

(No Model.)

2 Sheets—Sheet 1.

W. I. B. McHALE.

TUBE EXPANDER AND CUTTER.

No. 353,425.

Patented Nov. 30, 1886.

Fig. 1.

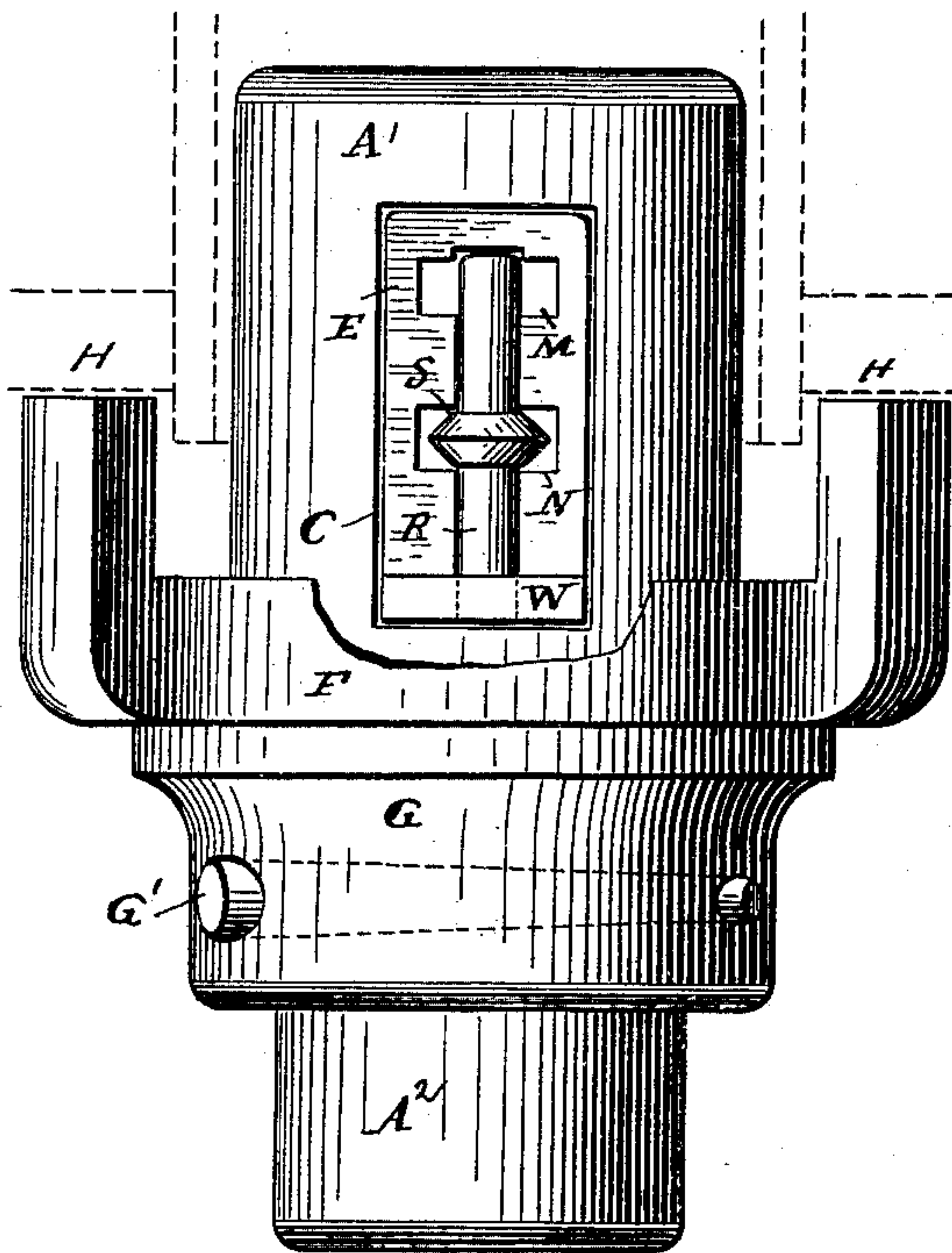


Fig. 2.

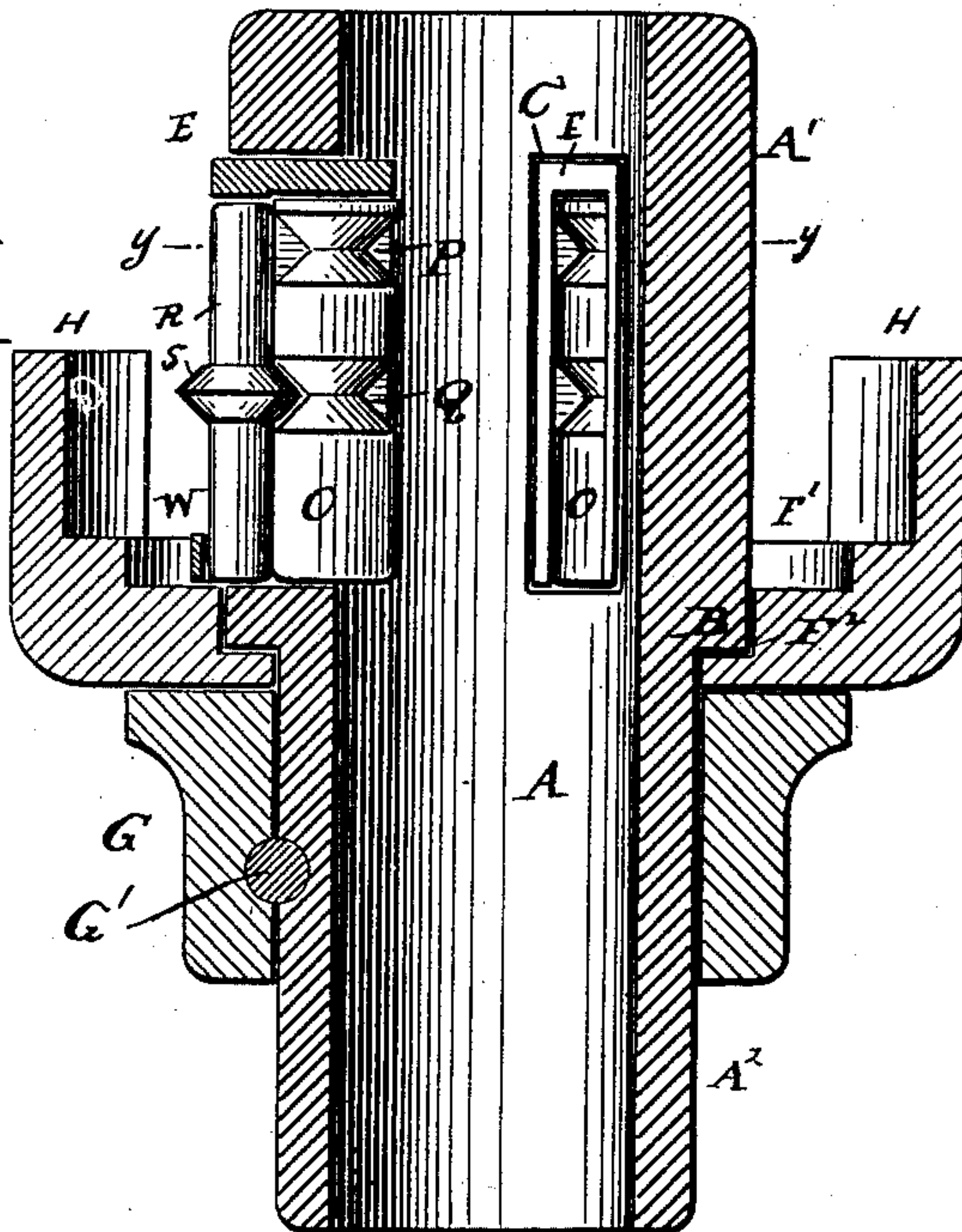
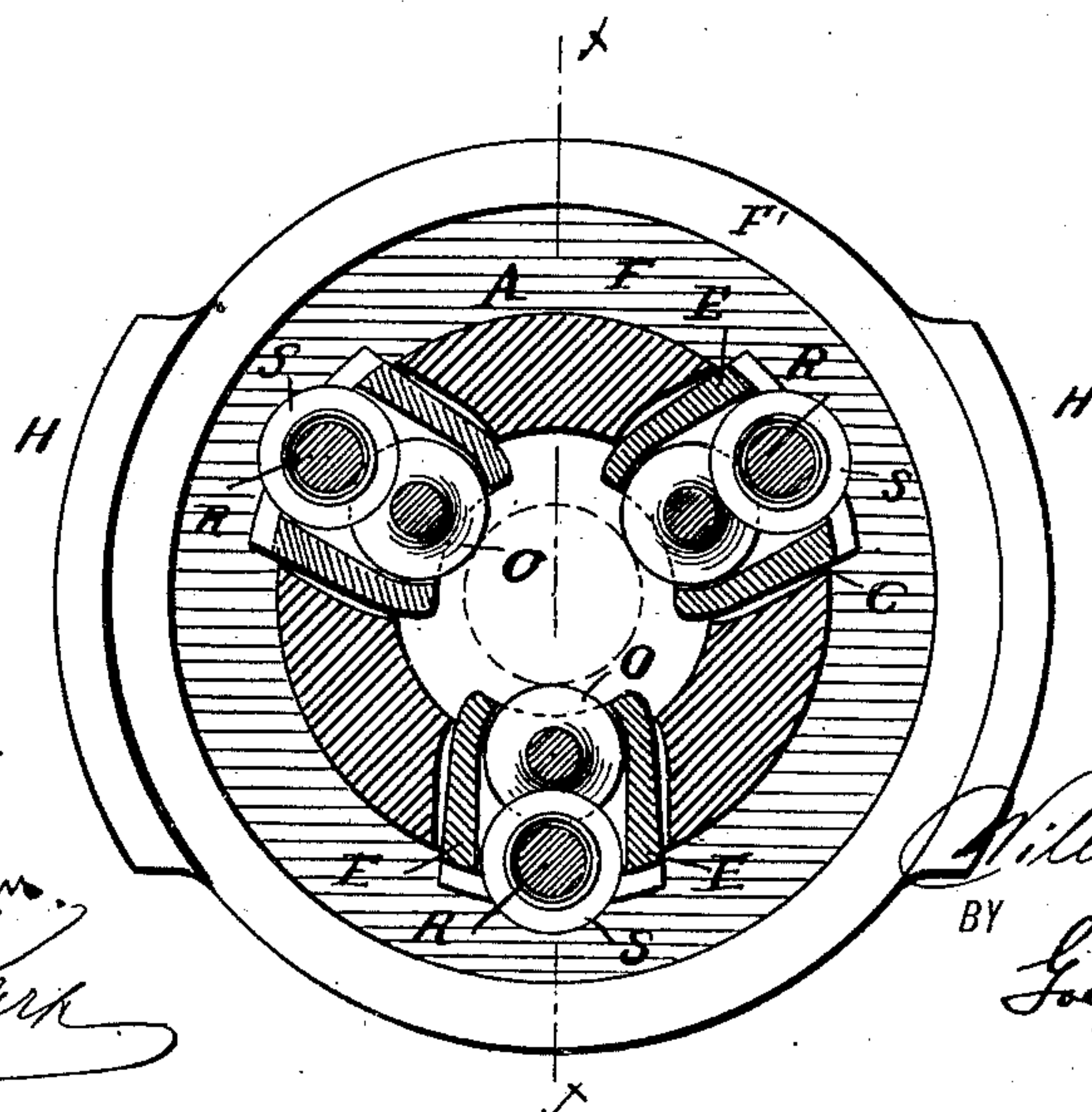


Fig. 3.



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(No Model.)

2 Sheets—Sheet 2.

W. I. B. McHALE.

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fig. 4.

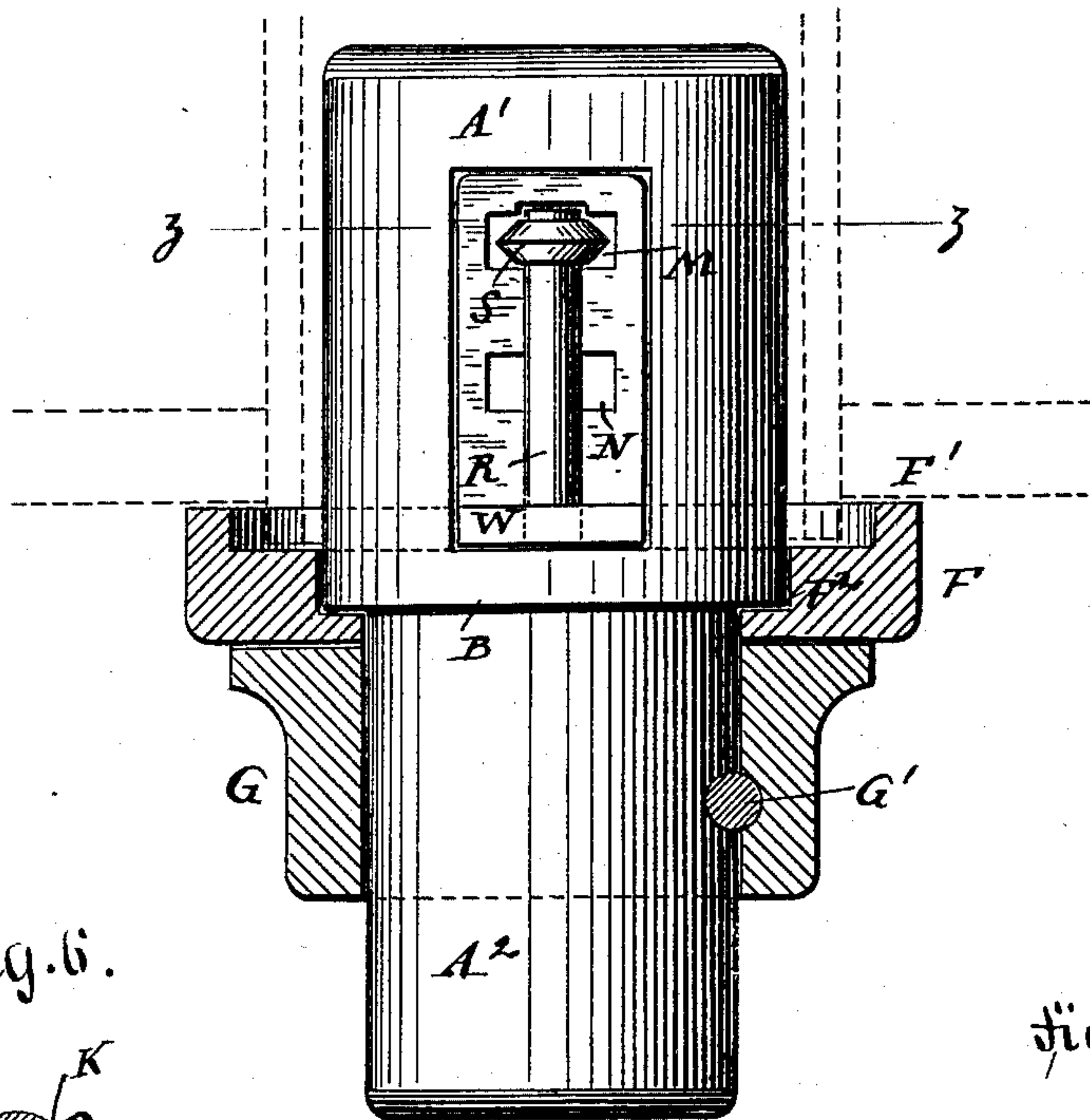


fig. 6.

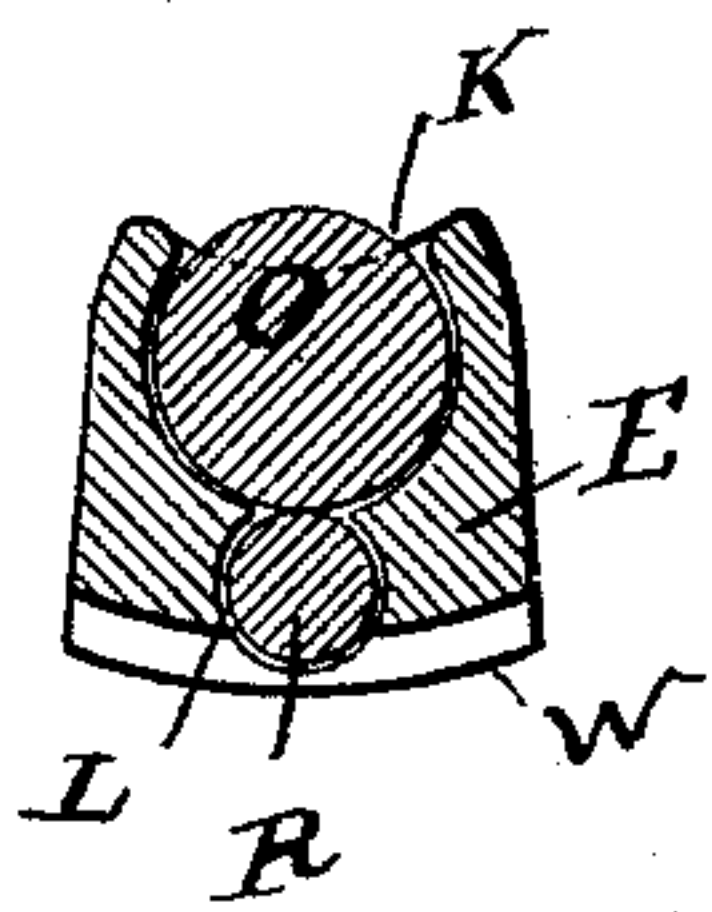
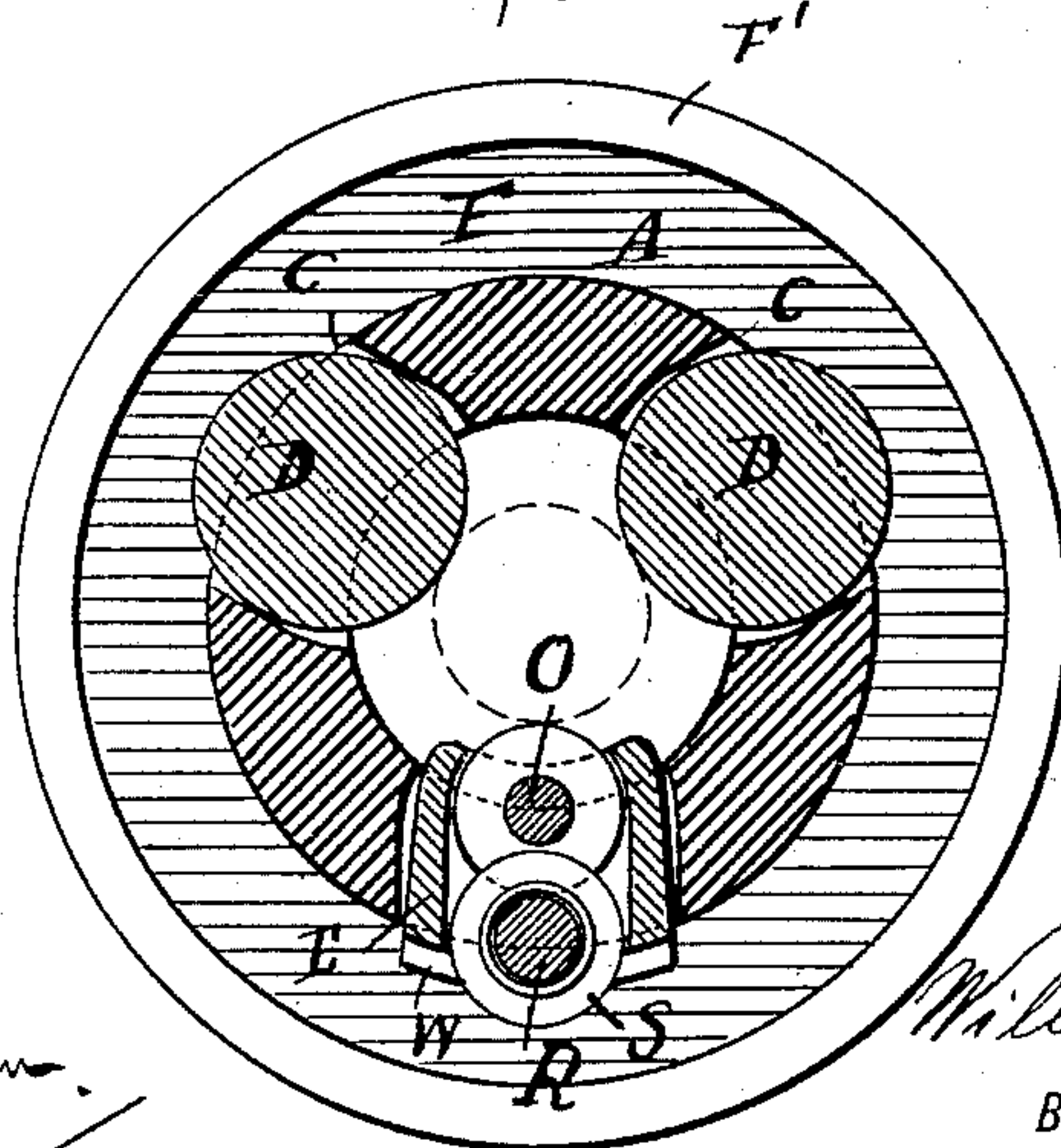


fig. 7.



fig. 5.



WITNESSES:

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UNITED STATES PATENT OFFICE.

WILLIAM I. B. McHALE, OF NEW YORK, N. Y.

TUBE EXPANDER AND CUTTER.

SPECIFICATION forming part of Letters Patent No. 353,425, dated November 30, 1886.

Application filed March 18, 1886. Serial No. 195,640. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM I. B. McHALE, of the city, county, and State of New York, have invented certain new and useful Improvements in Combined Tube Expander and Cutter, of which the following is a specification.

This invention relates to certain new and useful improvements in that class of implements used for the purpose of expanding the ends of tubes.

The object of my invention is to provide a tube-expander with an attachment for expanding the tubes and cutting them at the outside at the same time, or for cutting them at the inside of the boiler-head.

The invention consists in the combination, with a slotted stock, of boxes in the slots of the stock, swages or rollers in the boxes, and detachable cutters on the outer rollers in the boxes.

The invention also consists in various details and combinations of the same, as will be described and set forth hereinafter, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a side view of my improved tube expander and cutter, parts being broken out. Fig. 2 is a cross-sectional view of the same on the line x x , Fig. 3. Fig. 3 is a sectional plan view of the same on the line y y , Fig. 2. Fig. 4 is a side view of the same, showing it adjusted for cutting the tubes at the inside of the boiler-head. Fig. 5 is a sectional plan view of the same on the line z z , Fig. 4. Fig. 6 is a detail cross sectional view of one of the boxes. Fig. 7 is a partial side and sectional view of a modified construction of one of the cutters.

Similar letters of reference indicate corresponding parts.

The tubular stock A is provided at about the middle of its length with an external annular offset or shoulder, B, separating the parts A^1 and A^2 of the stock, the part A^1 having a slightly greater diameter than the part A^2 . The part A^1 is provided with three or more longitudinal slots, C, which extend from the bore of the stock to the outer surface, and are slightly narrowed from the outer to the inner surface of the stock, and the sides of the slots are slightly curved toward each other. In said slots C the cylindrical swages D or the boxes E, which will be described hereinafter, are placed. The stock is passed into a ring, F, having an annular flange, F', and an annu-

lar rabbet, F², into which the lower part of the larger cylindrical part A^2 of the stock, is placed against the bottom of the ring F and is held in place by a pin or key, G'. If desired, the ring F may have two lugs, H, projecting in the direction toward the upper or free end of the part A^1 .

The cylindrical rollers or swages D are of the same length as the slots C, so as to have no longitudinal play in the same, and are so shaped as to revolve freely in the slots. The diameters of the swages or rollers are such that the rollers can be inserted into the slots from the outside, but cannot pass entirely through the same, as the diameter of the swages is greater than the inner width of the slots.

Each box E is provided with a longitudinal groove, K, in the inner or narrower side, said groove having approximately the cross-section of about three-quarters of a circle. From said groove K a longitudinal slot, L, extends to the wider side of the box, the sides of said slot L being curved. The outer or wider side of each box is curved on a convex line, and the inner side on a concave line, as shown in dotted lines in Figs. 5 and 6.

The box E is closed at one end and open at the other end to permit passing the rollers into the slots and grooves. In the outer convex surface of each box two transverse slots, M and N, are provided, one at one end and the other at the middle, said slots extending through to the longitudinal groove K. In the groove K I place a roller, O, which is provided with two annular grooves, P and Q, so located that when a roller is placed in the box the grooves will be in line with the transverse slots M and N. In the slot L, I place a roller, R, which is passed through a circular cutter, S, in one of the grooves M and N, thus adapting said cutter to revolve on said roller R, the roller R resting on the surface of the roller O. The cutter S is made V-shaped in cross-section, or may consist of a short cylinder provided with a V-shaped cutting-edge, as shown in Fig. 7. The grooves P and Q may be V-shaped or may be shaped the same as the contour of the cutter shown in Fig. 7. The sides of the box E are slightly curved and inclined toward each other. A flange, W, is formed on the open end of each box to bridge over the slot L. The operation is as follows: When a tube

is to be expanded and cut off outside of the boiler-head, a box, E, is placed in each slot of the stock, and the ring F, having the lugs H, is fastened on the stock. The part A' of the stock is inserted into the tube until the ends of the lugs H rest against the boiler-head, (shown in dotted lines in Fig. 1,) and a mandrel is then driven through the stock, and, pressing on the rollers O, presses them outwardly, whereby the boxes are also pressed outward and the rollers R pressed against the inside of the tube. By turning the mandrel the rollers O are revolved on their longitudinal axis, and they in turn revolve the rollers R. The stock A is also turned on its longitudinal axis, and thus the cutters are carried in a circle along the inside of the tube. As the edges of the cutter project more than the surfaces of the rollers R, the cutters first act on the inside of the tube and cut a groove in the same, which is gradually deepened until the projecting end of the tube outside of the boiler-head is cut off. Then the rollers R begin to act on the tube and expand the same. In case the device is to be used as an ordinary tube-expander without cutting the tube, the swages D are inserted into the slots. In case it is desired to cut off the tubes inside the boiler-head, two cylindrical rollers or swages, D, are placed in two of the slots, and a box, E, in the third. The cutter S of the box E is placed in the forward groove, M. The stock is passed into the tube, the part A² being shown in Fig. 4 in position in the tube, which, with the head, is shown in dotted lines, the flange F' of the ring F resting against the outer side of the boiler-head. The mandrel is inserted and turned on its longitudinal axis, whereby the rollers O and R are revolved, and the stock is revolved on its longitudinal axis. The cutter S acts on the tube inside of the boiler-head and cuts a groove into the same, which is gradually deepened, and, finally, the tube is cut off and drops to the bottom of the boiler. If desired, all three boxes may be used for cutting off the tube at the inside of the boiler-head; but I prefer to use two swages and one box, as the friction-surface is increased and the stock may be revolved on its longitudinal axis more easily. The ring F, provided with or without the lugs H, can easily be removed from the stock and readily replaced. The flange F' limits the outward movement of the swages or boxes and prevents moving the said parts outward sufficiently to remove them from their slots. The swages or boxes can only be removed after the rings F and G have been removed.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a tube expander and cutter, the combination, with a stock having longitudinal slots, of boxes in said slots, rollers mounted in the boxes, and cutters mounted detachably on said rollers, substantially as herein shown and described.

2. In a tube expander and cutter, the com-

bination, with a stock having slots, of boxes in said slots, two parallel longitudinal rollers in each box, and a cutter on one roller on each pair of rollers, substantially as shown and described.

3. In a tube expander and cutter, the combination, with a stock having slots, of boxes in said slots, two longitudinal parallel rollers in each box, and a cutter mounted loosely on the outer roller, substantially as shown and described.

4. In a tube expander and cutter, the combination, with a stock having slots, of boxes in the slots and two longitudinal parallel rollers in each box, substantially as shown and described.

5. In a tube expander and cutter, the combination, with a stock having slots, of a box in each slot, two longitudinal parallel rollers in each box, one roller projecting from the inner surface of the box and the other from the outer surface, and said rollers being in contact, substantially as shown and described.

6. In a tube expander and cutter, with a stock having slots, of boxes in the slots, two parallel longitudinal rollers in each box, one roller projecting from the inner and the other from the outer surface of the box, the inner rollers having annular grooves and the outer rollers carrying cutters, substantially as shown and described.

7. In a tube expander and cutter, the combination, with a stock having slots, of boxes in the slots, each box having a longitudinal groove and slot and two transverse slots, and of a cutter mounted on the outer roller within one of the transverse slots, substantially as shown and described.

8. In a tube expander and cutter, the combination, with a stock having slots, of pairs of rollers in the slots of the stock, said rollers being mounted to travel transversely to their longitudinal axis toward and from the center of the stock, and said rollers being in contact, and of cutters on the outer rollers, substantially as shown and described.

9. In a tube expander and cutter, the combination, with the stock having longitudinal slots, of boxes in the slots, each box having longitudinal grooves and slots, rollers in the boxes, and the bridging-flanges W at the ends of the boxes, substantially as shown and described.

10. In a tube expander and cutter, the combination, with the stock A, having the longitudinal slots E, of the rings F, having the lugs H and the rabbet, the lower ends of the slots E being flush with the upper surface of the ring-F, substantially as shown and described.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

WILLIAM I. B. McHALE.

Witnesses:

OSCAR F. GUNZ,
SIDNEY MANN.