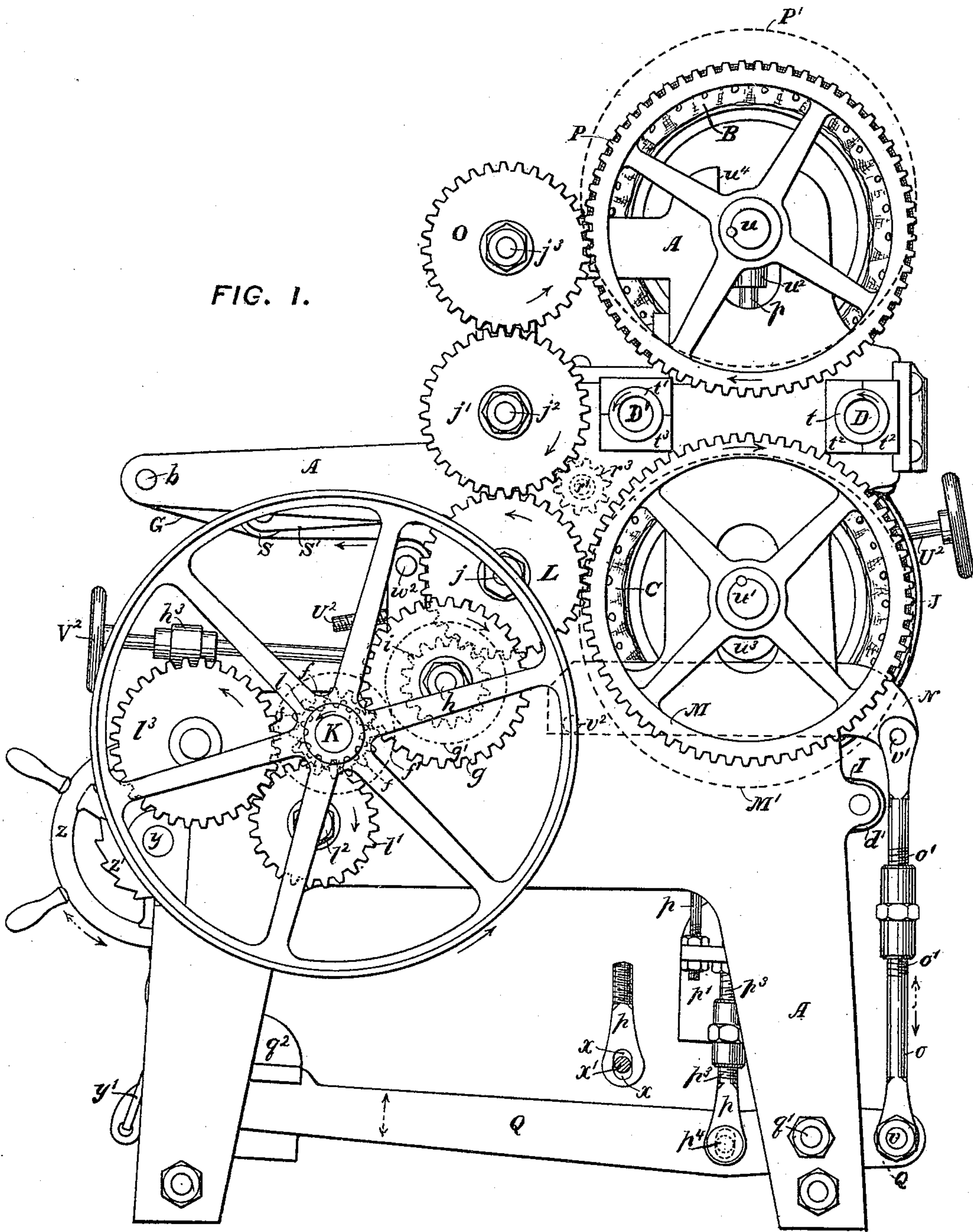


T. S. WILES.  
IRONING MACHINE.

No. 440,292.

Patented Nov. 11, 1890.

**FIG. 1.**



**WITNESSES:**

Austin Ford Park  
James Thorn Goodfellow

***INVENTOR:***

Thomas Shires Wiles.

T. S. WILES.  
IRONING MACHINE.

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No. 440,292.

Patented Nov. 11, 1890.

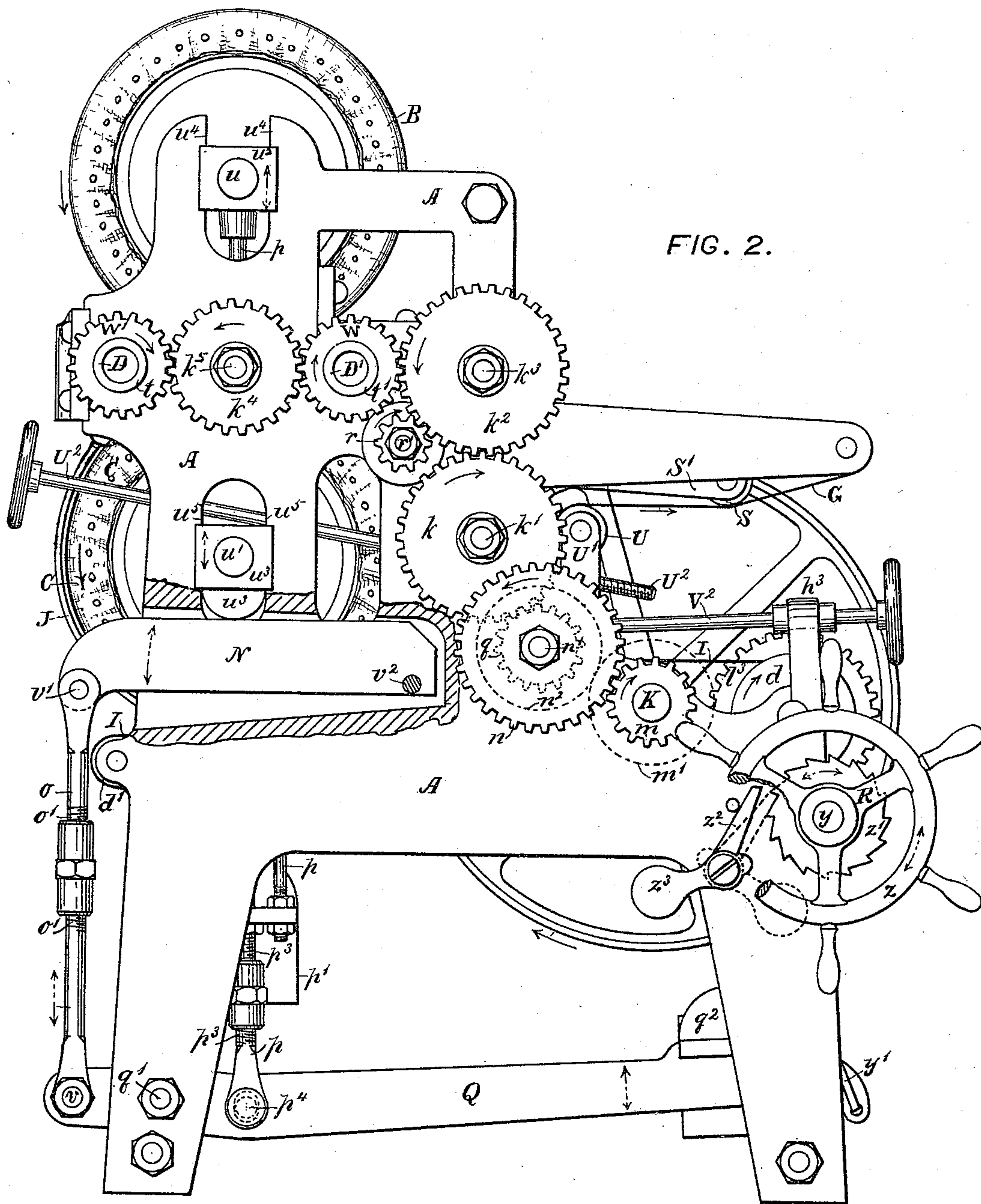


FIG. 2.

WITNESSES:

Austin Ford Park  
James Thorn Goodfellow

INVENTOR:

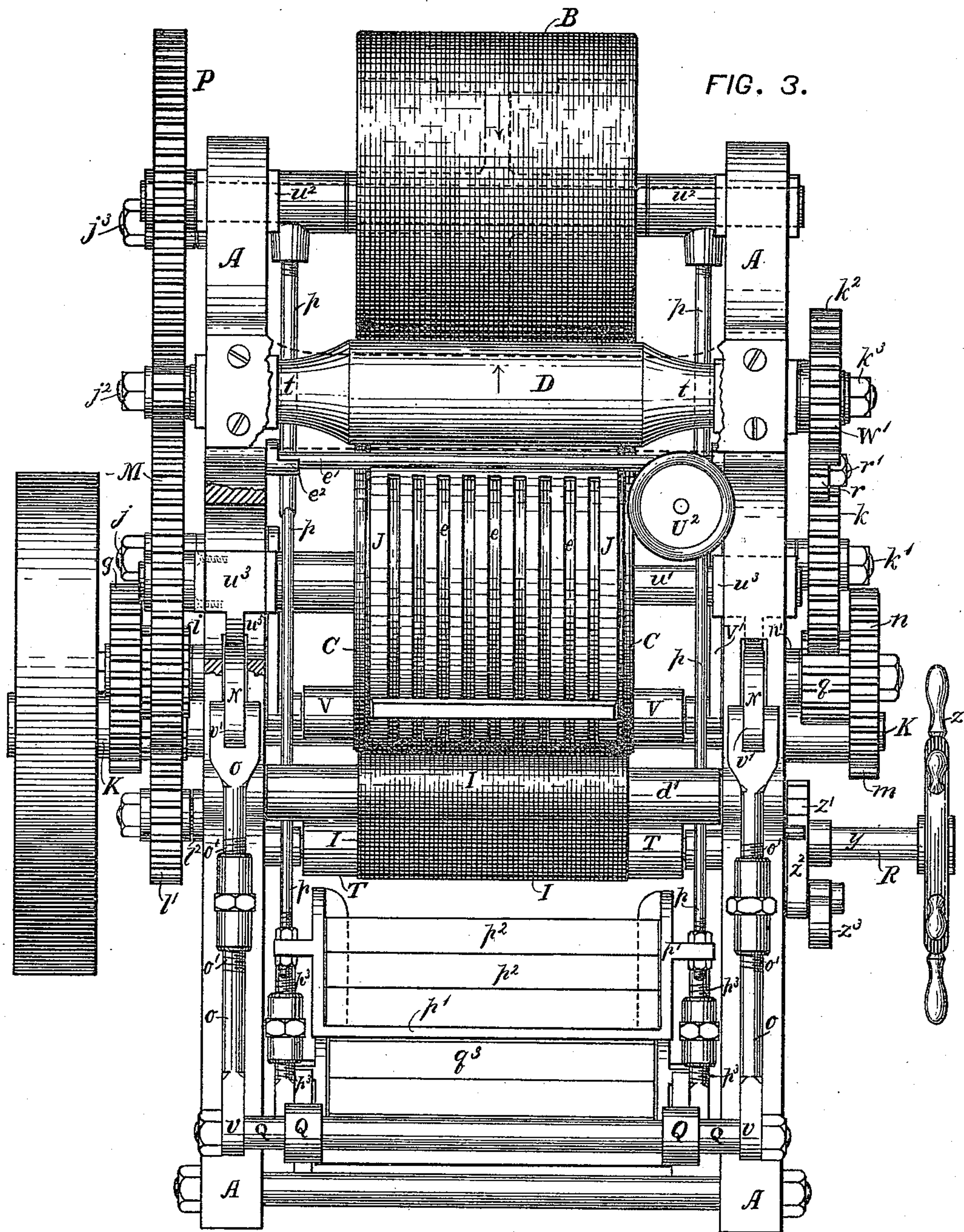
Thomas Shier Wiles.



T. S. WILES.  
IRONING MACHINE.

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WITNESSES:

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James Thom Goodfellow

INVENTOR:

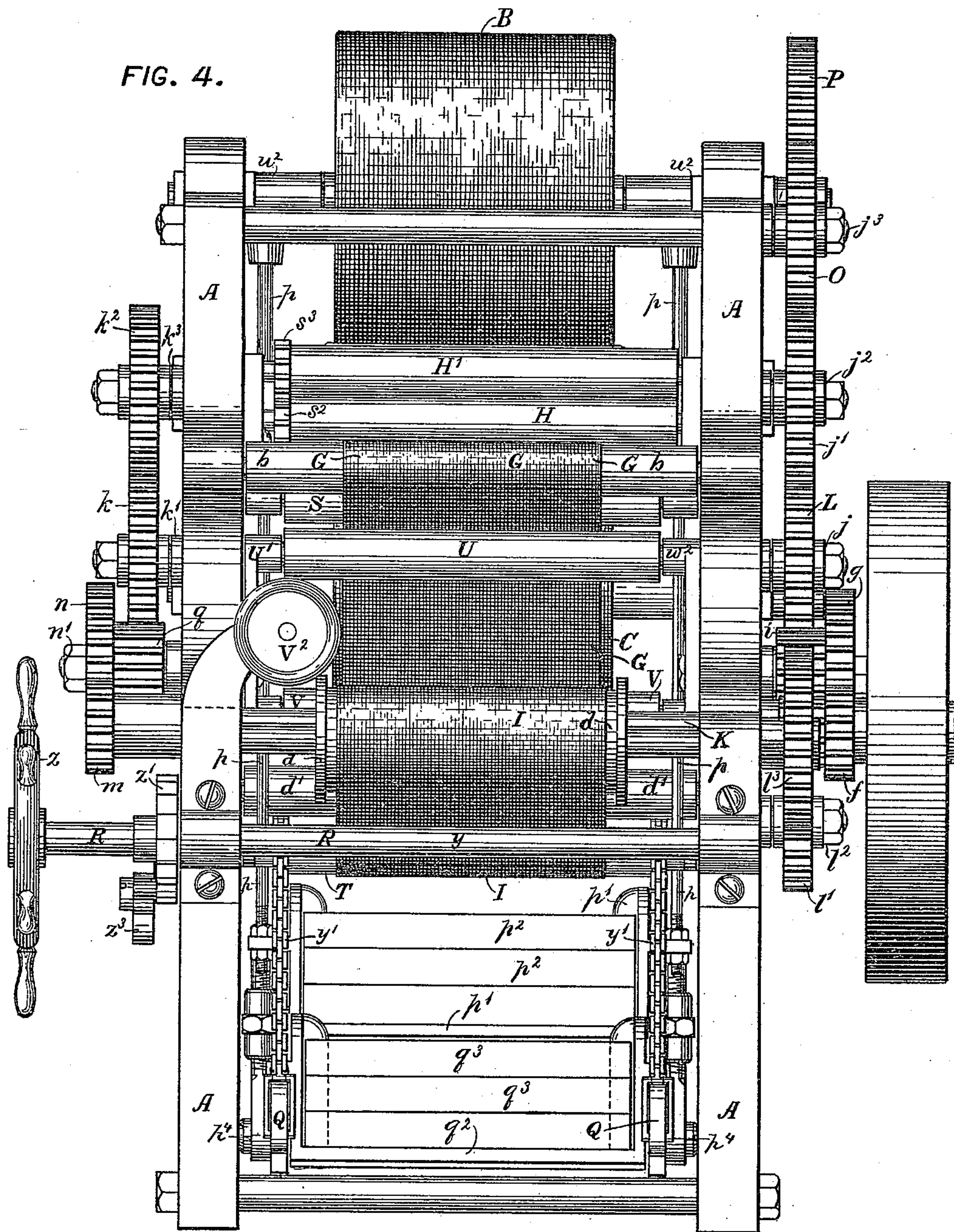
Thomas Shires Wiles.



T. S. WILES.  
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WITNESSES:

Austin Ford Park  
James Thorn Goodfellow.

INVENTOR:

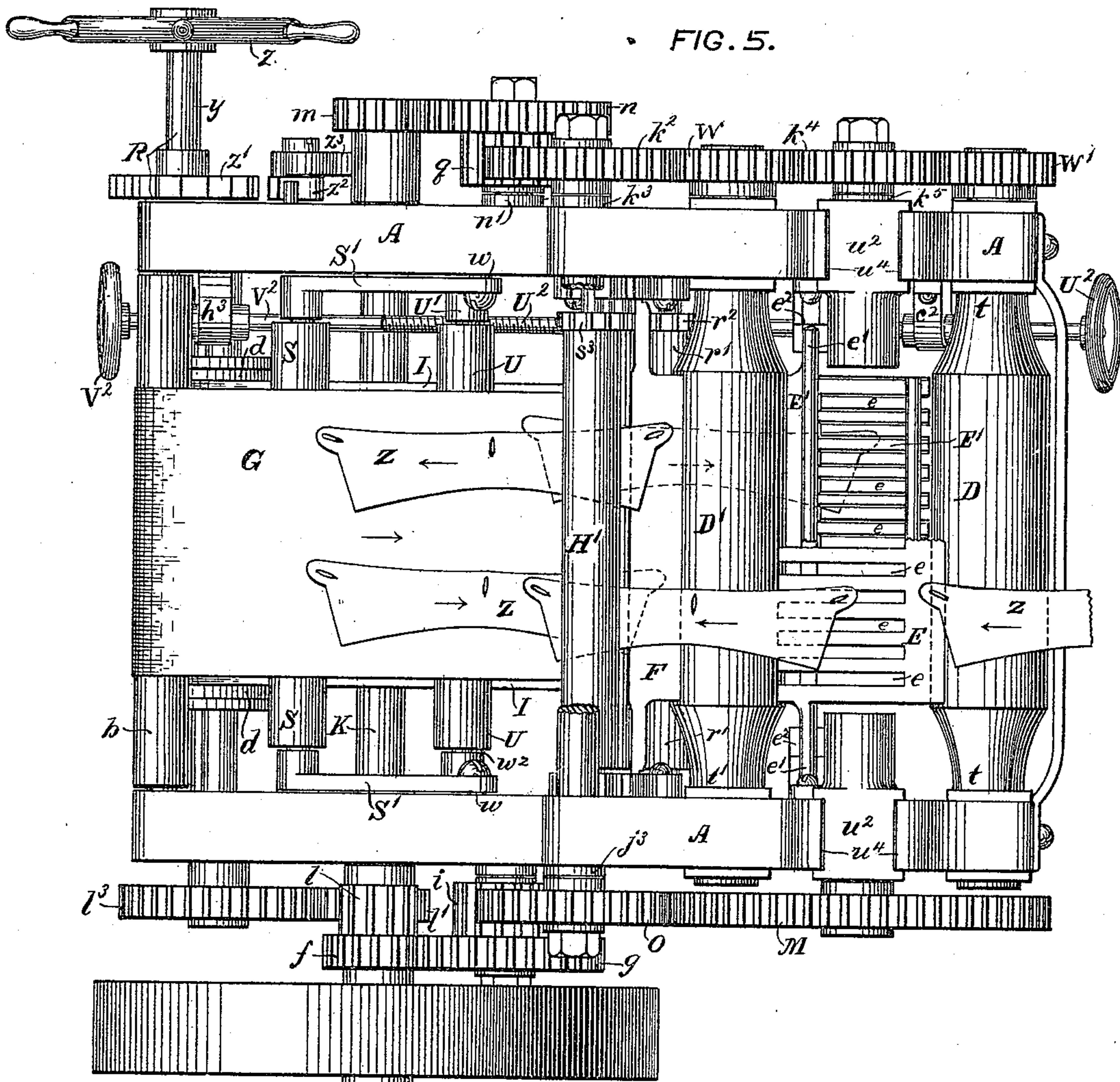
Thomas Shires Wiles.

T. S. WILES.  
IRONING MACHINE.

8 Sheets—Sheet 5.

No. 440,292.

Patented Nov. 11, 1890.



WITNESSES:

Austin Ford Park  
James Thom Goodfellow.

INVENTOR:

Thomas Shires Wiles.

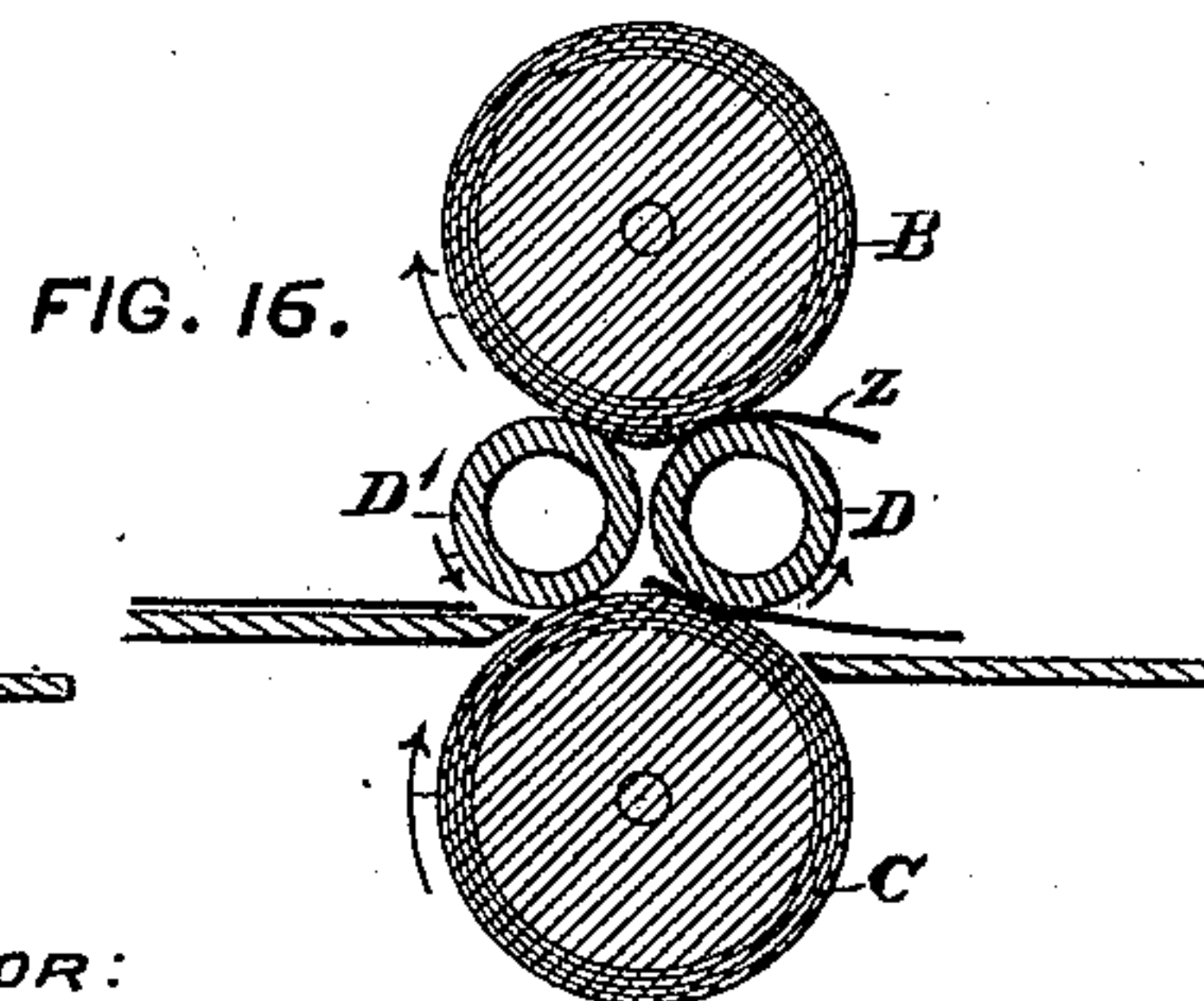
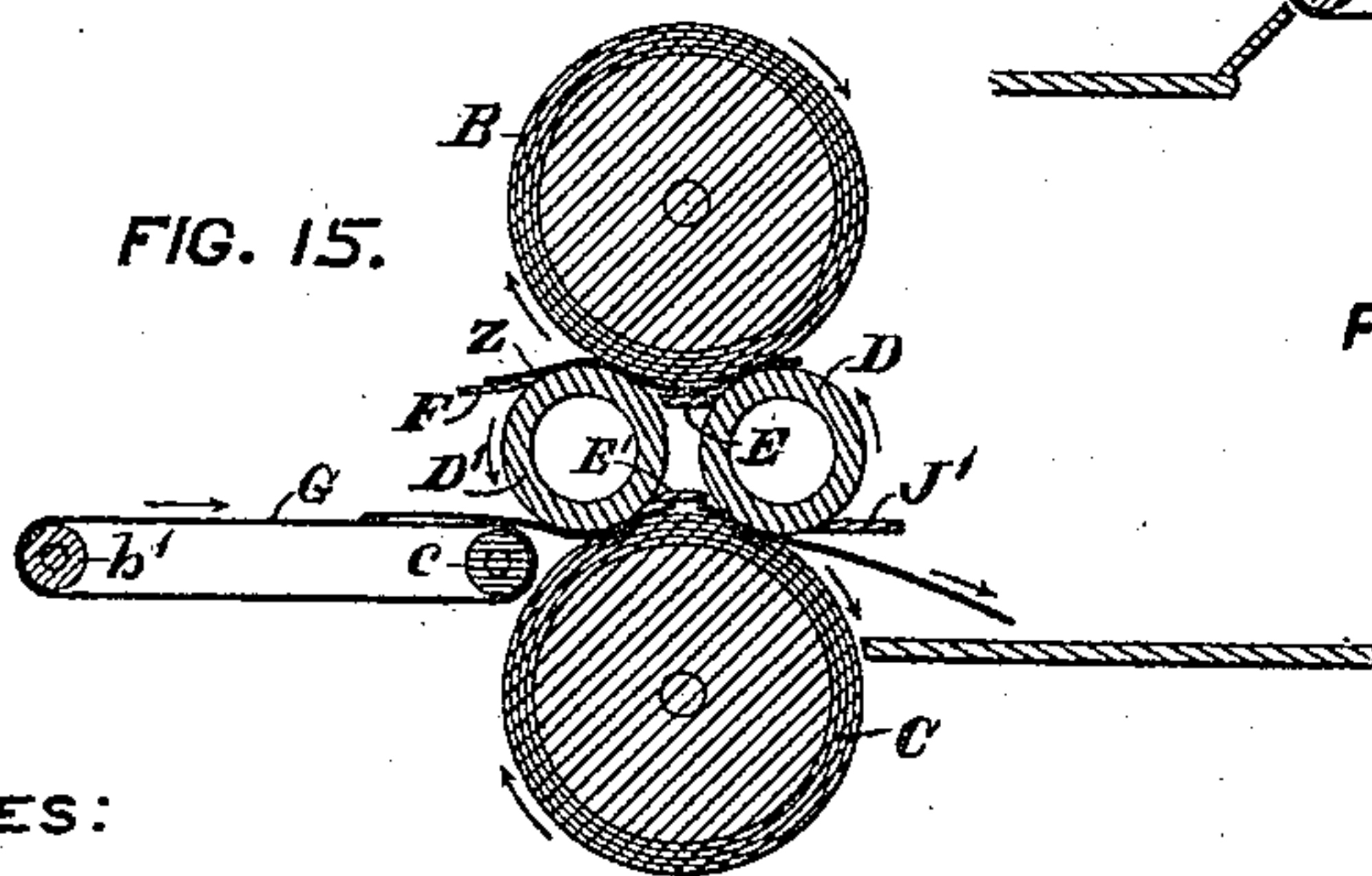
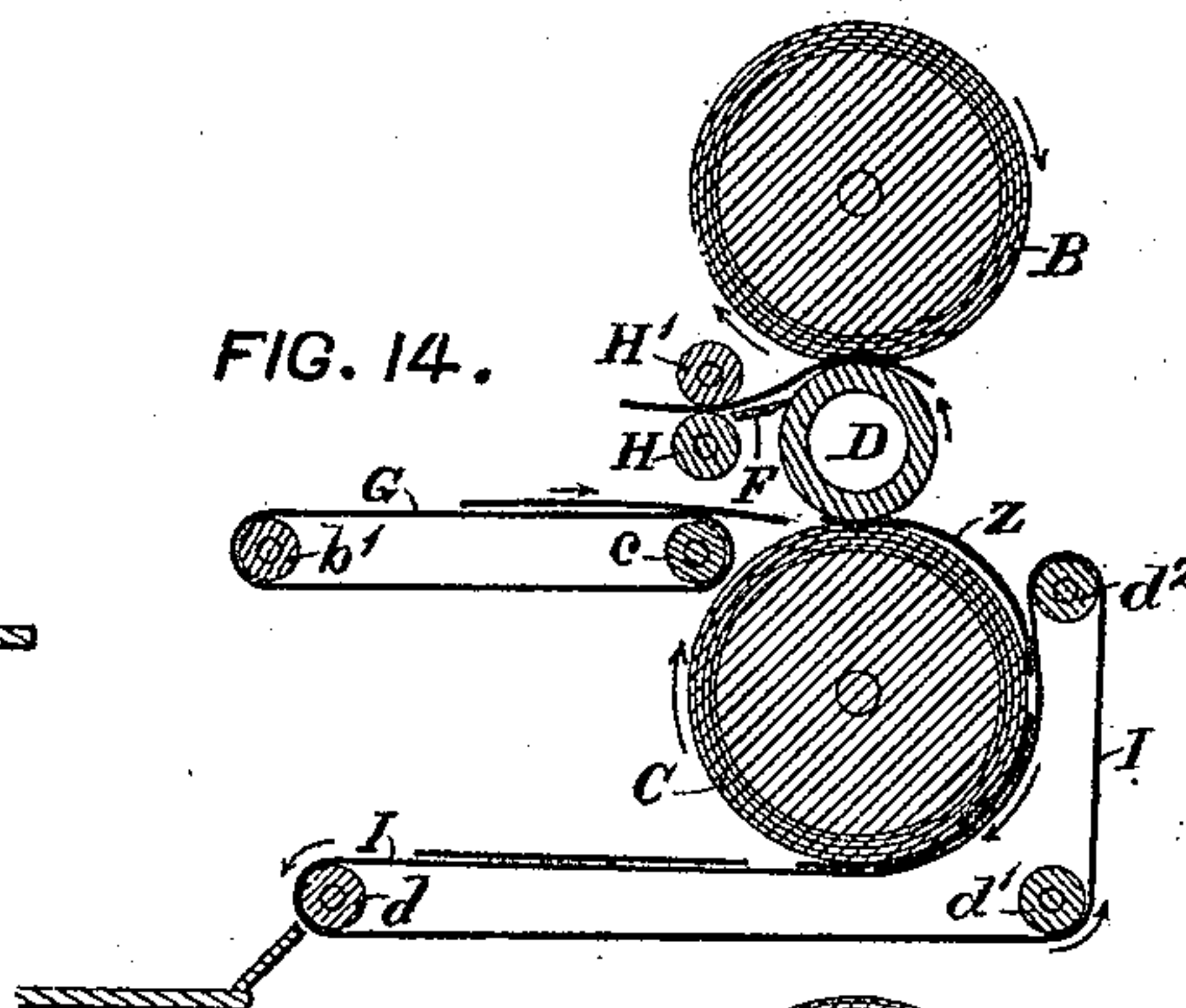
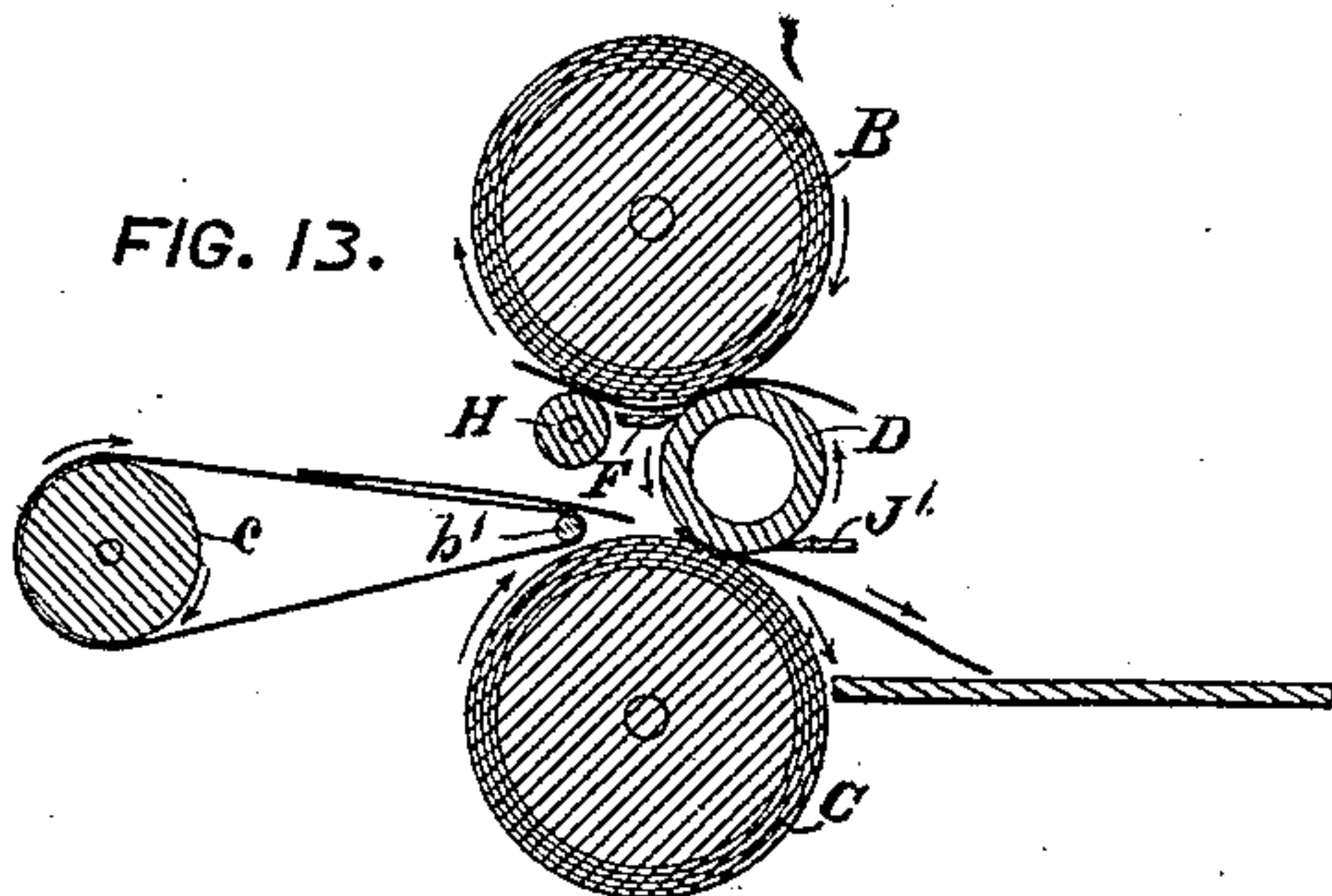
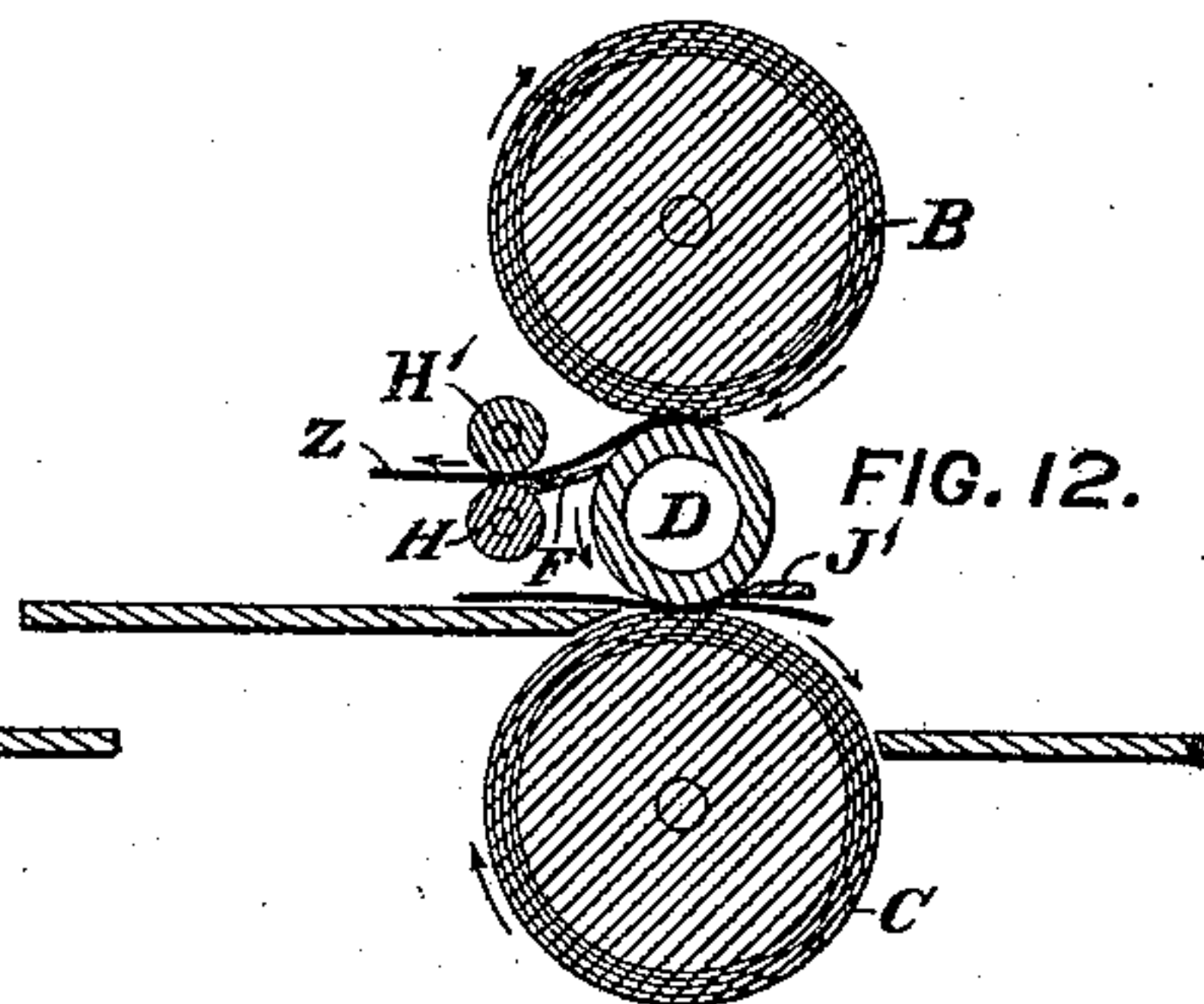
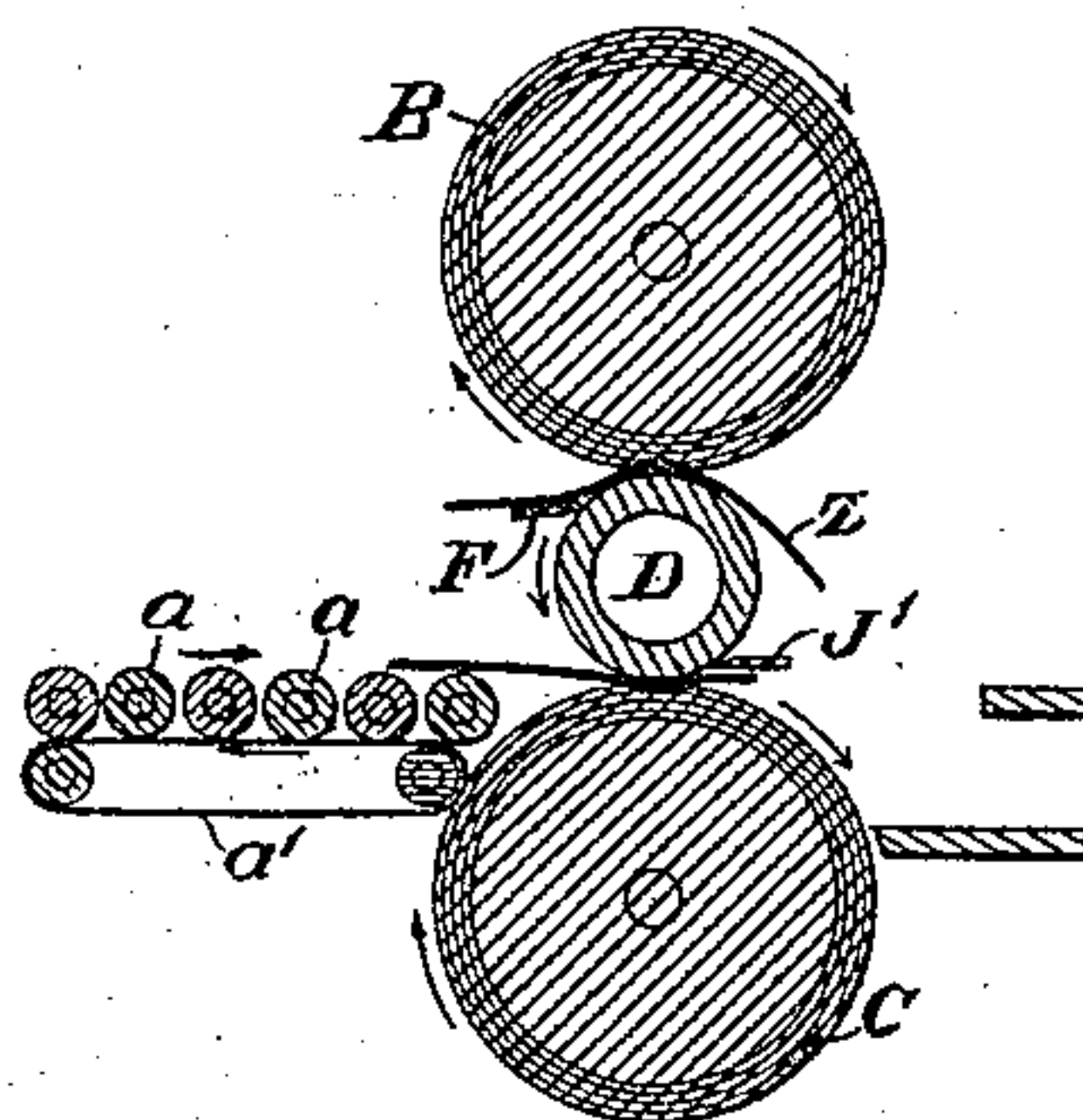
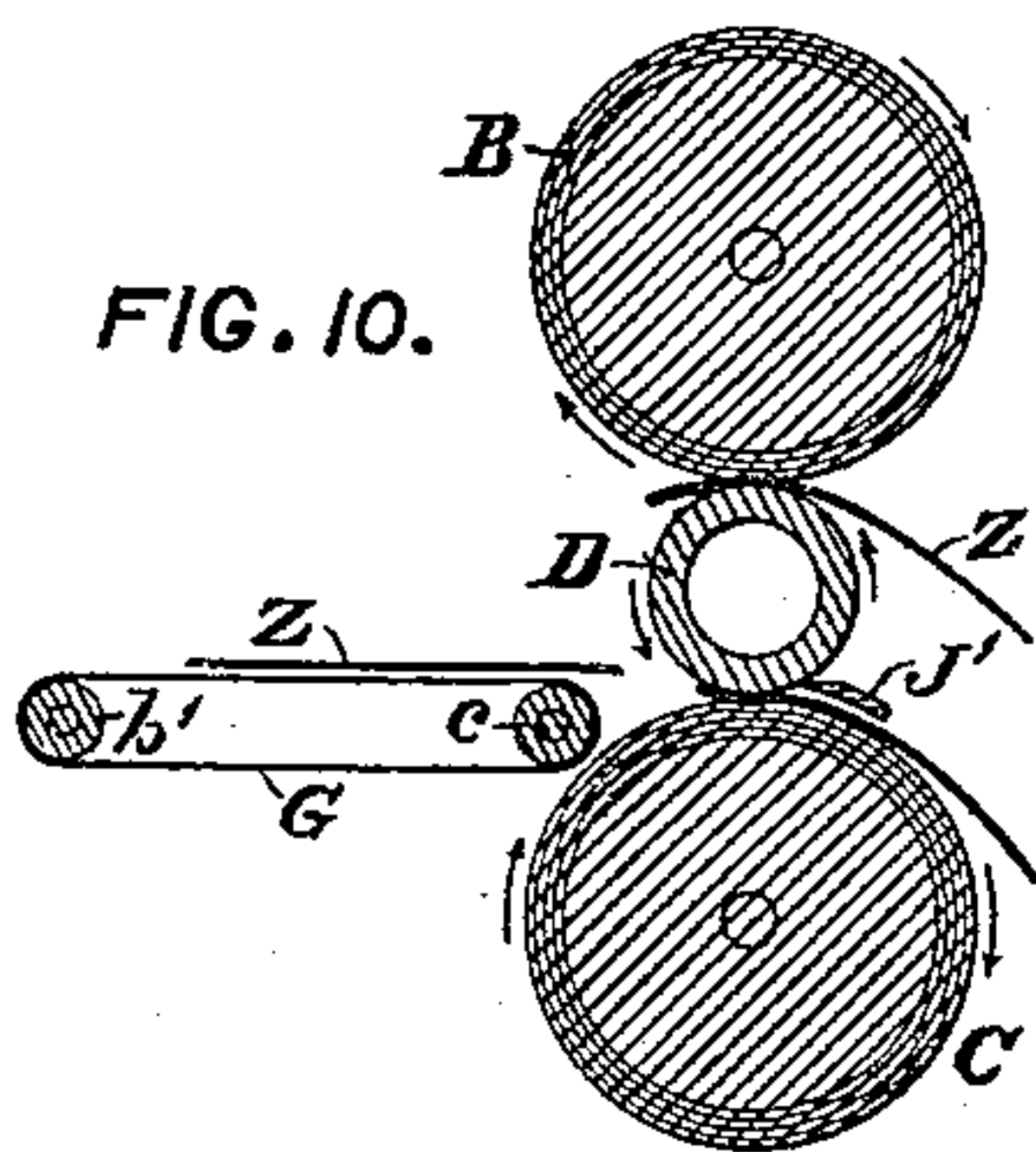
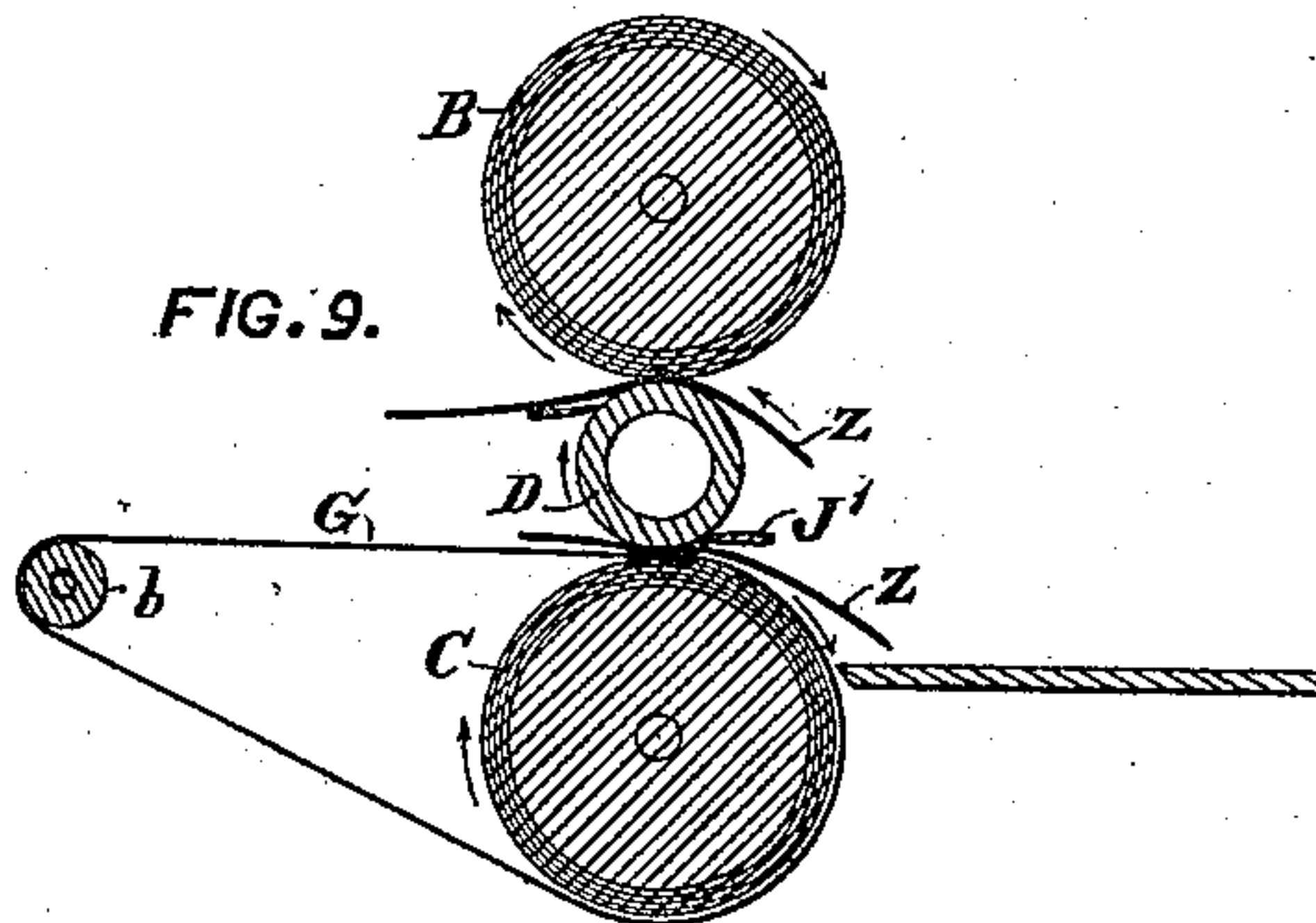
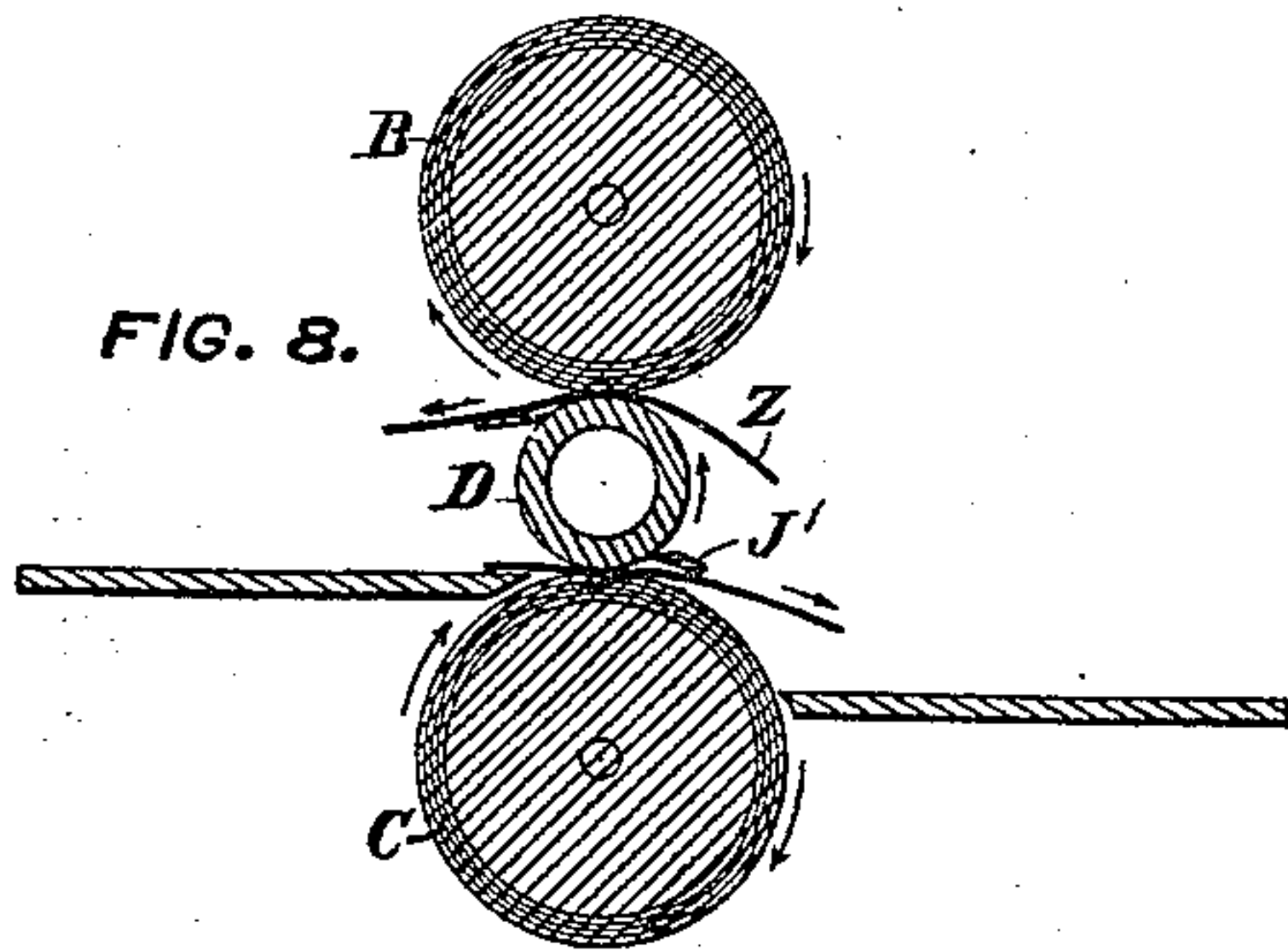


T. S. WILES.  
IRONING MACHINE.

8 Sheets—Sheet 8.

No. 440,292.

Patented Nov. 11, 1890.



WITNESSES:

Austin Ford Park  
James Thorn Goodfellow

INVENTOR:

Thomas Shires Wiles.

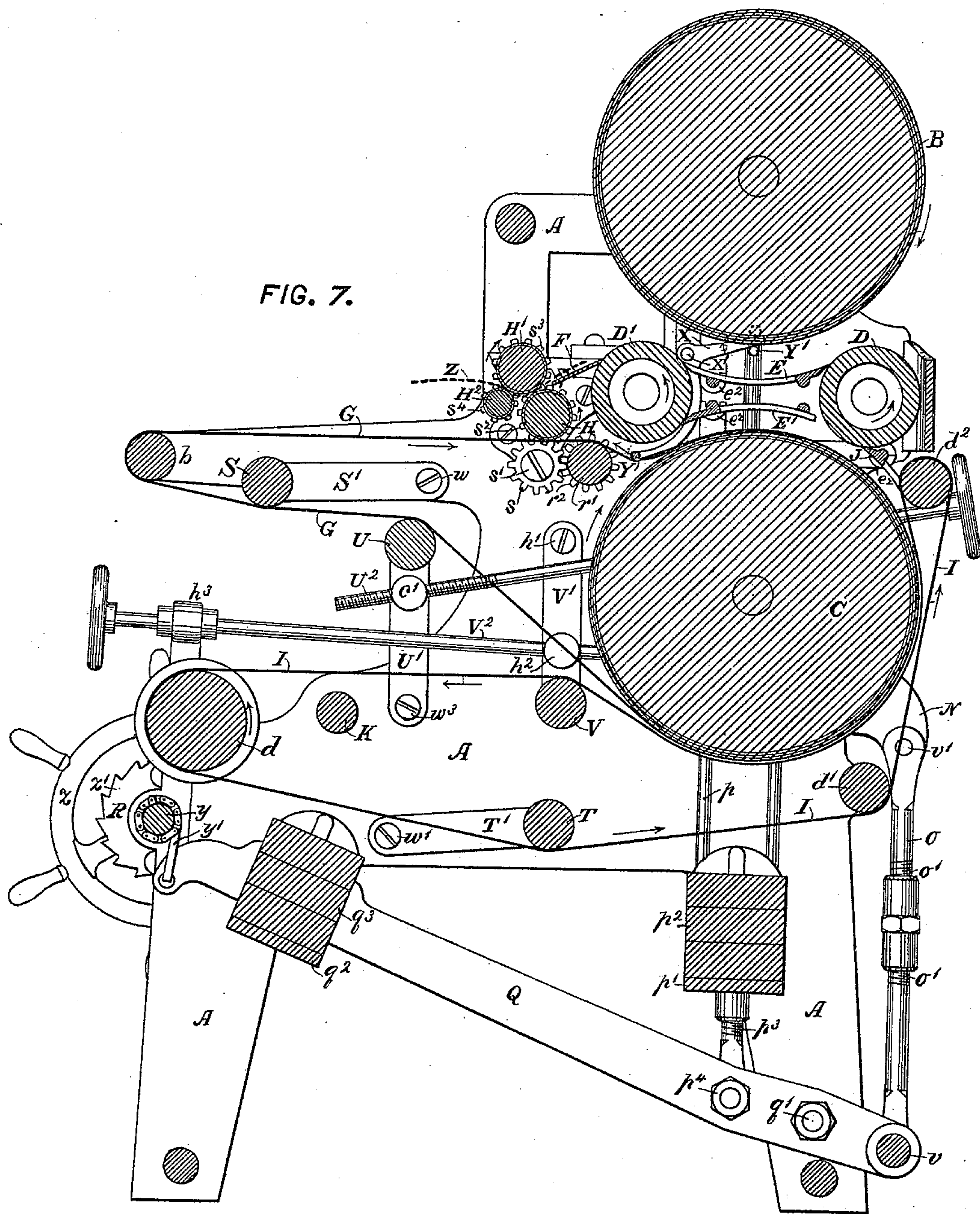


T. S. WILES.  
IRONING MACHINE.

8 Sheets—Sheet 7.

No. 440,292.

Patented Nov. 11, 1890.



WITNESSES:

Austin Ford Park  
James Thom Goodfellow.

INVENTOR:

Thomas Shier Wiles.

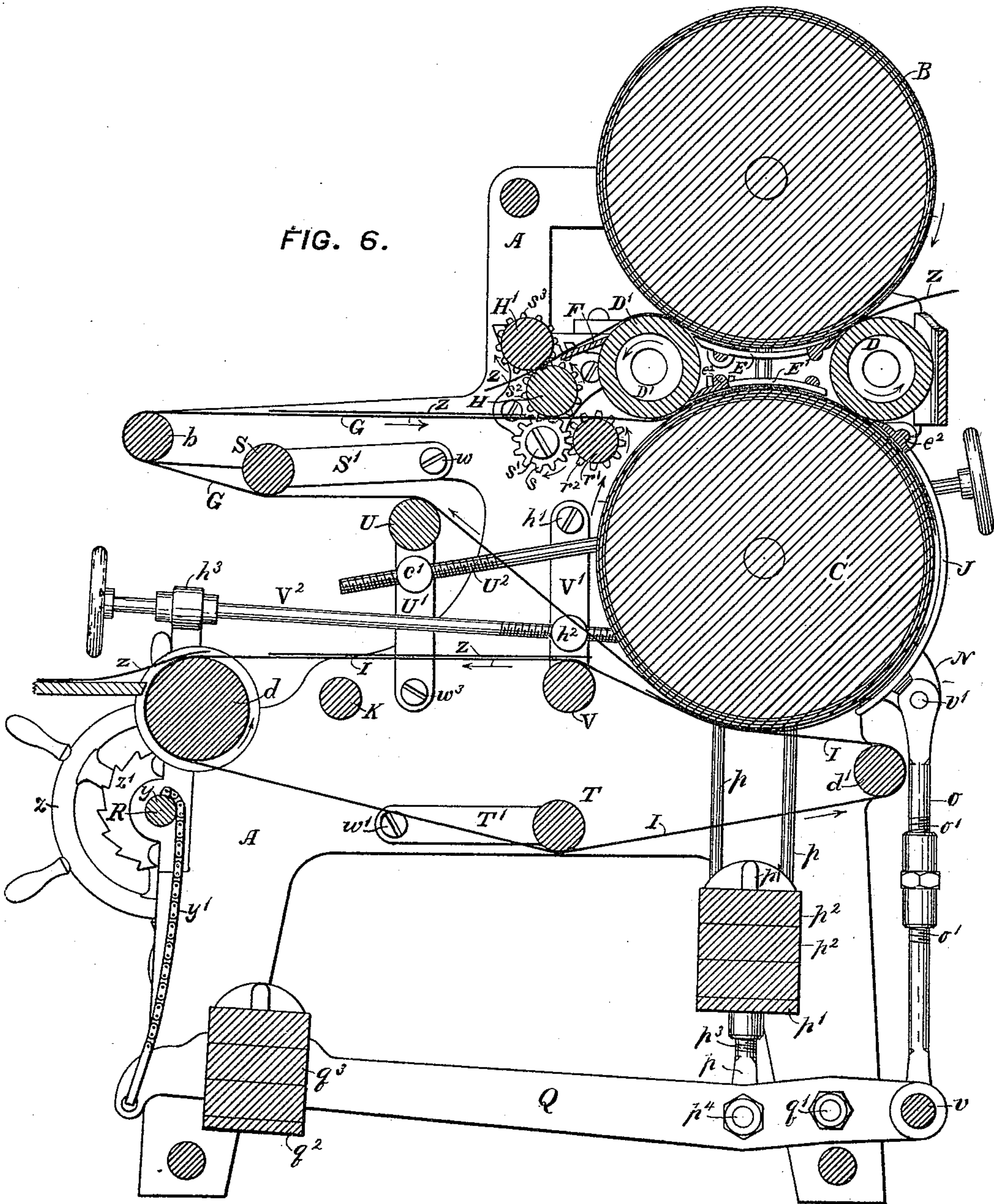


T. S. WILES.  
IRONING MACHINE.

No. 440,292.

Patented Nov. 11, 1890.

FIG. 6.



WITNESSES:

Austin Ford Park  
James Thorne Goodfellow.

INVENTOR:

Thomas Siles Wiles.



# UNITED STATES PATENT OFFICE.

THOMAS SHIRES WILES, OF ALBANY, NEW YORK, ASSIGNOR OF ONE-HALF  
TO ALONZO PELTON ADAMS, OF SAME PLACE.

## IRONING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 440,292, dated November 11, 1890.

Application filed November 8, 1876. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS SHIRES WILES, of the city of Albany, in the county of Albany and State of New York, have invented certain new and useful Improvements in Ironing-Machines, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to machines in which the ironing of articles of cloth is accomplished by means of a roller or rollers adapted to be heated internally and having a hard smooth surface, and hereinafter called an "ironing-roller" or "ironing-rollers," and turned with and against another roller or rollers, hereinafter called a "clothed roller" or "clothed rollers," and having an elastic covering with an outer surface of smooth cotton cloth or other suitable fabric or material, which will not slip so easily as the ironing-roller or ironing-rollers upon damp articles of cloth, and will control the movements of the latter in passing between the rollers in being ironed thereby, and which covering will yield to hems, seams, and other thick parts of the articles, so as to thereby materially prevent injurious compression and strain thereof, and equalize the ironing action of the rollers upon the thick and the thin parts of the articles.

In the aforesaid drawings, Figure 1 is an elevation of one side; Fig. 2, an elevation of the other side, partly in broken section; Fig. 3, an elevation of the feeding-in end; and Fig. 4, an elevation of the discharging end, all of an ironing-machine which embodies the principal parts of this invention. Fig. 5 is a plan of the same machine, the upper clothed roller being removed. Fig. 6 is a central vertical section of the same machine, showing the clothed rollers in working contact with the ironing-rollers, the same as is the case in Figs. 1, 2, 3, and 4. Fig. 7 is a like central vertical section of the same machine with some additions and modifications, and showing the two clothed rollers away from the ironing-rollers. Figs. 8, 9, 10, 11, 12, 13, 14, 15, and 16 represent, on a smaller scale, central vertical sections of modifications of some of the parts of this invention, the frames for supporting and devices for turning and moving the rollers being omitted.

Like parts are marked by like letters in the different figures, and the arrows therein indicate the directions in which the adjacent parts move or are movable when in use.

A is a stationary frame, which supports the other parts, and may have any suitable construction.

B and C are two clothed rollers having soft elastic surfaces of any suitable construction, and arranged apart, opposite, and parallel, and, by general preference, one over the other.

In Figs. 8, 9, 10, 11, 12, 13, and 14, D is an ironing-roller arranged between, parallel to, and against the two clothed rollers B and C, which are to be pressed with a yielding force against the ironing-roller and turned with the latter, so that the contiguous surfaces shall move in the same direction and at the same or different speeds to produce a lusterless or a glossy finish on damp articles of cloth passing between the rollers.

In Figs. 15 and 16 and in the machine represented by Figs. 1, 2, 3, 4, 5, 6, and 7, D D' are two ironing-rollers arranged between and against and revolved with the two yielding clothed rollers B and C, so that suitable articles of cloth of various thicknesses in different parts can be passed at one direct progressive operation between the clothed roller B and the two ironing-rollers D and D', and thereby evenly ironed twice on one and the same side in direct and immediate or quick succession, and that the same articles thus ironed twice on one side can, without being turned over, be passed in a reverse direction at one direct progressive operation through between the other clothed roller C and the same two ironing-rollers D' D, and thereby twice evenly ironed on the other side.

In Figs. 5, 6, 7, and 15, E is a guide arranged between the two ironing-rollers D D' and along the clothed roller B, and E' is a guide arranged between the same two ironing-rollers and along the clothed roller C, so that the forward ends of bent, short, or limpsy articles introduced, passed through, and issuing from between the ironing-rollers D and the clothed roller B shall be prevented by the guide E from following along the roller D to and between the latter and the clothed roller C, and shall be directed by the guide E along the



clothed roller B to and between the latter and the ironing-roller D', and so that the forward ends of articles issuing from between the ironing-roller D' and the clothed roller C shall be conducted therefrom along the latter roller by the guide E' to and introduced between the ironing-roller D and the clothed roller C.

In ironing some starched articles by means of the clothed rollers B C and the intervening rollers D D', the guides E E' can be dispensed with when the rollers D D' are sufficiently close together, as in Fig. 16.

In Figs. 5, 6, 7, 8, 9, 11, 12, 13, 14, and 15, F is a guide applied to the upper delivering side of the ironing-roller D or D', so that articles ironed on the under side by and issuing from between the upper clothed roller B and the ironing-roller or ironing-rollers, and thereby more or less bent or curved toward the delivering ironing-roller, shall be, by the guide F, bent back or straightened in a good degree and conducted away and prevented, in opposition to the downward bending and gravitation of the articles, from passing directly between the same ironing-roller or ironing-rollers and the lower clothed roller C with the ironed side of the articles next to the ironing-roller or ironing-rollers.

In the machine represented by Figs. 1, 2, 3, 4, 5, 6, and 7, and in Figs. 9, 10, 11, 13, 14, and 15, an active moving feeding device is arranged, so that suitable collars, cuffs, and other articles of cloth passed between and ironed on one side by the ironing-roller D or ironing-rollers D D' and the clothed roller B, and delivered therefrom upon the said feeding device with the ironed side of the articles undermost, will be carried by the said feeding device to and passed in a reverse direction through between the same ironing-roller or ironing-rollers and the lower clothed roller C, and thereby ironed on the other side. This feeding device may have any suitable construction. In Fig. 11 it consists of several rollers *a*, arranged in a plane and bearing on a turning endless band *a'*, which bears against the clothed roller C, and is thereby turned, so that the rollers *a* are all turned in the same direction as the roller C and with the same surface speed as that roller.

I generally prefer to have the feeding device consist, mainly, of an endless turning-apron G, of muslin or other suitable fabric or material. In Figs. 5, 6, 7, and 9 this apron G extends around an idle-pulley *b* and the clothed roller C, and is thereby turned with the same surface speed as that roller. In Figs. 10, 13, 14, and 15 the apron G extends around an idle-pulley *b'* and a driving-pulley *c*, which is to be turned by any suitable gearing with the same surface speed as the roller C.

To assist the guide F in straightening bent articles issuing from between the elastic roller B and the hard-heated roller D or rollers D D', and in preventing such articles from passing directly between the same ironing-roller or

ironing-rollers and the clothed roller C, and in properly delivering such articles upon the reversely-moving rollers *a* or apron G, when used, I arrange in connection with the guide F and the rollers B, C, and D or D D', and in respect to the feeding-rollers *a* or apron G, when used, a roller H, Fig. 13, or two rollers H H', Figs. 4, 6, 12, and 14, or three rollers H H' H<sup>2</sup>, Fig. 7, each having a smooth surface of paper, cloth, or any suitable material and a surface speed substantially the same as that of the roller B. In Fig. 13 the roller H is against the clothed roller B, so as to be turned by contact with the latter. The rollers H H' in Figs. 4, 6, 12, and 14, and H H' H<sup>2</sup> in Fig. 7 are gently pressed together by the weight of the roller H', and are to be turned by any suitable gearing, and, although generally of importance, may be dispensed with, as indicated in Figs. 8, 9, 10, 11, 15, and 16 in ironing suitable stiff articles under moderate pressure.

The combination of the elastic clothed roller B, ironing roller or rollers D or D D', guide F, and rollers H H', with or without the roller H<sup>2</sup>, Fig. 7, constitutes a useful mechanism by which very thick collars and cuffs can be powerfully compressed and ironed, so that as they shall issue from between the clothed and ironing rollers the articles will be bent or curved toward the delivering ironing-roller, but will be materially straightened by the guide F and rollers H H'.

In the machine represented by Figs. 1, 2, 3, 4, 5, 6, and 7, and in Fig. 14, I is an endless apron arranged below the clothed roller C and extended around a driving-pulley *d* and an idle-pulley *d'* in Fig. 6, and idle-pulleys *d'* *d*<sup>2</sup> in Figs. 7 and 14, and turned with substantially the same surface speed as the roller C; and J, Figs. 6 and 7, is a guide arranged along the clothed roller C and between the ironing-roller D and the apron I, so that articles of cloth passing between the clothed roller C and the ironing-roller or ironing-rollers will be received by the apron I and thereby conducted back under the roller C, so that a person can conveniently take the articles from the apron I and again pass them between the roller C and the ironing-roller D or rollers D D', or lay them away, as may be required.

In case the articles issuing from between the clothed roller C and the ironing-roller D are stiff and curved or bent upward or toward the roller D, or do not follow the roller C, the guide J is of much importance in conducting the articles from the roller D to the endless apron I; but in other cases the guide J may be omitted when the apron I extends along the discharge side of the roller C to near the roller D, as shown in Figs. 7 and 14.

In Figs. 8, 9, 10, 11, 12, 13, and 15 the guide J', as well as the guide J in Figs. 6 and 7, serves to prevent any articles that shall issue in upwardly-curved form from between the clothed roller C and the ironing-roller D from coiling or following around the latter roller



to and between it and the clothed roller B, and tends to straighten such articles.

The combination of the clothed roller C, ironing-roller D or ironing-rollers D D', and return delivery-apron I, with the guide J, as above described and clearly shown in Figs. 6 and 7, (the roller B, apron G, and rollers H H' H<sup>2</sup> being left out of the machine,) may be very successfully used alone in ironing articles of cloth, the latter being in such case fed by hand between the clothed roller C and the ironing-roller or ironing-rollers, and the articles thereby ironed on one side being returned by the apron I into convenient position to be again fed by hand between the same clothed and ironing rollers.

By the combination of the feeding-apron G, clothed roller C, and ironing-roller D or ironing-rollers D D', and the return delivery-apron I with the guide J, as above specified, and clearly shown in Figs. 6 and 7, suitable articles of cloth can be ironed on one side with facility by merely placing them on the apron G, which will feed the articles between the clothed roller C and the ironing-roller or ironing-rollers, from whence the articles will be received by the apron I and thereby returned under the apron G and in convenient position to be removed therefrom and again placed by hand on the apron G to be ironed on the other side.

By the combination of the two clothed rollers B C, intervening ironing-roller D or ironing-rollers D D', endless feeding-apron G, and return delivery-apron I, with or without one or more of the guides E E' F J, and rollers H H' H<sup>2</sup>, as above specified, suitable articles of cloth of various thickness in different parts can be evenly ironed first on one side and next on the other side all at one automatic operation by inserting such articles Z in proper damp condition between the elastic roller B and the ironing-roller or ironing-rollers, which will then iron the articles on one side, and from which the articles thus partly ironed will be received by the endless apron G and thereby fed in the reverse direction between the same ironing-roller or ironing-rollers and the clothed roller C, which will iron the articles on the other side, and from which the articles thus ironed on both sides will be received by the apron I, and thereby delivered at the same side of the machine as the feeding-apron G and in convenient position to be taken off and examined by a person at that side without interfering with a person engaged at the other side of the machine in introducing the articles between the clothed roller B and the ironing-roller or ironing-rollers.

Each of the guides E, E', and J in the machine represented by Figs. 1, 2, 3, 4, 5, 6, and 7 has its body in open-work form, or with slots e, Figs. 3 and 5, therein, so that the steam which is expelled from the damp articles in being ironed shall have free escape through the body of each guide and not condense

thereon, to the great injury of the ironed surface of the articles passing along the guide. Each of these guides has at its ends pivots e', which are supported by suitable bearings e<sup>2</sup>, so that the weight of the guide shall gently press the thin edge thereof against the delivery side of the ironing-roller to which it is applied.

In the machine shown by Figs. 1, 2, 3, 4, 5, 6, and 7 the two clothed rollers B and C are connected with a driving-shaft K by a set of gearing, so as to be positively turned with substantially equal surface speed, and the two ironing-rollers D and D' are connected with the same driving-shaft K by another set of gearing, which gives equal surface speed to the two ironing-rollers.

The gearing which connects the two rollers B C with the shaft K is shown by Figs. 1, 3, 4, and 5, and consists of a pinion f, secured to the shaft K and gearing into a spur-wheel g, that is mounted to turn on a stud h, and is secured to a pinion i, which gears into a spur-wheel L, that is mounted to turn on a stud j and gears into a spur-wheel M, fast on the shaft of the clothed roller C, and the spur-wheel L also gears into a spur-wheel j', that is mounted to turn on a stud j<sup>2</sup> and gears into a spur-wheel O, that is mounted to turn on a stud j<sup>3</sup> and gears into a spur-wheel P, fast on the shaft of the clothed roller B.

The endless apron I is turned with about the same surface motion as the clothed rollers B and C by a spur-wheel l, Figs. 1 and 5, secured to the shaft K and gearing with a spur-wheel l', that is mounted to turn on a stud l<sup>2</sup> and gears into a spur-wheel l<sup>3</sup>, fast on the shaft of the driving-roller d of the apron.

Rotary motion is communicated from the driving-shaft K to the ironing-rollers D D' by a pinion m, Figs. 2, 3, 4, and 5, secured to the shaft K and gearing into a spur-wheel n, that is mounted to turn on a stud n', and is secured to a pinion q, that gears into a spur-wheel k, that is mounted on a stud k' and gears into a spur-wheel k<sup>2</sup>, that is on a stud k<sup>3</sup> and gears with a wheel W, fast on the shaft of the roller D' and gearing into a wheel k<sup>4</sup>, that turns on a stud k<sup>5</sup> and gears into a wheel W', fast on the shaft of the roller D.

The delivery-rollers H H' H<sup>2</sup>, Fig. 7, are turned with substantially the same surface speed as the rollers B C by means of a pinion r, Fig. 2, which gears into the spur-wheel k<sup>2</sup>, and is fast on a rotary shaft r', Figs. 6 and 7, which has fast on it a pinion r<sup>2</sup>, that gears into a pinion s, which is mounted to turn on a stud s' and gears into a pinion s<sup>2</sup>, that is fast on the roller H and gears into a pinion s<sup>3</sup>, which is fast on the gravitating roller H', and in Fig. 7 gears into a pinion s<sup>4</sup>, fast on the roller H<sup>2</sup>.

The two sets of gearing by which the shaft K gives independent rotary motion to the two clothed rollers B C and to the intermediate ironing-rollers D D' are shown in the drawings so arranged and proportioned as to



give substantially the same surface speed to the ironing-rollers as to the clothed rollers, so that the ironing-rollers shall give a lusterless or "domestic" finish to the articles passed between the rollers.

In order that the gearing may be readily changed, so that the ironing-rollers  $D D'$  shall be turned at a faster surface speed than the clothed rollers  $B C$ , so as to give a glossy finish or polish to the articles passed between the rollers, the pinion  $m$  is fastened to the shaft  $K$  by any suitable well-known means, so that the pinion  $m$  can be readily removed from that shaft and a pinion of larger diameter secured in its place thereon, as indicated by dotted lines at  $m'$ , Fig. 2, and the wheel  $n$  is pinned or secured to the pinion  $q$ , so that it can be detached therefrom and a smaller spur-wheel (indicated by dotted lines at  $n^2$ , Fig. 2) of suitable size to gear with the substituted pinion  $m'$  can be fastened to the pinion  $q$  in place of the wheel  $n$ . The surface speed of the two clothed rollers  $B C$  can also be changed without altering that of the intervening ironing-roller or ironing-rollers by means of the pinion  $f$ , which is made changeable on the shaft  $K$  for another pinion of smaller or larger diameter, as indicated by dotted lines at  $f'$  in Fig. 1, and the spur-wheel  $g$ , which is removable from the pinion  $i$  and changeable in connection therewith for another of proper different size (indicated by dotted lines at  $g'$ ) to gear with the substituted pinion  $f'$  on the shaft  $K$ .

By connecting the two clothed rollers  $B C$  with the driving-shaft  $K$  by one set of changeable gearing and connecting the intervening ironing-roller  $D$  or ironing-rollers  $D D'$  with the same driving-shaft by another set of changeable gearing, substantially as above described, the speed of the clothed rollers can be altered so that they will be turned either at a very slow rate suitable for ironing very thick articles or at different faster rates, as shall be desirable or necessary in ironing thinner articles of various different thicknesses, and at the same time the speed of the ironing-roller or ironing-rollers can be changed so as to turn either at the same surface speed as the clothed rollers to give a lusterless finish or at a different or faster surface speed than the clothed rollers to produce a glossy or polished surface on each side of the articles whatever shall be the speed of the clothed rollers, and all without altering the speed of the said driving-shaft.

The surface speed of the delivering-rollers  $H H'$ , Fig. 6, or  $H H' H^2$ , Fig. 7, can be made to equal that of the clothed roller  $B$  in all changes in the speed of the latter by changing the wheels  $r^2$  and  $s$  for others of suitable different relative diameters or by having the shaft  $r'$  extend through the other side of the frame and gear with the spur-wheel  $j'$ , Fig. 1, by a pinion (indicated by dotted lines at  $r^3$ ) instead of gearing the shaft  $r'$  with the spur-wheel  $k^2$ , Fig. 2, by the pinion  $r$ .

The shafts  $t t'$  of the ironing-rollers  $D D'$  are mounted to turn in stationary journal-boxes  $t^2 t^3$ , Fig. 1. These journal-boxes are removable and fastened in the frame by common detachable caps and screws, as indicated in Figs. 1 and 3, so that either one or the other, or both, of the ironing-rollers  $D D'$  can be readily removed from and replaced in the machine. The shafts  $u u'$ , Fig. 2, of the clothed rollers  $B C$  are mounted to turn in journal-boxes  $u^2 u^3$ , which are fitted to slide up and down in ways  $u^4 u^5$  in the frame  $A$ , so that the rollers  $B C$  can be moved and adjusted against the intervening rollers  $D D'$  for use in ironing articles, as in Fig. 6, and can be moved and set away from the same ironing-rollers, as in Fig. 7, to prevent the latter from burning the covering of the clothed rollers when the ironing-rollers are heated, while articles are not being passed between the rollers or the rollers are not revolving.

The spur-wheels  $L$  and  $O$ , Fig. 1, are arranged so as to be constantly in gear with the spur-wheels  $M$  and  $P$ , that are fast on the shafts  $u' u$  of the clothed rollers  $C$  and  $B$  when each of those rollers is in contact with the intervening ironing-rollers  $D D'$ , as shown in Fig. 6, and the wheels  $M$  and  $P$  are then in the positions represented in full lines in Fig. 1, and also when the rollers  $B C$  are moved away from the ironing-rollers, as shown in Fig. 7, and the wheels  $M$  and  $P$  are in the positions indicated by dotted lines  $M' P'$  in Fig. 1.

The clothed roller  $C$  is raised to and pressed with an adjustable yielding force against the ironing-rollers  $D D'$  by means of two weighted levers  $Q$ , connected by two rods  $o$  with two levers  $N$ , upon which bear the journal-boxes  $u^3$  of that clothed roller. The levers  $Q$  are pivoted at  $q'$  to the frame  $A$ , and their long arms are connected together by a frame  $q^2$  with removable weights  $q^3$  thereon. The rods  $o$  have right and left screw adjustments  $o'$ , and are pivoted at  $v$  to the short arms of the levers  $Q$  and at  $v'$  to the levers  $N$ , which are pivoted to the frame  $A$  at  $v^2$ . In Figs. 1, 2, 3, and 6 the weighted levers  $Q$  press the roller  $C$  against the rollers  $D D'$  with a yielding force, which can be made greater or less by adding or taking off one or more of the weights  $q^3$ . By raising the long arms of the levers  $Q$ , as in Fig. 7, the roller  $C$  is lowered away from the rollers  $D D'$ .

The clothed roller  $B$  is pressed against the ironing-rollers  $D D'$  with a yielding force by means of the rods  $p$ , Fig. 3, secured at top to the journal-boxes  $u^2$  of the roller  $B$ , and connected together at the lower part by a frame  $p'$ , having separate removable weights  $p^2$ , so that the yielding force with which the roller  $B$  will be pressed against the ironing-rollers shall be increased and lessened by adding weights to and taking them from the connecting-frame  $p'$ . The rods  $p$  have right and left screw adjustments at  $p^3$ , and are connected at  $p^4$  to the levers  $Q$ , as hereinafter more fully



described, so that by elevating the long arms of the latter, as shown in Fig. 7, the roller B will be raised away from the rollers D D', as represented in that figure, and so that upon  
 5 depressing the levers Q to the position shown in Fig. 6 the roller B will be lowered so as to bear against the rollers D D', and will then be pressed against the latter rollers by the weighted rods *p*, whether the levers Q shall  
 10 or shall not have connection with the roller C, as above described.

It is very important that the clothed rollers B and C shall be separately pressed against the intervening ironing-roller or ironing-rollers by independent yielding devices, and it is  
 15 also of consequence that the movement of one of the clothed rollers to and from the ironing-roller or ironing-rollers shall cause or be attended by a corresponding movement of the other clothed roller. To accomplish this  
 20 twofold object the weighted rods *p* and levers Q are loosely connected together by any suitable means—as, for example, by having through each of the rods *p* an opening *x*,  
 25 Fig. 1, of much larger size in the vertical direction than the studs or pivots *x'*, by which the rods *p* and levers Q are connected together, so that those levers may have a short movement without acting on the rods *p*, and  
 30 so that when the rollers B and C shall be in contact with the ironing-rollers D D' the weighted rods *p* shall not bear down on the levers Q and the weighted levers Q shall not bear down on the rods *p*.

For convenience in raising, supporting, and lowering the long arms of the levers Q, I combine therewith a windlass R, having a shaft  
 35 *y* mounted to turn in the frame A and secured by flexible connections *y'* to the long arms of the levers Q and furnished with a hand-wheel *z*, ratchet-wheel *z'*, and pawl *z''*,  
 40 furnished with a shifting weight *z'''*, so that by turning the windlass in one direction the long arms of the levers Q will be elevated so  
 45 as to remove the clothed rollers B C from the ironing-rollers, as in Fig. 7, in which action and position the weight of the roller C tends to counterbalance the weight of the roller B, and in which position the rollers B C will be  
 50 retained by the weighted pawl *z''z'''*, when the latter shall be engaged with the ratchet *z'*, as indicated by dotted lines in Fig. 2, and so that by disengaging the pawl from the ratchet-wheel, as shown in full lines in Fig. 2, the  
 55 weighted levers Q will turn the windlass in the opposite direction, and cause with the rods *p* the movement and pressure of the two clothed rollers B C to and against the intervening ironing-rollers.

In all cases the ironing-roller or ironing-rollers should be hollow and made of cast-iron or other suitable metal or material, and heated internally by burning therein gas or  
 60 mixed gas and air, or by any suitable means, and can be heated very successfully by the use of burners of the kind described in United

States Letters Patent No. 165,775, dated July 20, 1875.

S is an idle-roller journaled in two arms S', Fig. 5, that are pivoted to the frame A at *w*.  
 70 The roller S, Figs. 6 and 7, bears by its weight on the apron G, and thus gives tension to the latter, and permits it to yield and conform to the up and down movements of the roller C. To prevent the apron G from bearing against  
 75 the roller D' when the roller C shall be depressed, as in Fig. 7, two levers X, of which only one is shown in Fig. 7, may be pivoted at X' to the frame A, and have their lower arms connected by a rod Y, extending across  
 80 and over the apron G, and their upper arms extended between and operated by pins projecting at Y' from the rods *p*. Suitable tension is imparted to the apron I, Figs. 6 and 7, by means of the idle-roller T, which bears by  
 85 its gravity on the apron I, and is journaled in two arms T', that are pivoted to the frame at *w'*. As a means of conveniently adjusting the apron G to run truly around the roller C, an idle-roller U, Figs. 5, 6, and 7, is jour-  
 90 naled at one end to the frame at *w''*, Fig. 5, and at the other end in an arm U', that is pivoted to the frame at *w'''*, and has a screw-nut *c'*, through which extends an adjusting  
 95 hand-screw U<sup>2</sup>, that is mounted to turn without endwise movement in a socket at *c''*, Fig. 5. To adjust the apron I to run truly, an idle-roller V, Figs. 6 and 7, is journaled at  
 100 one end to the frame A, and at the other end in an arm V', which is pivoted to the frame at *h'*, and has a nut *h''*, through which is fitted an adjusting-screw V<sup>2</sup>, that is mounted to turn in a socket at *h'''*.

By inspecting Figs. 1, 2, and 6 it will be seen that the roller D, having the detachable  
 105 journal-boxes *t''t'''*, can be removed from the machine without in any way altering the position or the action of the other ironing-roller D' in its above-described combination with the two clothed rollers and other parts of the  
 110 machine. It will also be seen that when the one roller D' only is thus left in the machine (shown by Figs. 1, 2, 3, 4, 5, 6, and 7) the clothed rollers B and C, guide F, rollers H H', reverse feeding-apron G, conducting-guide J,  
 115 return delivery-apron I, the gearing for revolving the rollers, and the devices for removing the clothed rollers from and pressing them against the ironing roller or rollers, as above described, all remain and act together  
 120 in combination with that one ironing-roller exactly the same as when the two ironing-rollers were present without any modification of any of the parts of that machine.

In case but one ironing-roller shall be employed and shall be arranged diametrically  
 125 between and in combination with the two clothed rollers, as in Fig. 8, 9, 10, 11, 12, or 14, and in combination with an endless feeding-apron G, as in Fig. 9, 10, or 14, guide-  
 130 rollers H H', as in Fig. 12 or 14, and a returning-apron I, as in Fig. 14, the several rollers



and aprons can be rotated and operated, substantially as hereinbefore set forth, by gearing and devices like or similar to those hereinbefore described for the like purposes, some of the parts being modified in positions and dimensions to suit the change in position of the ironing-roller and guide-rollers in respect to the clothed rollers. Indeed, in carrying out my present invention, each of the clothed rollers, ironing-rollers, guide-rollers, and endless aprons can be rotated, as hereinbefore set forth, by any suitable known gearing or devices.

I claim as my invention—

1. The combination of the two clothed rollers, the two ironing-rollers, each between and against the two clothed rollers, the guides E E', and the work receiving and feeding endless apron, substantially as set forth.

2. The combination of the two clothed rollers, an ironing-roller between and against the two clothed rollers, the guide F, applied to said ironing-roller, and the work receiving and feeding endless apron below said guide, substantially as set forth.

3. The combination of the two clothed rollers, the two ironing rollers, each between and against the two clothed rollers, the guides E and E', the guide F, and the work receiving and feeding endless apron, substantially as described.

4. The combination of the two clothed rollers, an ironing-roller between and against the two clothed rollers, the guide F, applied to the ironing-roller, the rollers H H', and the work receiving and feeding apron, substantially as set forth.

5. The combination of the two clothed rollers, the two ironing-rollers between and against the two clothed rollers, the guides E E', the rollers H H', and the feeding-apron, substantially as described.

6. The combination of the two clothed rollers, an ironing-roller between and against the two clothed rollers, the guide F, applied to the ironing-roller, the rollers H H', the auxiliary roller H<sup>2</sup>, and the work receiving and feeding apron, substantially as described.

7. The combination of the two clothed rollers, the two ironing-rollers between and against the two clothed rollers, the guides E E', the guide F, the rollers H H', the auxiliary roller H<sup>2</sup>, and the work receiving and feeding apron, substantially as described.

8. In an ironing-machine, the combination, with the clothed roller C and the two ironing-rollers over and against the clothed roller, of the guide E', guide J, and the apron I, extending under the clothed roller and next to the guide J, substantially as set forth.

9. In an ironing-machine, the combination, with the clothed roller C and the two ironing-rollers over and against said clothed roller, of the feeding-apron, the guide E', the guide J, and the return delivery-apron I, extending

under the clothed roller and next to the guide J, substantially as set forth.

10. The combination, with the two clothed rollers and the two ironing-rollers between and against the two clothed rollers, of the work receiving and feeding apron, the guides E and E', the guide J, and the returning-apron I, substantially as described.

11. The combination, with the two clothed rollers and an ironing-roller between and against the clothed rollers, of the guide-rollers H H', the work receiving and feeding apron, the guide J, and the returning-apron I, substantially as described.

12. The combination, with the two clothed rollers and the two ironing-rollers, each between and against the two clothed rollers, of the guide-rollers H H', the work receiving and feeding apron, the guides E E', the guide J, and the returning-apron I, substantially as described.

13. In an ironing-machine, the combination of the two ironing-rollers D D', having fixed journal-bearings in a stationary frame, the two clothed rollers B C, arranged on opposite sides of the ironing-rollers and with each clothed roller against each of said ironing-rollers and movable in said frame away from and toward the ironing-rollers, and the two guides E E', separately pivoted to said stationary frame and applied to said ironing-rollers and extending between the said ironing-rollers and along the said clothed rollers, substantially as set forth.

14. The combination of the two clothed rollers, the two ironing-rollers, each between and against the two clothed rollers, the guides E and E', the guide F, the rollers H H', and the work receiving and feeding endless apron, substantially as described.

15. The combination, with a clothed roller and an ironing-roller over and against said clothed roller, of the return delivery-apron I, extending under said clothed roller, and the guide J, extending from said ironing-roller downward along said clothed roller and into direct and immediate proximity to the upper surface of said return delivery-apron, substantially as shown and described.

16. The combination, with the two clothed rollers, an ironing-roller between and against the two clothed rollers, the guide F, applied to said ironing-roller, and the work receiving and feeding endless apron below said guide, of the guide J and the return delivery-apron I, substantially as set forth.

17. The combination, with the two clothed rollers, the two ironing-rollers, each between and against the two clothed rollers, the guides E and E', the guide F, and the work receiving and feeding endless apron, of the guide J and the returning-apron I, substantially as set forth.

18. The combination, with the two clothed rollers, an ironing-roller between and against



the two clothed rollers, the guide F, applied to the ironing-roller, the rollers H H', and the work receiving and feeding apron, of the guide J and the returning-apron I, substantially as set forth.

19. The combination of the two clothed rollers, the two ironing-rollers, each between and against the two clothed rollers, the guides E and E', the guide F, the rollers H H', the work receiving and feeding endless apron, the guide J, and the returning-apron I, substantially as described.

20. In an ironing-machine, the combination, with its frame, two clothed rollers arranged one over the other, their journal-boxes movable upward and downward, and an ironing-roller between said clothed rollers and having stationary journal-bearings, of the levers N, applied to the boxes of said lower clothed roller, the rods o, jointed to said levers, the rods p, secured to the journal-boxes of said upper clothed roller and weighted, and the operating-levers Q, having at one side of their fulcrums short arms jointed to the rods o and at the opposite side of said fulcrums long arms weighted and jointed loosely to the rods p, substantially as described.

21. In an ironing-machine, the combination, with its frame, an ironing-roller having stationary journal-bearings, a clothed roller arranged above and a clothed roller arranged below said ironing-roller, and the journal-boxes of said clothed rollers movable upward and downward, of the levers N, applied to the journal-boxes of said lower clothed roller, the rods o, jointed to said levers, the rods p, secured to the journal-boxes of said upper clothed roller and weighted, the levers Q, having at one side of their fulcrums short arms jointed to the rods o and at the opposite side of said fulcrums long arms weighted and jointed loosely to said rods p, and the windlass connected to said long arms of the levers Q and furnished with a ratchet and pawl, substantially as set forth.

In testimony whereof I hereunto set my hand, in the presence of two subscribing witnesses, this 9th day of August, 1875.

THOMAS SHIRES WILES.

Witnesses:

AUSTIN FORD PARK,  
JAMES THORN GOODFELLOW.