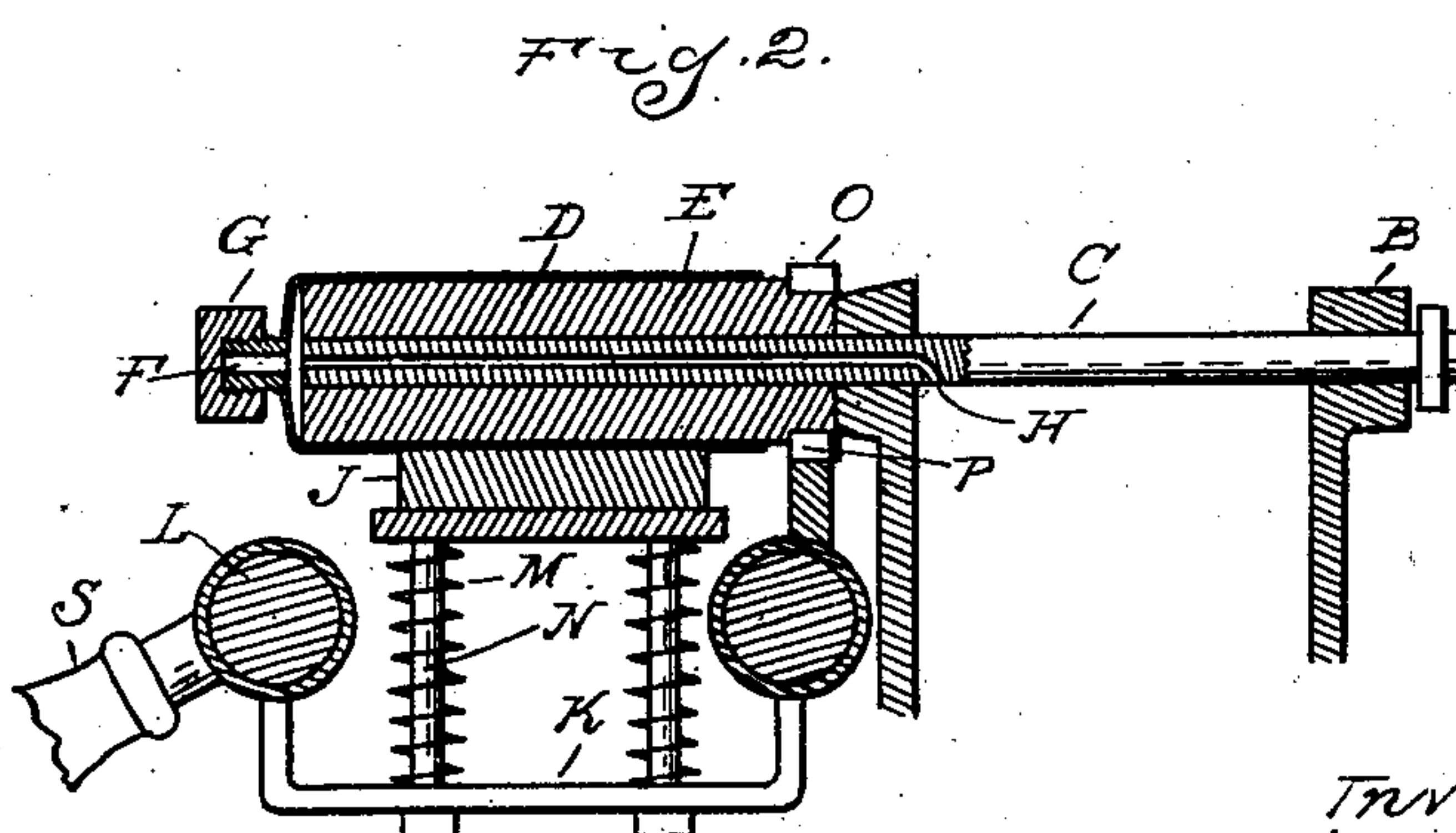
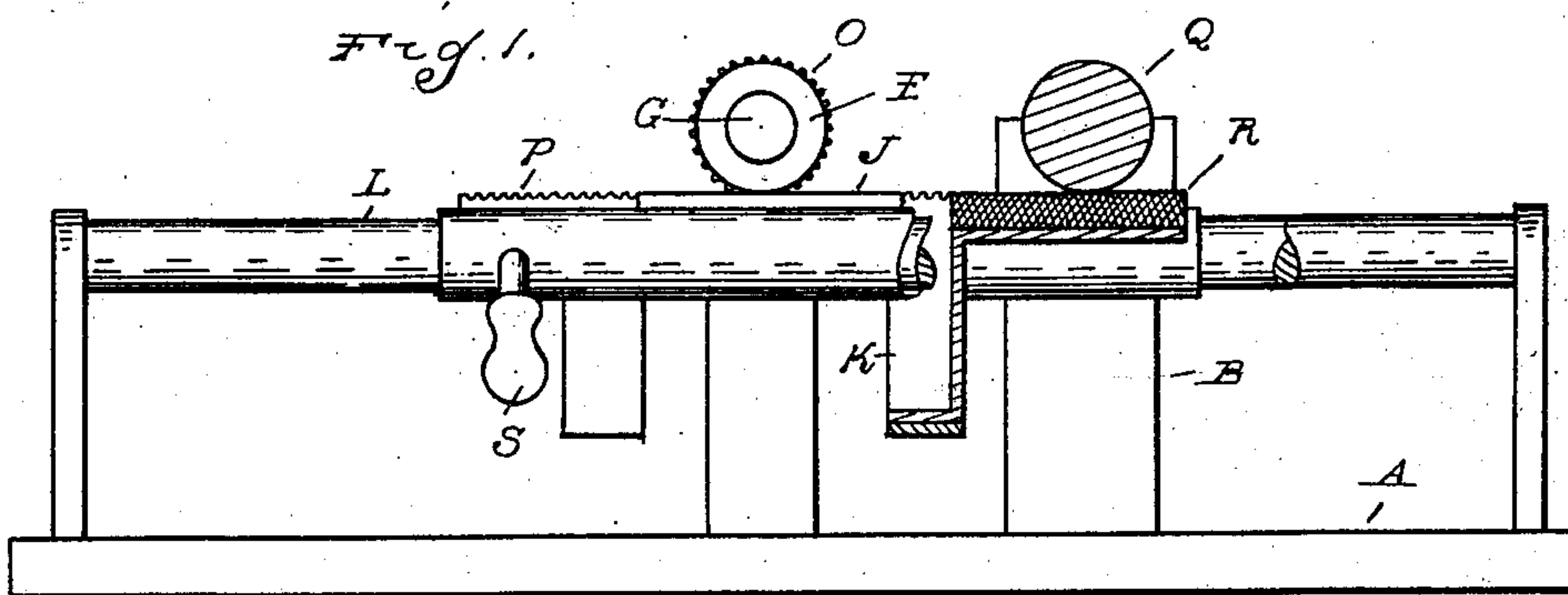
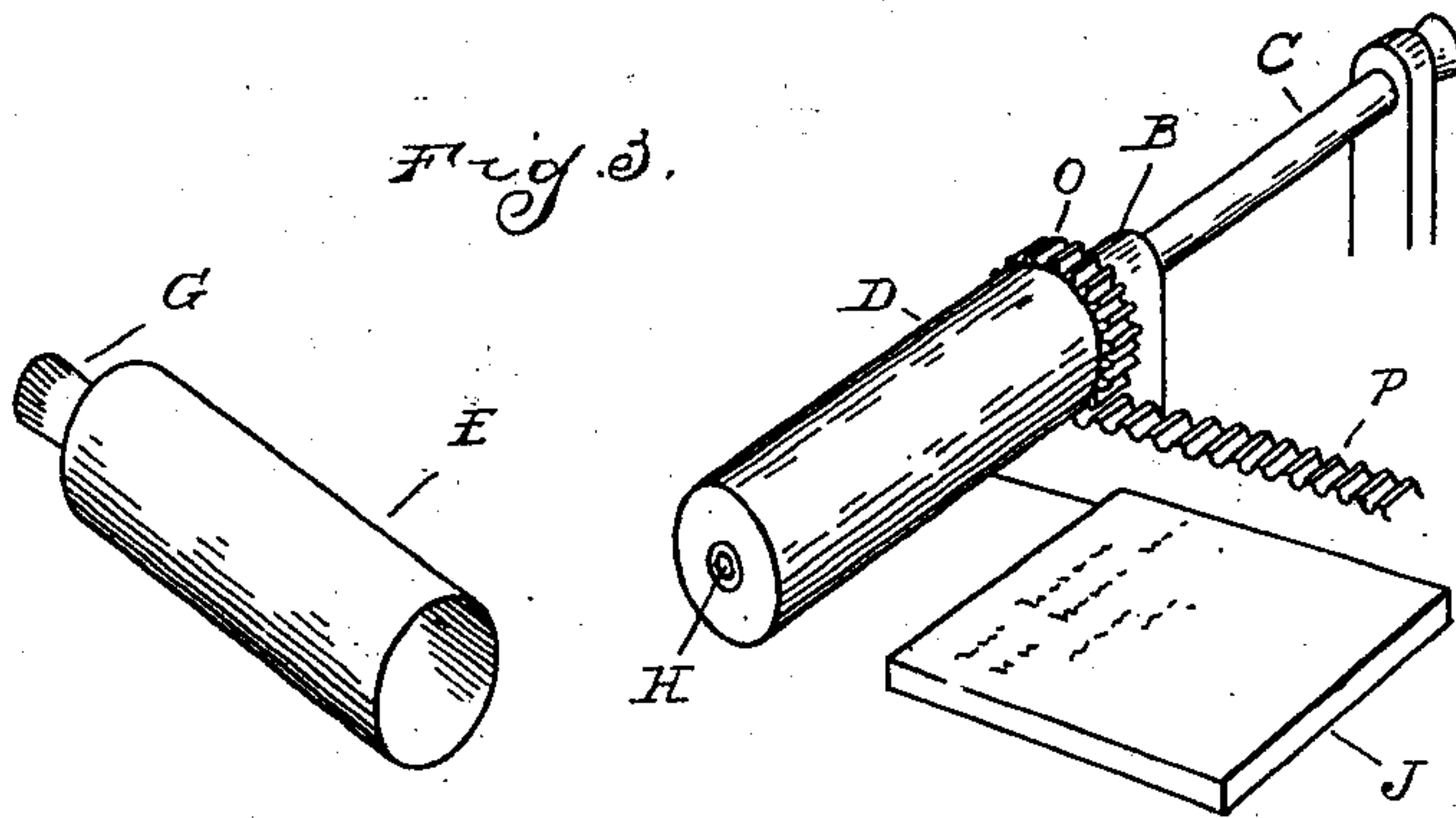


No. 744,554.

PATENTED NOV. 17, 1903.

F. F. INGRAM.  
MACHINE FOR PRINTING COLLAPSIBLE TUBES.  
APPLICATION FILED OCT. 7, 1902.

NO MODEL.



Witnesses  
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# UNITED STATES PATENT OFFICE.

FREDERICK F. INGRAM, OF DETROIT, MICHIGAN.

## MACHINE FOR PRINTING COLLAPSIBLE TUBES.

SPECIFICATION forming part of Letters Patent No. 744,554, dated November 17, 1903.

Application filed October 7, 1902. Serial No. 126,349. (No model.)

*To all whom it may concern:*

Be it known that I, FREDERICK F. INGRAM, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Machines for Printing Collapsible Tubes, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to the manufacture of collapsible metallic tubes such as are used for holding paint, medicines, and other plastic or liquid materials.

It is the object of the invention to obtain a machine by means of which the outer surfaces of the tubes may be printed.

The printing of tubes of this character is an exceedingly difficult operation to perform. This is for the reason that the material of which the tubes are made is thin and pliable, so it is easily thrown out of shape. Moreover, the tubes are usually of small diameter. As a consequence tubes of this character have usually been marked with printed labels affixed to the surface thereof, or when the printing or marking is placed directly upon the tube it is done by hand operation.

It is the object of my invention to obtain a machine which is adapted to rapidly print the surfaces of the tubes without danger of destroying the shape or blurring the printed characters.

To this end the invention consists, first, in the peculiar construction of the holder or mandrel upon which the tubes are placed during the printing; further, in the peculiar construction and arrangement of said mandrel in relation to the type-form, together with the means employed for relatively moving the same, and, further, in the peculiar construction, arrangement, and combination of parts, as hereinafter described and claimed.

In the drawings, Figure 1 is an elevation of one form in which my machine may be constructed. Fig. 2 is a vertical cross-section in the plane of the mandrel, and Fig. 3 is a perspective view of the mandrel and tube detached.

In the construction shown in the drawings the mandrel for holding the roll is rotated in fixed bearings, and the type-form is moved

in rolling contact with said mandrel. I do not wish, however, to be limited in this construction, as it is evident that any means of securing the same relative movement between the mandrel and type-form would operate satisfactorily. Thus the mandrel might remain stationary if the type-form were rotated around the same, or both mandrel and type-form might be moved in relation to other parts of the mechanism.

In the construction shown, A is a suitable bed or frame, upon which is mounted in the stationary bearings B a revoluble shaft C. This shaft is arranged to extend horizontally across the bed and has secured thereto a mandrel D. The mandrel is preferably of cylindrical form and of a diameter slightly less than that of the collapsible tube to be placed thereon. Where tubes of different diameters are to be printed upon the same machine, a number of mandrels of corresponding sizes may be provided, any one of which may be attached to the shaft C.

The collapsible tubes E are usually drawn from a single piece of metal and have threaded tips F, formed integral therewith at one end, and these tips are closed by corresponding threaded caps G. The printing of the tubes is effected before the opposite ends thereof have been closed. The body portion of the tube is thus in the form of a cylinder which is opened at one end, while the opposite end is closed by the tip F and cap G. To place the tubes upon the mandrel, the operator may take hold of the cap G and then slip the open-ended body portion of the tube over the end of the mandrel. Inasmuch as the mandrel is of approximately the same size as the tube and as the outer end of the tube is completely closed it is evident that the air inside of the tube would be trapped therein. This would prevent the operator from quickly slipping the tube completely onto the mandrel and might also cause the crimping or collapsing of the tube by end pressure thereon. I have avoided this difficulty by providing an air-vent extending from the outer end of the mandrel to a point beyond the end of the tube when placed thereon. As shown, this vent H is formed by making the shaft C hollow and providing a



lateral opening or port I at a point beyond the bearing B. Thus the air within the tube is free to pass through this vent and will not interfere with the rapid placing of the tube upon the mandrel.

J is a type-form containing the characters to be printed upon the mandrel. This form is secured to the carrier K, which, as shown, is mounted upon guides L, extending longitudinally of the bed, the arrangement being such that by moving the carrier upon said guides the type-form J will be carried past and in contact with the periphery of the mandrel. The type-form is preferably yieldingly pressed toward the mandrel by suitable means, such as the springs M, surrounding the post N on the carrier K, upon which the form J is mounted.

In order that the tubes may be printed without danger of blurring, it is necessary that the outer surfaces thereof should move in rolling contact with the face of the type-form when the latter is traveling upon the guides L. It is also essential that no lateral strain should be exerted upon the metal of the tube, as this would result in injury. I therefore provide means for revolving the mandrel at a peripheral speed which is the same as the longitudinal speed of the traveling type-form. This is accomplished by arranging a pinion O on the shaft C adjacent to the end of the mandrel or attached directly to the mandrel, said pinion having a pitch-diameter which is the same as the diameter of the mandrel. The pinion O meshes with the rack P, which is carried by the carrier K.

The inking of the type-form is accomplished by means of an inking-roll Q, secured to the frame at a point where it will contact with the faces of the type-form at one point in its movement. Ink may be supplied to this roll by any suitable means, that shown comprising an ink-plate R, which is secured to the carrier K.

The parts being constructed as shown and described, in operation the tubes may be successively placed upon and removed from the mandrel when the type-form is out of engagement therewith. The operator may then reciprocate the carrier K by means of a suitable handle S, which will cause the movement of the type-form across the face of the mandrel and the simultaneous rotation of said mandrel through the medium of the rack P and pinion O. As the type-form passes the mandrel the springs M will yieldingly press the same against the outer face of the type, and as the peripheral speed of said tube and longitudinal speed of the type are the same a perfect impression is produced. Each reciprocation of the carrier will cause the inking of the type-face by contact with the roll Q, while the latter will be supplied with fresh ink through contact with the plate R. The ink applied to the face of the type by contact with the roll is generally sufficient to

make two impressions, and thus the operator may remove the printed tube and place the unprinted one upon the mandrel when the carrier is at each end of its movement.

The success of the operation of the machine depends upon providing a mandrel which is so formed as to support the tube and press it in contact with the type-form without exerting any strain upon the metal. This result may be obtained where the peripheral speed of the mandrel is precisely the same as that of the type-form, the thickness of the tube being so slight as to make no appreciable difference between the speed of its inner and outer surface. Another important feature of the construction is the means by which the entrapped air within the tube is released, thereby relieving the walls of the tube from any strain when placing it or removing it from the mandrel.

What I claim as my invention is—

1. In a machine of the character described, the combination with a type-form, of a cylindrical mandrel, adapted to receive and support a collapsible tube, means for revolving said mandrel and coacting means for relatively moving said type-form at the same speed to maintain a rolling contact with the tube on the mandrel and means for yieldingly pressing said type-form against the surface of said tube during said rolling contact.

2. In a machine of the character described, the combination with a longitudinally-movable type-form, of a cylindrical mandrel supported at one end and adapted to receive upon its free end and to support a collapsible tube, means for reciprocating said type-form and coacting means for rotating said mandrel at the same speed to maintain rolling contact between the tube thereon and the type-form.

3. In a machine of the character described, the combination with a longitudinally-movable type-form, of a cylindrical mandrel supported at one end and adapted to receive upon its free end and to support a collapsible tube, means for reciprocating said type-form and coacting means for rotating said mandrel at the same speed to maintain rolling contact between the tube thereon and the type-form and means for yieldingly pressing said type-form against the tube during the rolling contact.

4. In a machine of the character described the combination with a longitudinally-movable type-form provided with a rack, of a cylindrical mandrel supported at one end and adapted to receive upon its free end and to support a collapsible tube, and a pinion secured upon the mandrel-shaft arranged to engage with the rack on the type-form when the same is reciprocated to maintain a rolling contact between the tube on the mandrel and the type-form.

5. In a machine of the character described the combination with a longitudinally-movable type-form provided with a rack, of a



5 cylindrical mandrel supported at one end and adapted to receive upon its free end and to support a collapsible tube, a pinion secured upon the mandrel-shaft arranged to engage with the rack on the type-form when the same is reciprocated to maintain a rolling contact between the tube on the mandrel and the type-form, and means for yieldingly pressing

said type-form against the tube during said rolling contact.

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In testimony whereof I affix my signature in presence of two witnesses.

FREDERICK F. INGRAM.

Witnesses:

M. B. O'DOHERTY,  
A. G. ROBERTSON.