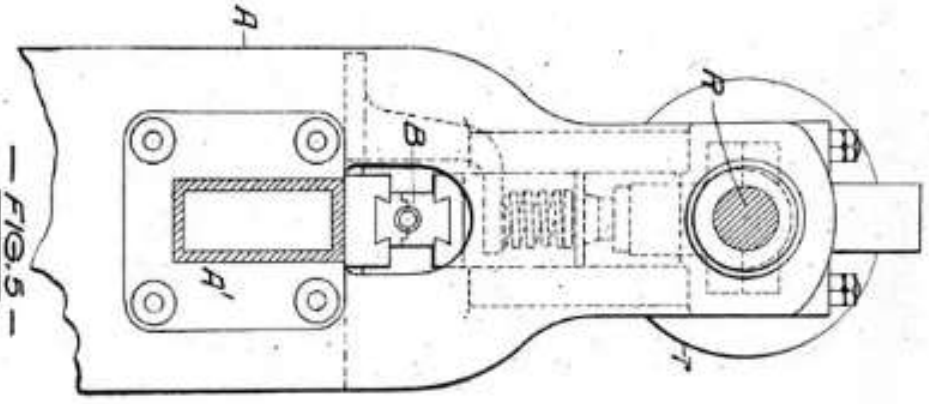


— FIG. 3 —

SHEET 3.



—FIG. 4—

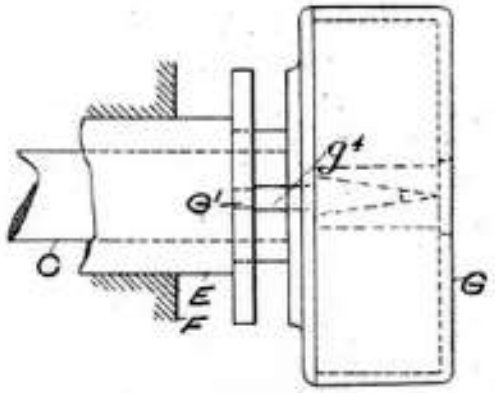


—FIG. 5—

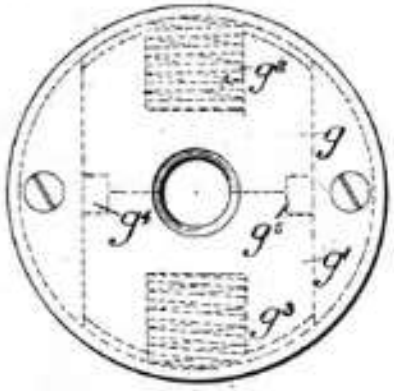
[This Drawing is a reproduction of the Original on a reduced scale.]

[4 SHEETS]

SHEET 4



—FIG.6—



—FIG.7—