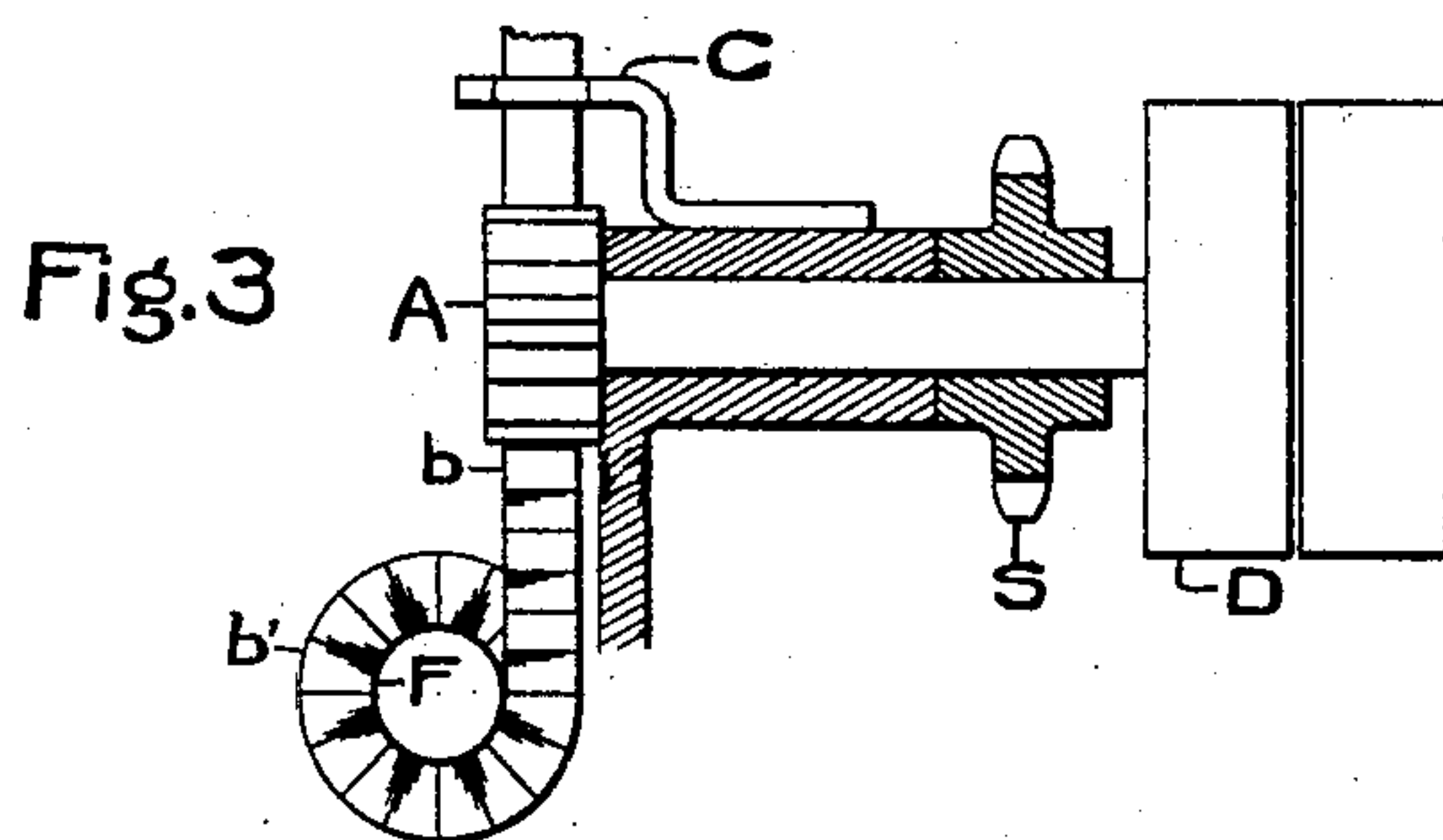
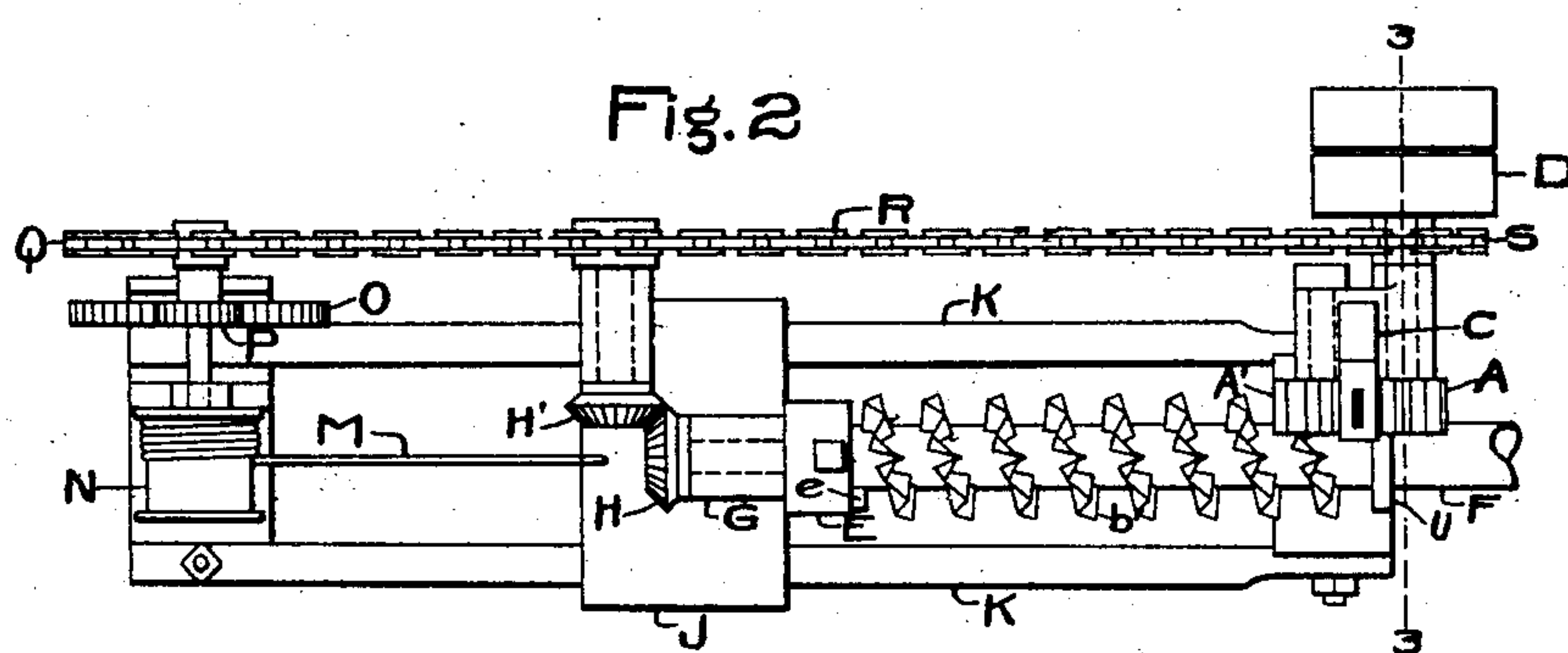
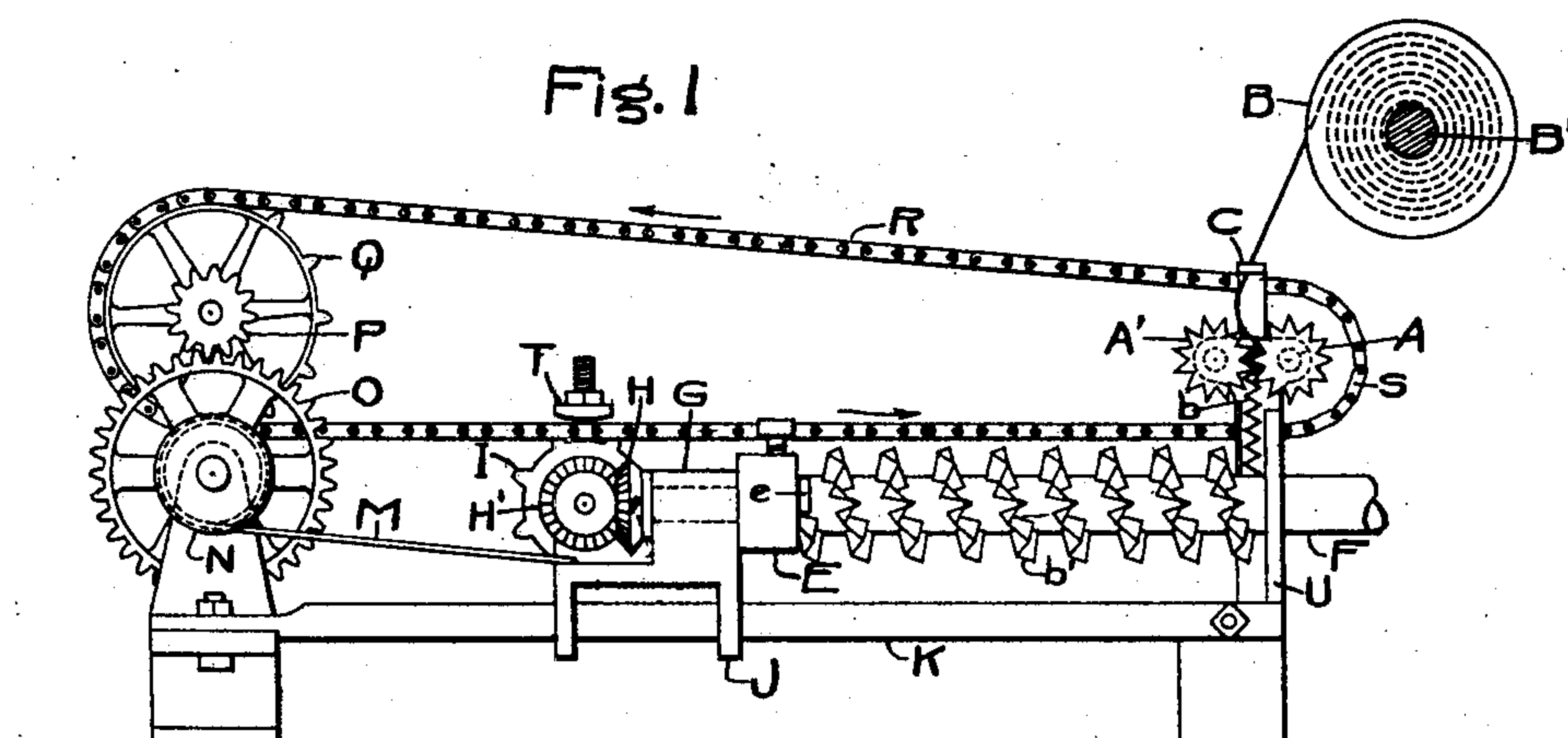


No. 777,817.

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F. H. STOLP.  
MACHINE FOR MAKING RADIATOR TUBES.  
APPLICATION FILED APR. 11, 1903.

NO MODEL.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

FRANK H. STOLP, OF CHICAGO, ILLINOIS.

## MACHINE FOR MAKING RADIATOR-TUBES.

SPECIFICATION forming part of Letters Patent No. 777,817, dated December 20, 1904.

Application filed April 11, 1903. Serial No. 152,208.

*To all whom it may concern:*

Be it known that I, FRANK H. STOLP, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have  
5 invented certain new and useful Improvements in Machines for Making Radiator-Tubes, of which the following is a specification.

The efficiency of a radiator depends to a  
10 great extent upon the area of its radiating-surface. To provide a maximum radiating-surface and at the same time minimize the size of the radiator, recourse has been had to so-called "extended" radiating-surfaces, and  
15 these have been of various kinds. When lightness is a desideratum, the radiator has been made of tubes having annular disks slipped onto them and secured at suitable distances apart, this being a form popular in automobile construction. It has also been proposed  
20 to use a tube around which a strip or ribbon of copper or other sheet metal is wound helically to provide a helical flange resembling the flange or blade of a spiral conveyer, excepting that it is provided with flutes or corrugations that are radial with respect to the  
25 tube and that decrease in depth from the surface of the tube outward radially. It is to a machine for making radiator-tubes of this  
30 type that the present invention relates, and its object is to provide a machine that will make such tubes perfectly and with absolute uniformity and at a cost sufficiently low to place them on a commercially-available basis.

To these ends the invention consists in the features of novelty that are hereinafter described with reference to the accompanying drawings, which are made a part of this specification, and in which—

40 Figure 1 is a front elevation of a machine embodying the invention. Fig. 2 is a plan view thereof. Fig. 3 is a sectional elevation thereof on the line 3 3, Fig. 2.

A A' are crimping-rolls having working  
45 faces provided with flutes or corrugations that are disposed parallel with their axes. The rolls are supported in such relations to each other that their flutes or corrugations intermesh, while at the same time there is sufficient  
50 space between them to admit a strip or

ribbon of thin copper or other suitable metal of which the extended radiating-surface is to be made. A coil B of this strip or ribbon is wound upon a spool B', from which it is unwound in response to the pull of the crimping-rolls, and a guide C is arranged between the spool and rolls to insure its being properly fed to the bite of the rolls. The roll A is provided with some suitable device D for turning it, and the roll A' derives its motion from the roll A through the intervention of the strip or ribbon. These rolls form in the strip a succession of transverse crimps or corrugations of uniform depth from side to side of the strip, as shown at *b*.  
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Before feeding the end of the strip into the bite of the crimping-rolls it is provided with a single perforation, and after a sufficient length has passed through the rolls this perforated end is buttoned or hooked onto a stud *e*, projecting from the face of a chuck E. This  
70 chuck also carries a mandrel F and is so disposed that the mandrel is at right angles to the axes of the crimping-rolls and a little to one side of the plane of their working faces, so that the crimped strip coming from the rolls will be tangential to the mandrel. Means are provided for rotating the chuck and mandrel, so that as fast as the crimped strip comes from the rolls it is wound upon the mandrel  
80 edgewise, and means are provided for moving the mandrel endwise also, so that the winding will take a helical form, as shown at *b'*.

The surface speed of the mandrel is about the same as the surface speed of the crimping-rolls, so that as fast as the crimped strip is delivered from the rolls it is wound upon the mandrel. It is manifest, however, that in order that this winding may take place, maintaining the wound strip in a position substantially radial with respect to the mandrel, an alteration in the condition of the crimps must take place as the winding proceeds, because the diameter of the completed structure is greater at the outer edge of the wound strip than it is at the surface of the mandrel. In consequence of this the crimped strip stretches along longitudinal lines excepting at its edge, which directly contacts with the mandrel, and the extent of this stretching in—  
95  
100



creases from said edge to its outer edge. As a result of this the crimps or corrugations are of greatest depth immediately adjacent to the mandrel, and from this point outward radially they gradually decrease in depth, being of least depth, or possibly *nil*, at the outer margin of the wound strip. If this process be continued until the mandrel reaches the limit of its endwise travel and the strip be severed at the terminus of the wound portion and removed from the mandrel, it will be found to be a helix with the described radial crimps or corrugations of graduated depths, and this helix may be slipped onto and secured by solder or otherwise to the tubes that are to be used in the construction of radiators. I prefer, however, to use these tubes as mandrels, each being the mandrel on which its own individual helix is made, and hence when the winding is complete the end of the helix is made fast to its tubular mandrel by a drop of solder or other suitable means, the other end having been buttoned to the chuck, as already described. The chuck is then removed, carrying with it the tubular mandrel and helix, (or, in other words, the radiator-tube with its extended radiating-surface,) and the whole is immersed in a solder-bath or otherwise treated, so that the helix and tube are firmly and permanently united. The chuck is then removed and used for another operation.

To produce the combined rotary and endwise movement of the mandrel, any suitable mechanism may be used; but I prefer to use the mechanism now to be described because it is simple and has proven absolutely satisfactory in practice.

The chuck E is carried by a short shaft which is journaled in a bearing G and carries a miter-wheel H, which meshes with a corresponding miter-wheel H', carried by a short shaft which is journaled in a bearing G' and carries a sprocket-wheel I. The two bearings G and G' are supported by a carriage J, which is slidably mounted upon a pair of parallel tracks or ways K, suitably supported by the table of the machine. To the carriage is attached one end of a band or cord M, the other end of which is attached to a drum or spool N, the shaft of which carries a pinion O, which meshes with a second pinion P on the shaft of a sprocket-wheel Q. This sprocket-wheel is embraced by a sprocket-chain R, which embraces also a sprocket-wheel S on the shaft of the crimping-roll A, so that as the said crimping-roll is revolved movement is transmitted through the connections just described to the carriage J. The relative proportions of the several wheels included in this transmitting mechanism should be such as to give the carriage the desired speed relatively to the speed of the crimping-rolls, so as to make the helix of the desired pitch.

The lower run of the sprocket-chain en-

gages the top side of the sprocket-wheel I, being held in contact therewith by an adjustable presser T, so that it imparts movement to the said wheel, and through the parts H H' and their accessories the rotary movement is imparted to the mandrel.

U is a guide-bracket having through it an opening for receiving the mandrel, whereby the latter is held against lateral displacement or flexure incident to the strains put upon it in winding up the crimped strip.

What I claim as new is—

1. In a machine for making radiator-tubes, having extended radiating-surfaces consisting of a crimped metallic ribbon wound spirally about the tube proper, the combination of co-operating crimping-rolls arranged to produce transverse crimps or corrugations in the ribbon as it passes between them, a mandrel arranged in operative relation to said crimping-rolls and adapted to have the crimped ribbon wound spirally upon it, edgewise, the axis of the mandrel being transverse to the axes of the crimping-rolls, and means for revolving the crimping-rolls and mandrel at correlative speeds whereby as the ribbon is crimped and leaves the crimping-rolls it is wound spirally upon the mandrel edgewise, substantially as described.

2. In a machine of the class described, the combination of crimping-rolls, a mandrel arranged in operative relation thereto, means for revolving the mandrel and means for moving the mandrel endwise whereby the strip of material crimped by the crimping-rolls is wound spirally upon the mandrel, substantially as described.

3. In a machine of the class described the combination of crimping-rolls, a mandrel arranged at right angles to the axes of the crimping-rolls and means for revolving the mandrel whereby the strip of material crimped by the crimping-rolls is wound upon the mandrel, substantially as described.

4. In a machine of the class described, the combination of crimping-rolls, a mandrel arranged at right angles to the axes of the crimping-rolls, means for revolving the mandrel and means for moving the mandrel endwise whereby the strip crimped upon the crimping-rolls is wound spirally upon the mandrel, substantially as described.

5. In a machine of the class described the combination of crimping-rolls, a mandrel arranged at right angles to the axes of the crimping-rolls and at one side of the plane of their working faces and means for revolving the mandrel whereby the strip crimped by the crimping-rolls is wound upon the mandrel, substantially as described.

6. In a machine of the class described the combination of crimping-rolls, a mandrel arranged at right angles to the axes of the crimping-rolls and at one side of the plane of their working faces, means for revolving the man-



drel and means for moving the mandrel endwise whereby the strip crimped by the crimping-rolls is wound spirally upon the mandrel, substantially as described.

5 7. In a machine of the class described, the combination of crimping-rolls, a tubular mandrel arranged in operative relation thereto, means for revolving the mandrel and means for moving the mandrel endwise whereby the  
10 strip crimped by the crimping-rolls is wound spirally upon the mandrel, substantially as described.

8. In a machine of the class described the combination of crimping-rolls, a mandrel arranged in operative relation thereto, a chuck  
15 adapted to hold the mandrel, means for revolving the chuck and means for moving the chuck endwise, substantially as described.

9. In a machine of the class described the combination of crimping-rolls, a mandrel arranged in operative relation thereto, a chuck  
20 adapted to hold the mandrel, a movable carriage on which the chuck is mounted, means for moving the carriage and means for revolving the chuck, substantially as described.

10. In a machine of the class described, the combination of crimping-rolls, a mandrel arranged in operative relation thereto, a chuck  
25 to which the mandrel is secured, a movable carriage on which the chuck is mounted, a

miter-wheel carried by the shaft of the chuck, a second miter-wheel meshing therewith, means for revolving the second miter-wheel and means for moving the carriage, substantially as described.

11. In a machine of the class described, the combination of crimping-rolls, a mandrel arranged in operative relation thereto, a chuck carrying the mandrel, a movable carriage supporting the chuck, a band one end of which is  
35 attached to the carriage, a drum to which the other end of the band is attached, means for revolving the drum and means for rotating the chuck, substantially as described.

12. In a machine of the class described, the combination of crimping-rolls, a mandrel arranged in operative relation thereto, a chuck  
45 to which one end of the mandrel is secured, a movable carriage supporting the chuck, a sprocket-wheel supported by the carriage, means for transmitting movement from the sprocket-wheel to the chuck, a sprocket-chain  
50 engaging the wheel, means for driving the sprocket-chain and means for moving the carriage and thereby moving the mandrel endwise, substantially as described.

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Witnesses:

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