

(No Model.)

7 Sheets—Sheet 1.

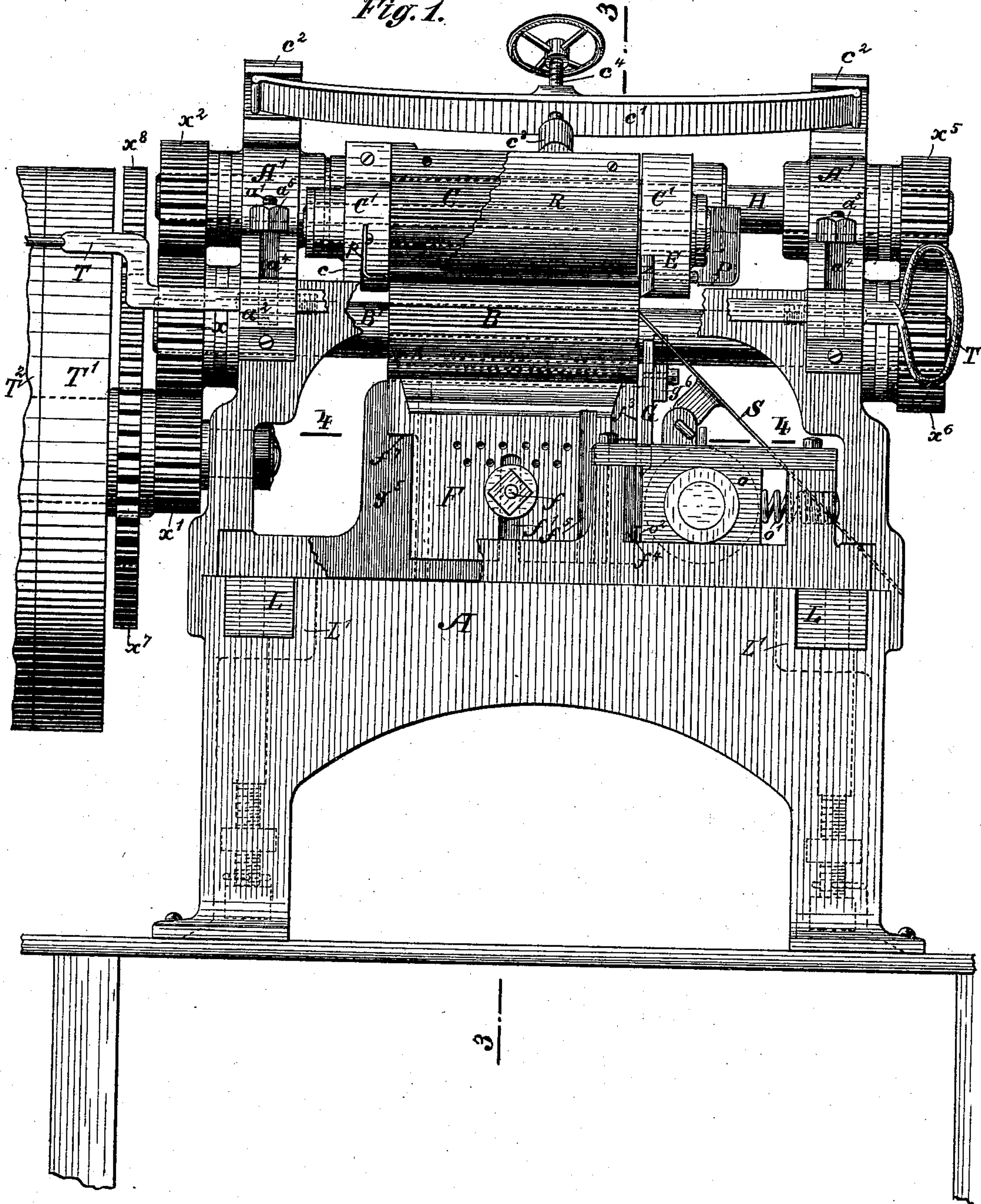
C. E. ROBERTS.

MACHINE FOR SPLITTING SCRAPS OF LEATHER.

No. 373,196.

Patented Nov. 15, 1887.

Fig. 1.



Witnesses:

Chas. B. Bawley  
A. W. Munday

Inventor:

Charles E. Roberts  
by Munday Evans & Adcock  
his Attys



(No Model.)

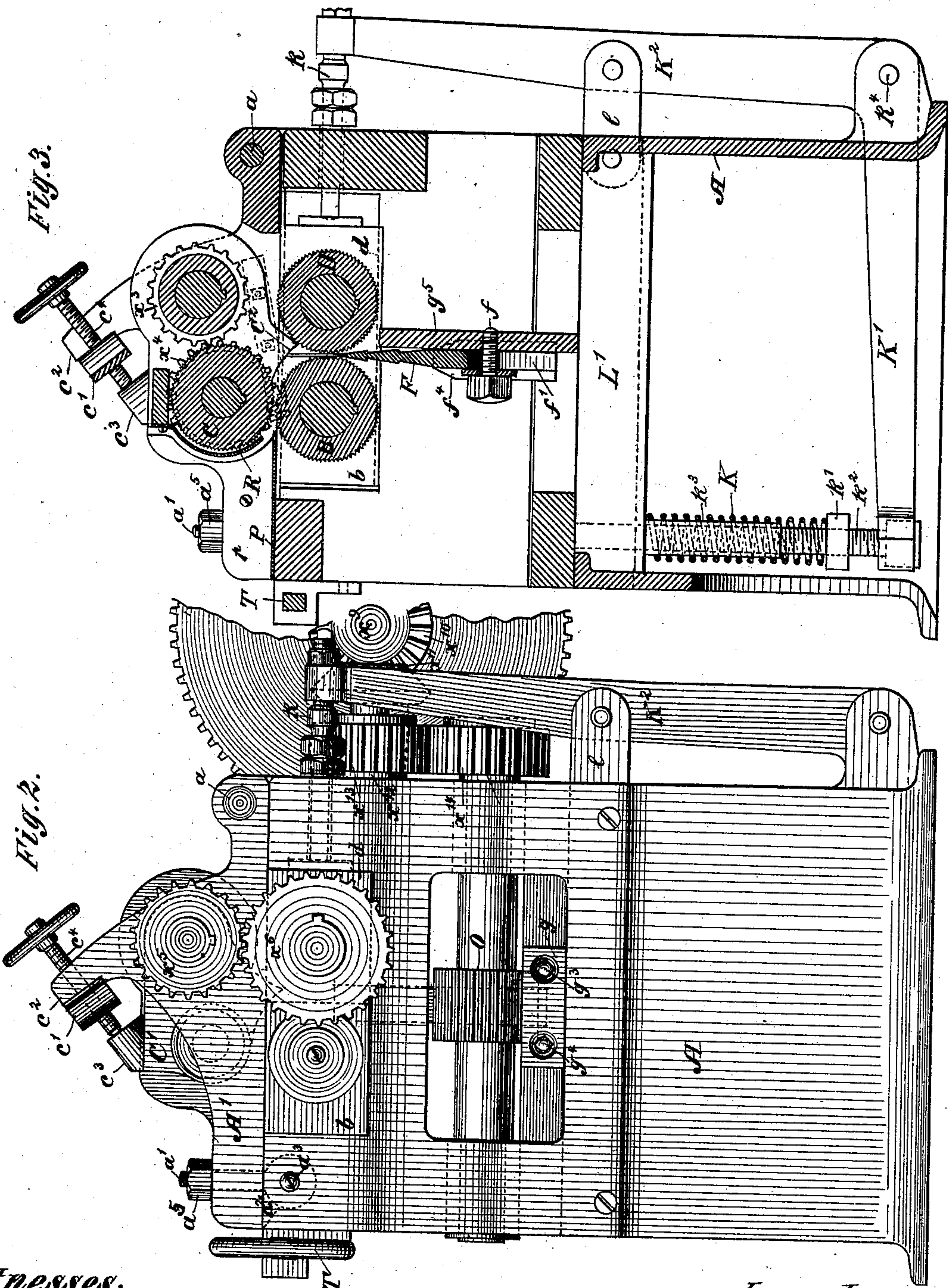
7 Sheets—Sheet 2.

C. E. ROBERTS.

MACHINE FOR SPLITTING SCRAPS OF LEATHER.

No. 373,196.

Patented Nov. 15, 1887.



Witnesses:

Chas. Bawley  
A. M. Munday

Inventor:

Charles E. Roberts  
by Sunday Evans & Adcock  
his Atty.

(No Model.)

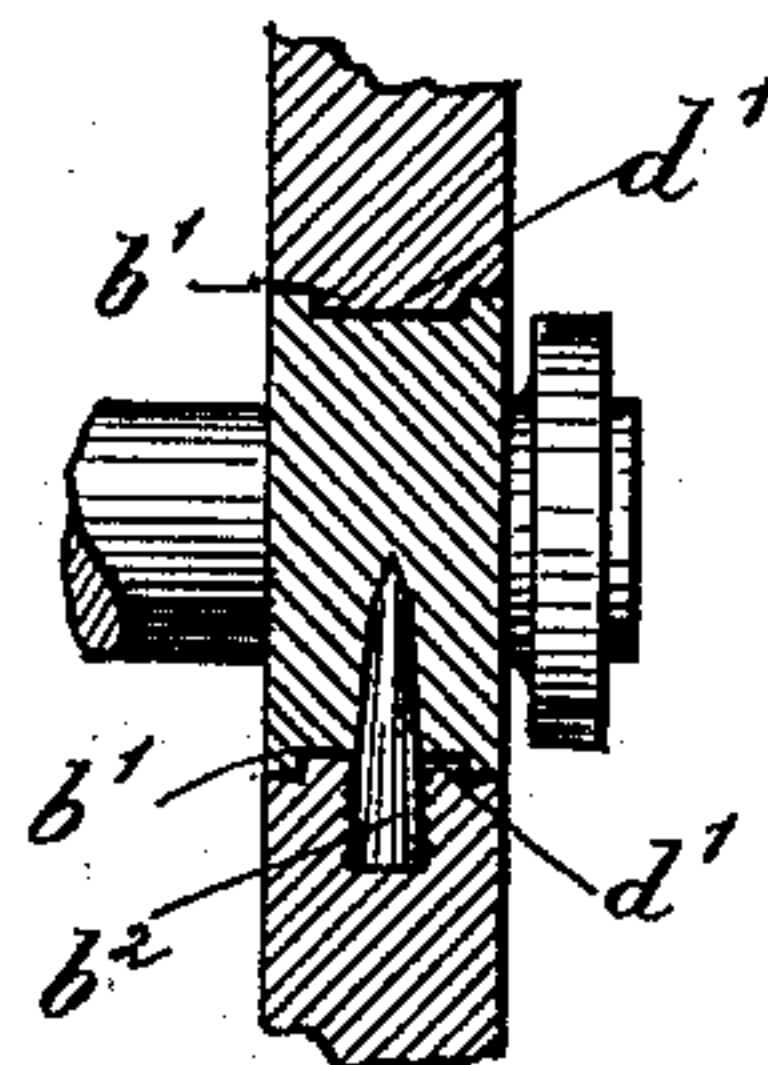
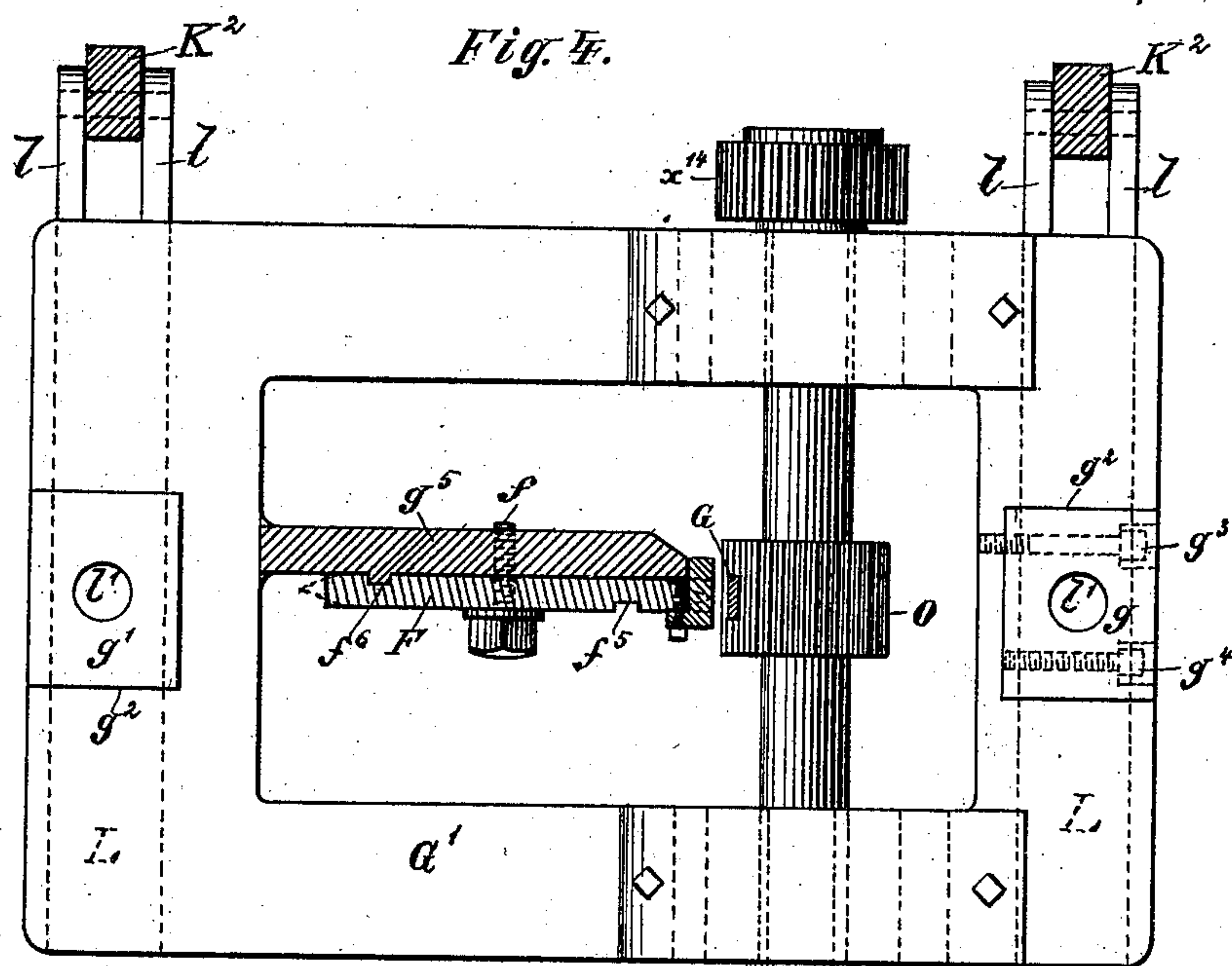
7 Sheets—Sheet 3.

C. E. ROBERTS.

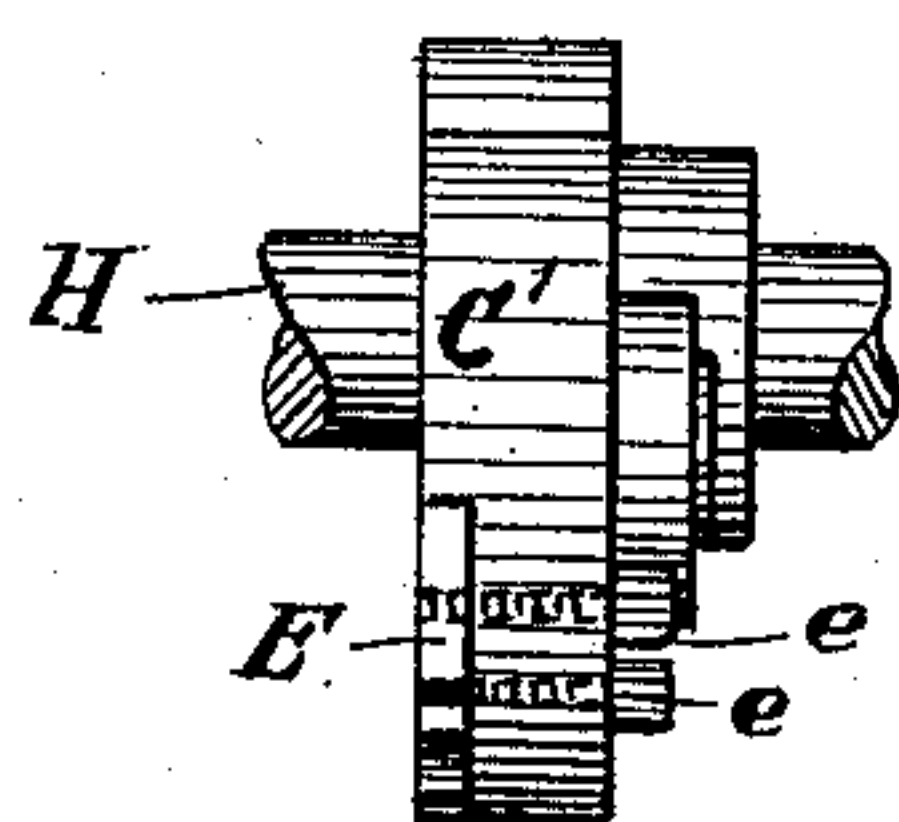
MACHINE FOR SPLITTING SCRAPS OF LEATHER.

No. 373,196.

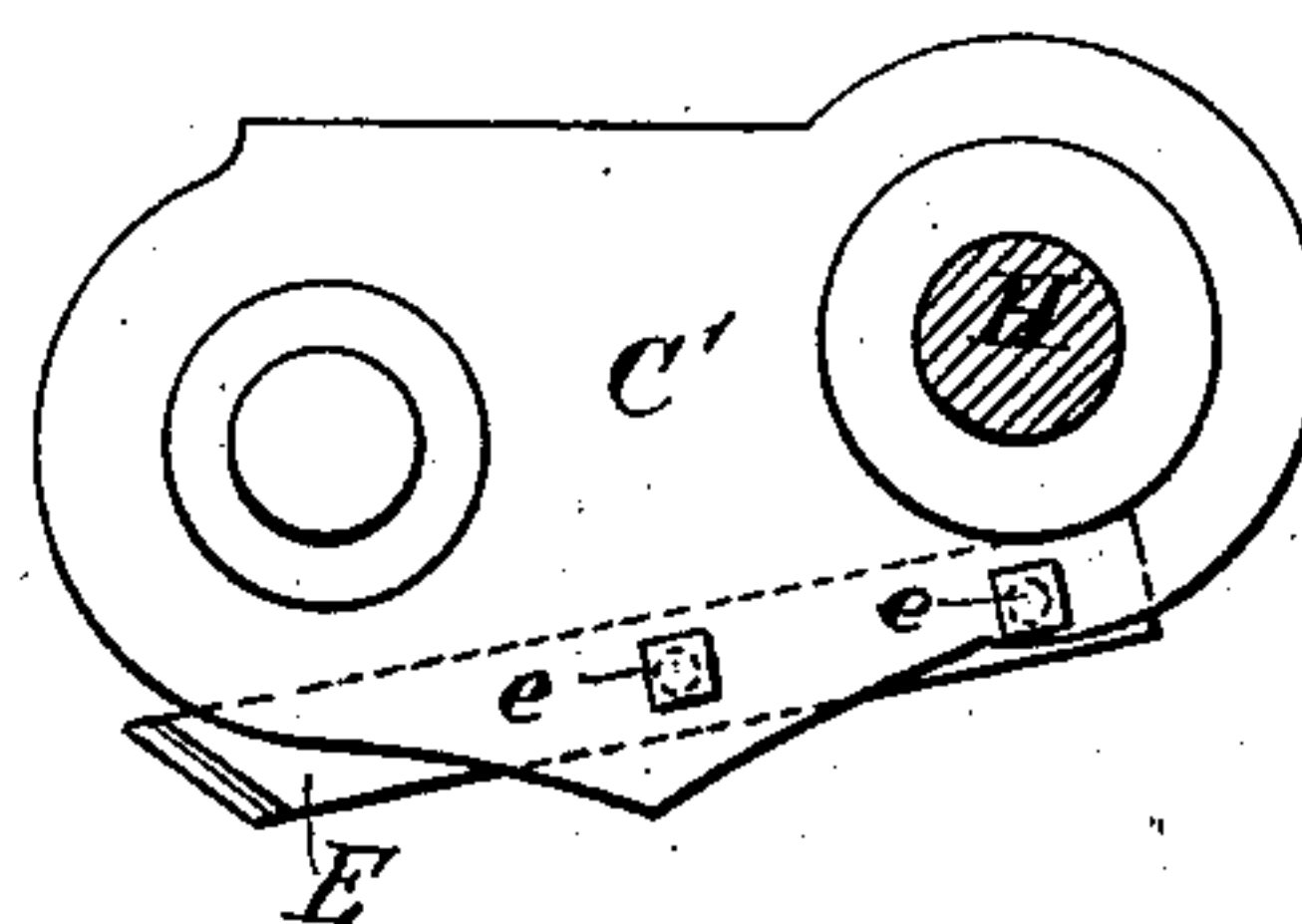
Patented Nov. 15, 1887.



*Fig. 5.*



*Fig. 6.*



*Fig. 7.*

*Fig. 8.*



*Witnesses:*

*Chas. Baur*  
*A. W. Munday*

*Inventor:*

*Charles E. Roberts*  
*by Munday, Evans & Adcock*  
*his attys*



(No Model.)

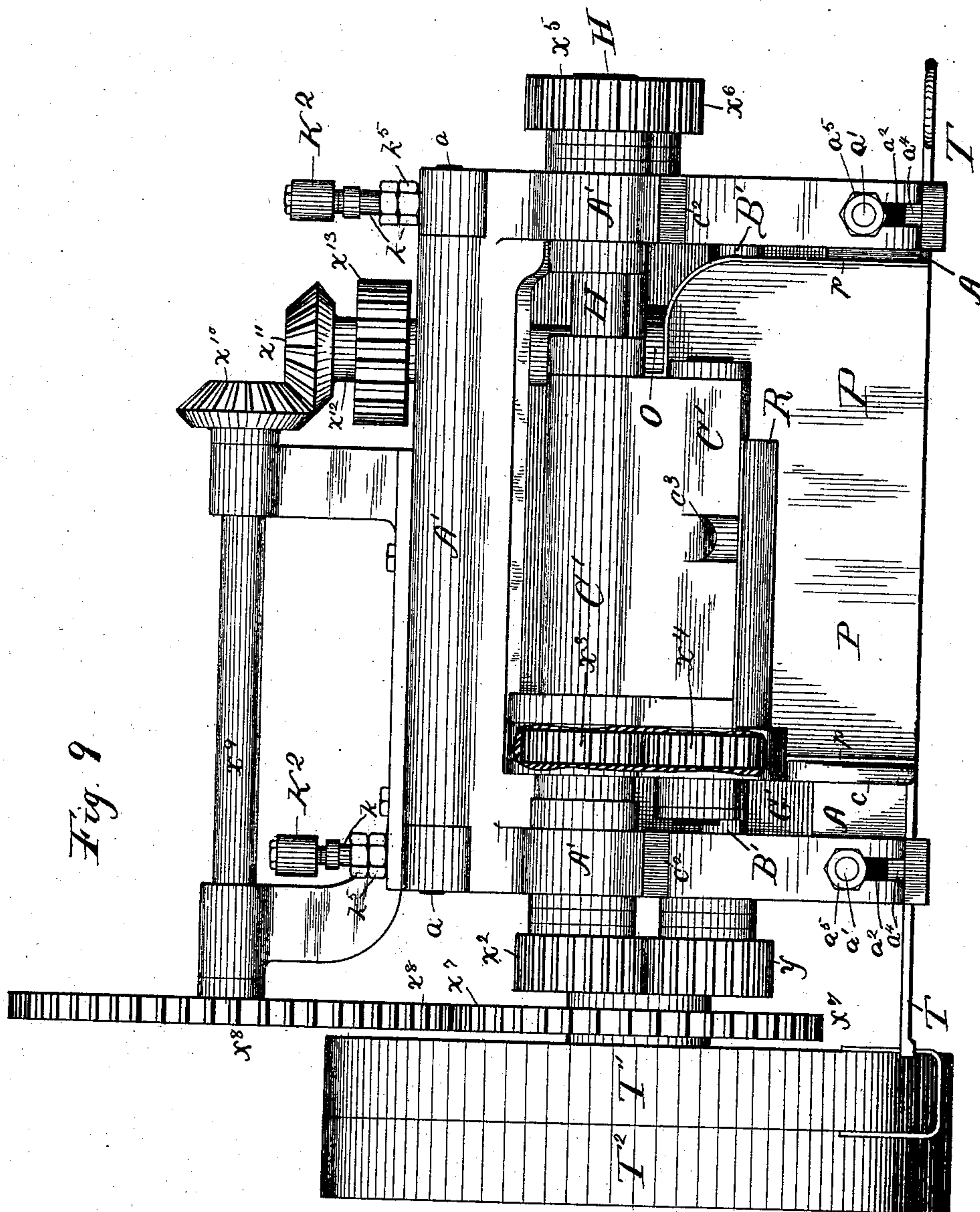
C. E. ROBERTS.

7 Sheets—Sheet 4.

MACHINE FOR SPLITTING SCRAPS OF LEATHER.

No. 373,196.

Patented Nov. 15, 1887.



Witnesses:  
Lew. C. Curtis.  
H. W. Munday.

Inventor:  
Charles E. Roberts.

By Munday, Everts & Aldcock,  
his Attorneys.

(No Model.)

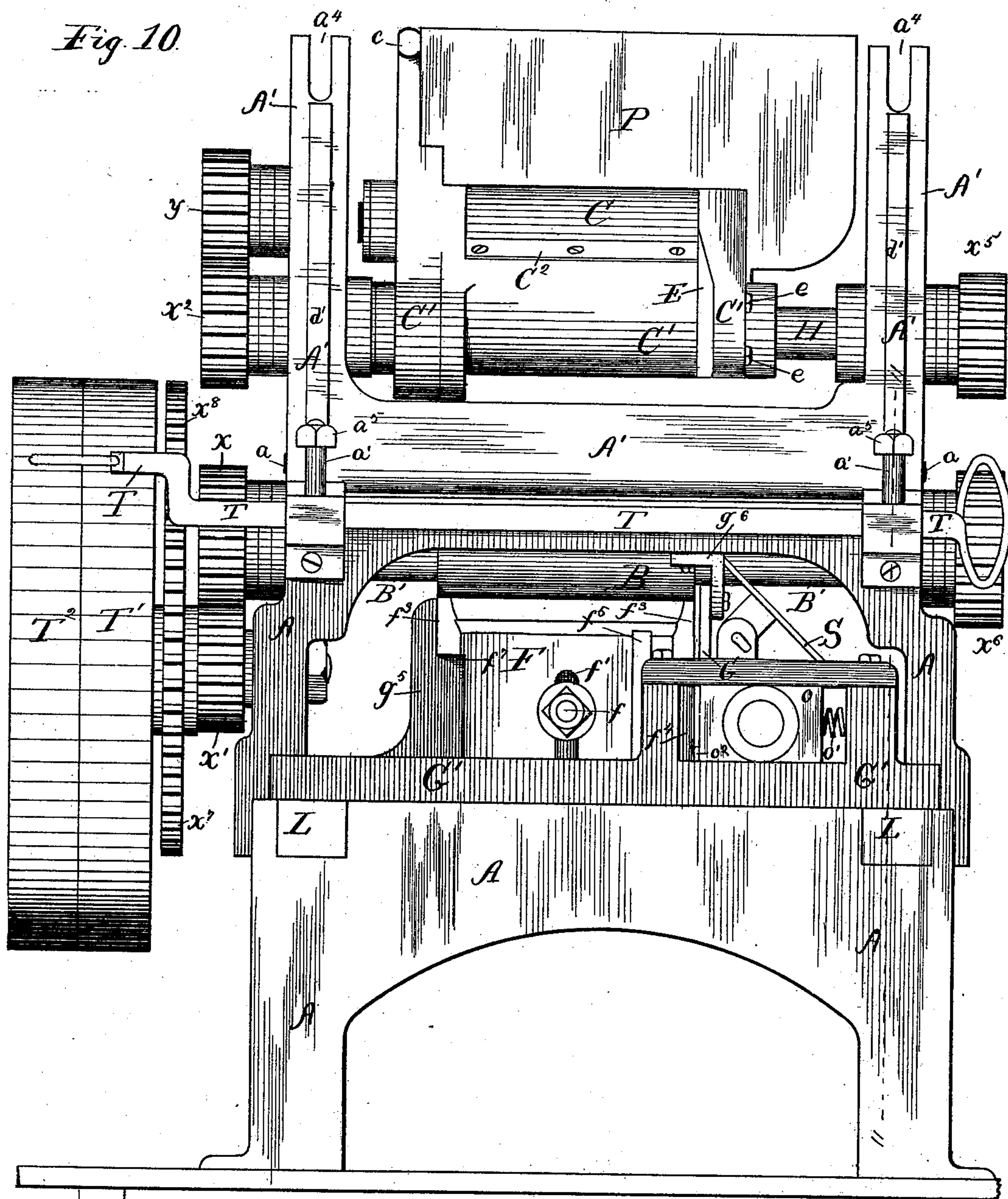
7 Sheets—Sheet 5.

C. E. ROBERTS.

MACHINE FOR SPLITTING SCRAPS OF LEATHER.

No. 373,196.

Patented Nov. 15, 1887.



Witnesses:  
Lew. C. Curtis.  
A. M. Munday.

Inventor:  
Charles E. Roberts  
By Munday, Evarts & Alden.  
his Attorneys.



(No Model.)

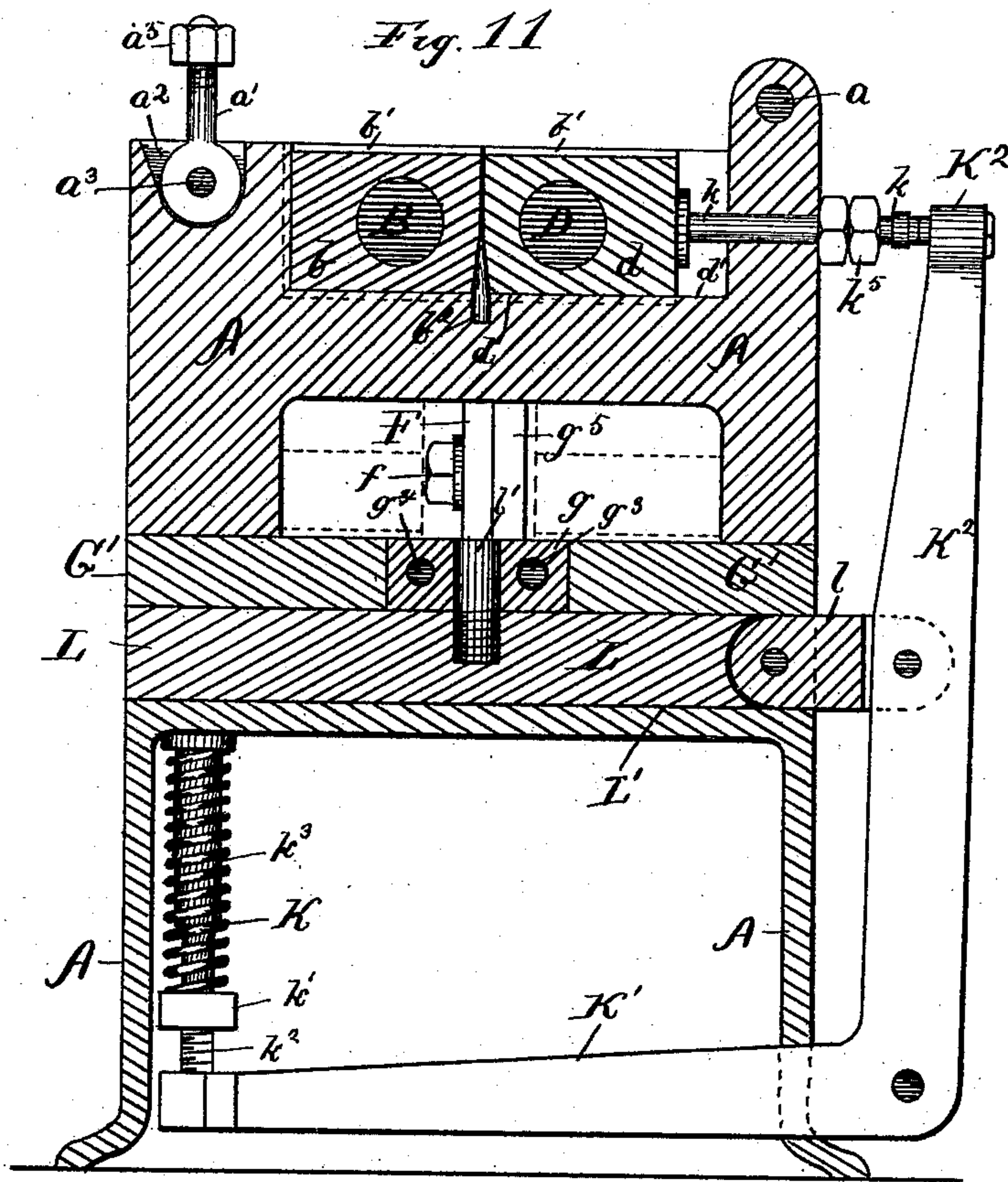
7 Sheets—Sheet 6.

C. E. ROBERTS.

MACHINE FOR SPLITTING SCRAPS OF LEATHER.

No. 373,196.

Patented Nov. 15, 1887.



Witnesses:  
Lew. C. Carter.  
H. W. Munday.

Inventor:  
Charles E. Roberts.  
By Munday, Swarts & Hadcock.  
his Attorneys:

(No Model.)

7 Sheets—Sheet 7.

C. E. ROBERTS.

MACHINE FOR SPLITTING SCRAPS OF LEATHER.

No. 373,196.

Patented Nov. 15, 1887.

Fig. 12

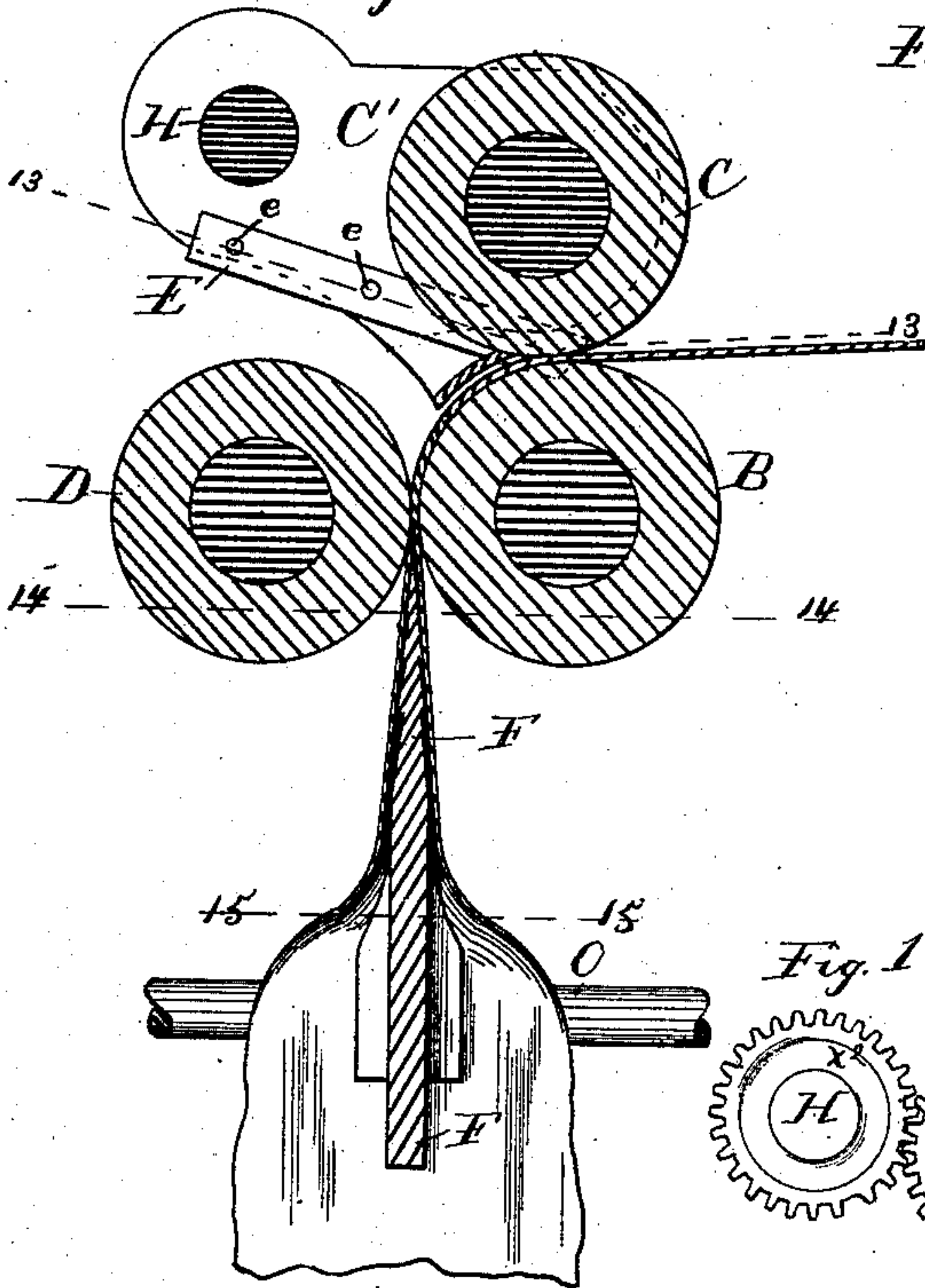


Fig. 14

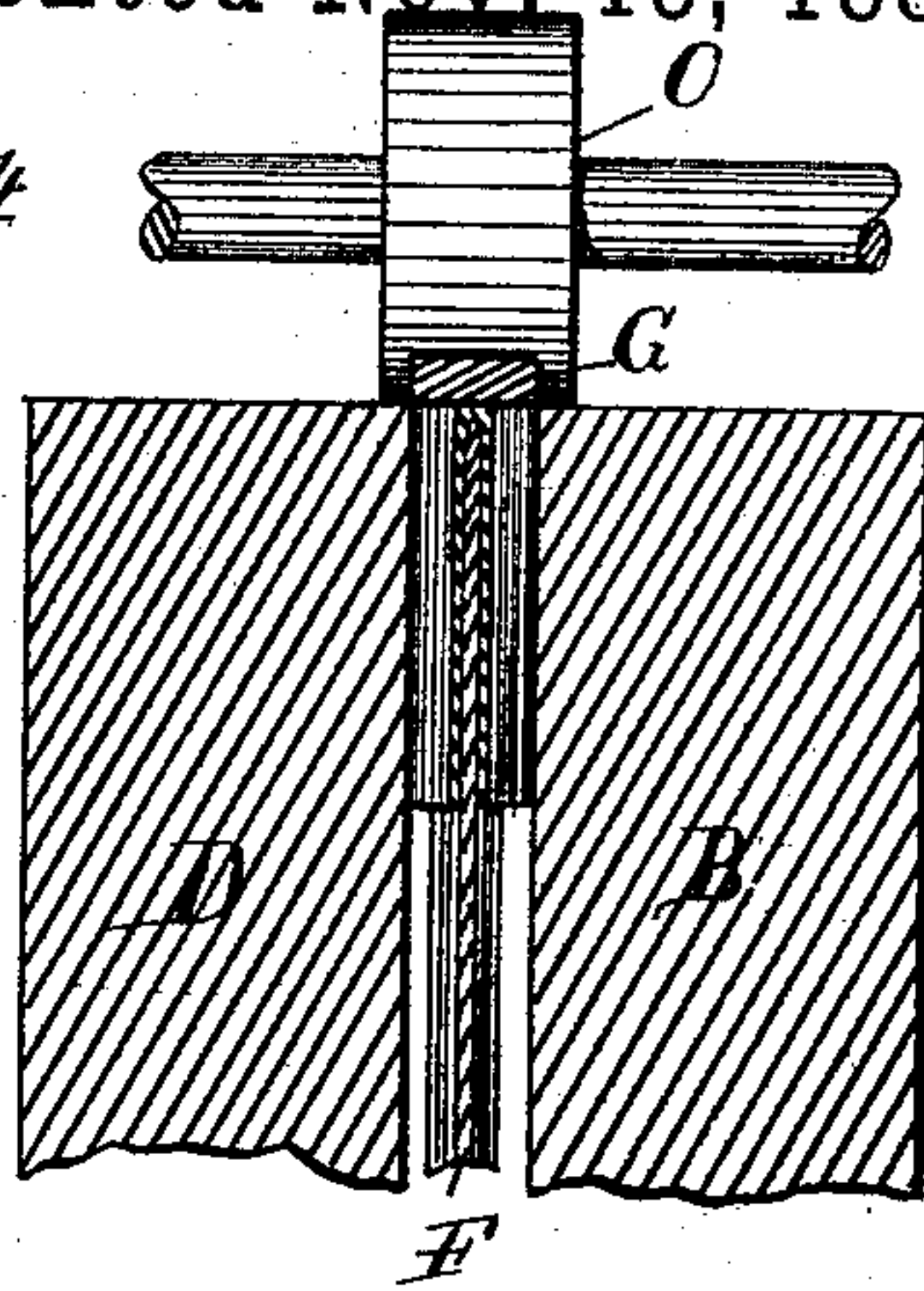


Fig. 15

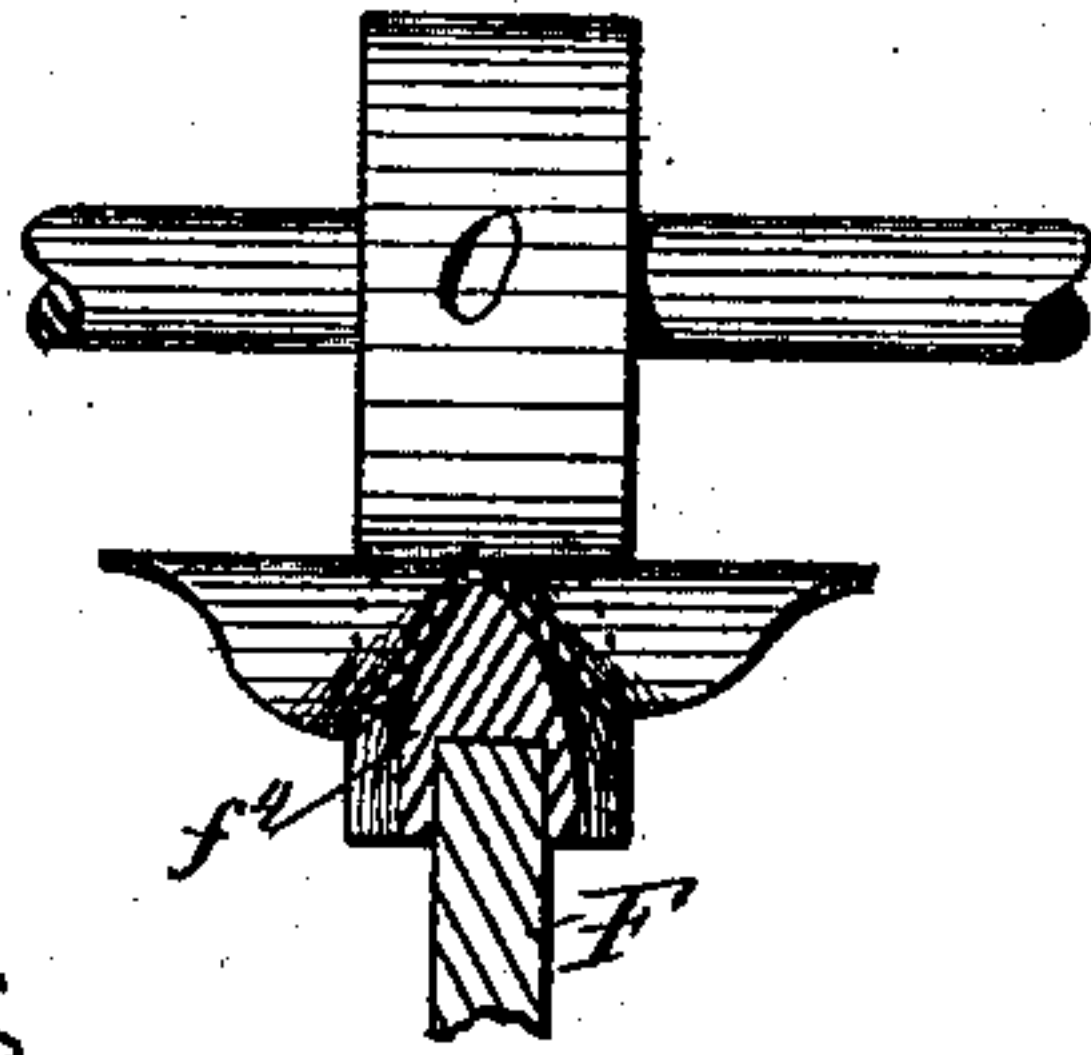


Fig. 16

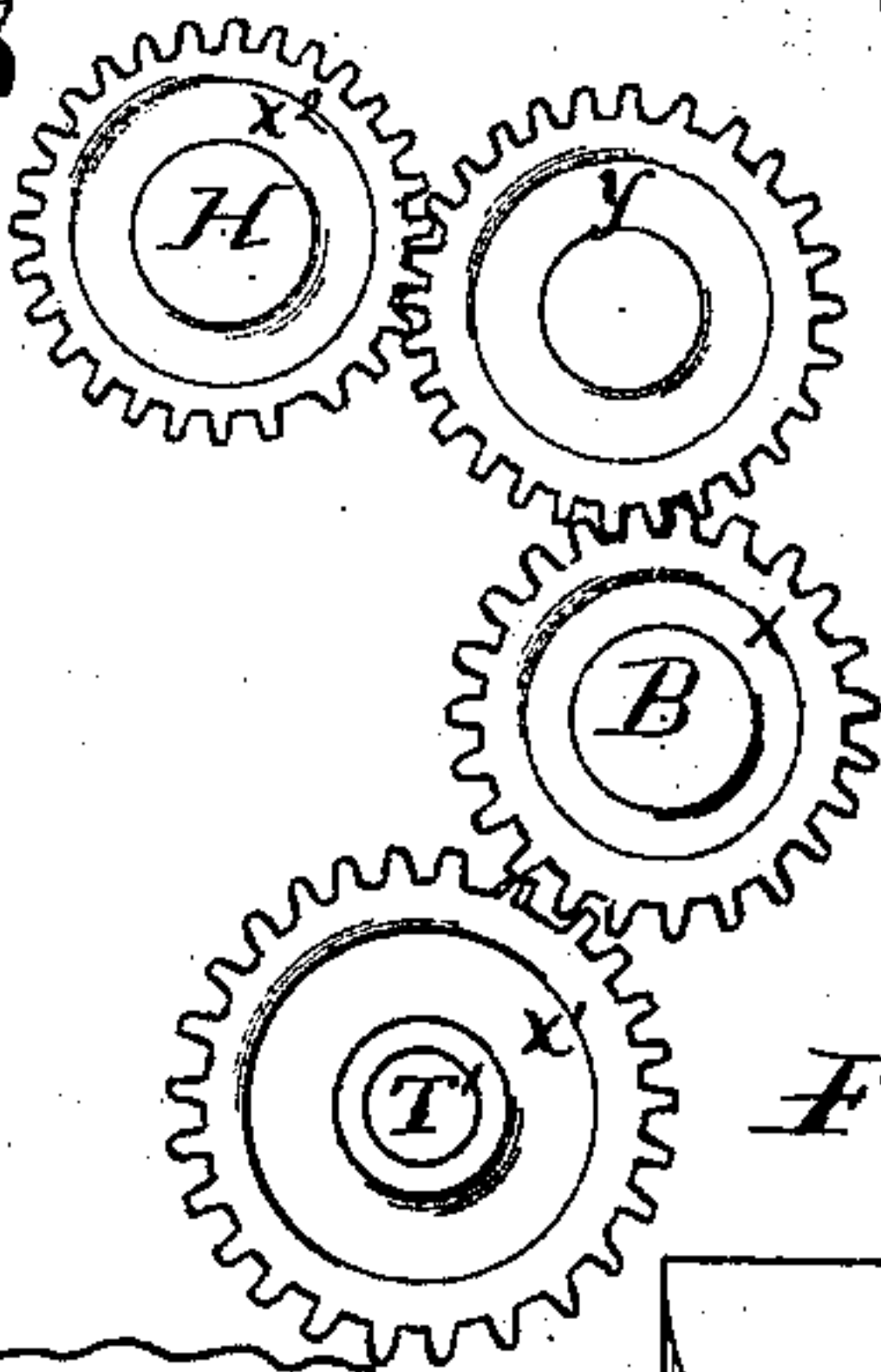


Fig. 13

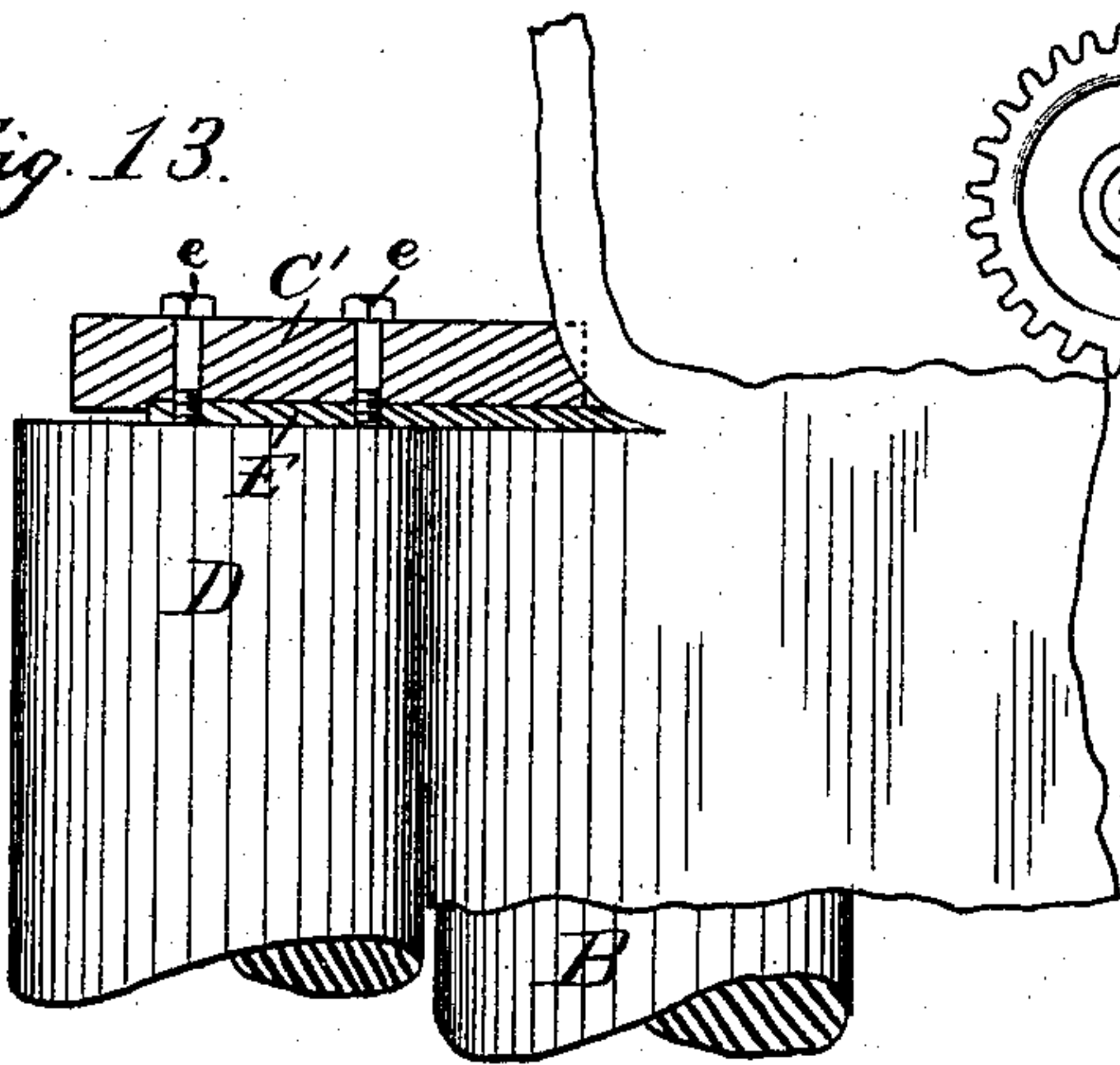
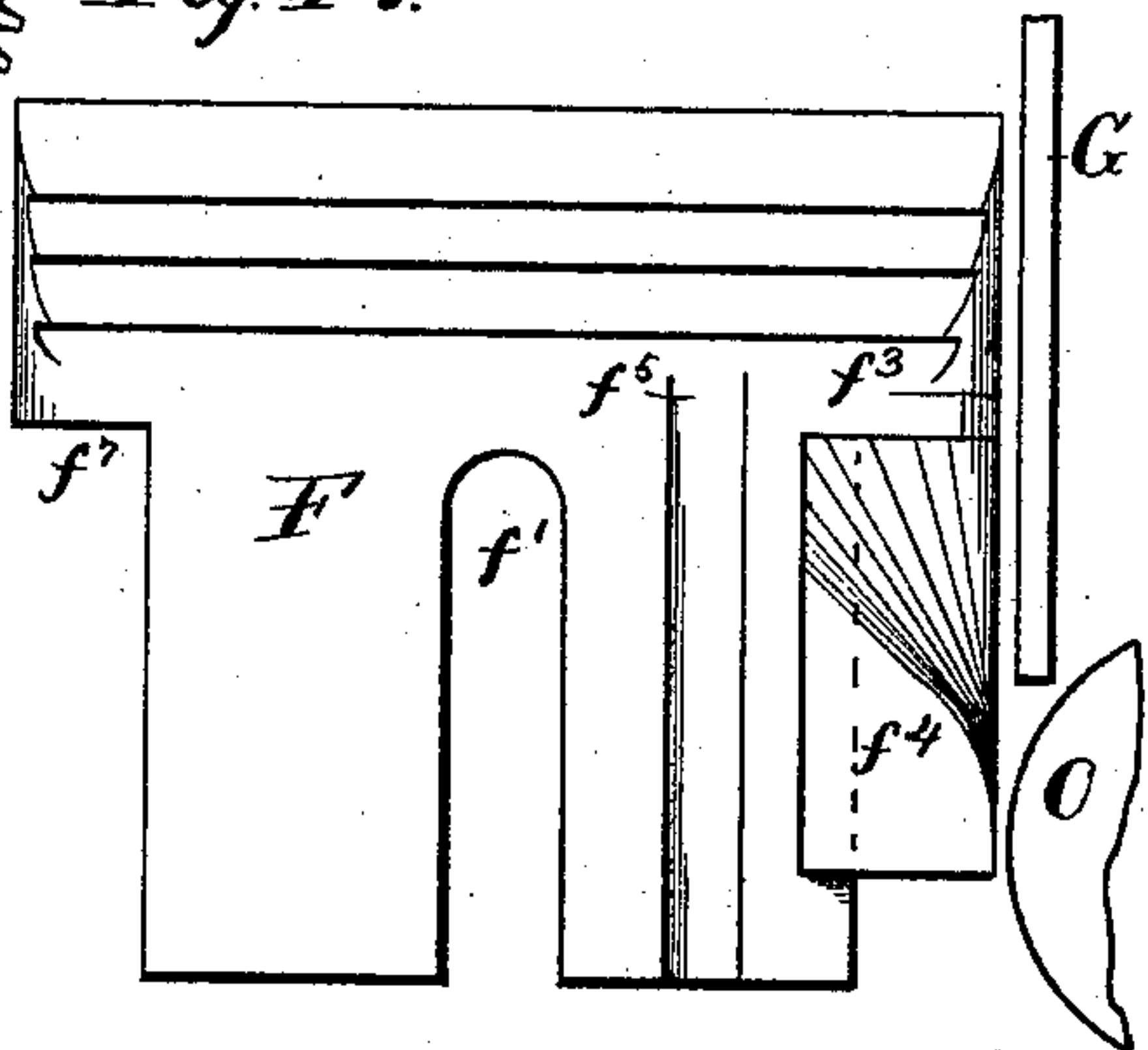


Fig. 17



Witnesses:  
Lew. E. Curtis.  
A. W. Munday.

Inventor:  
Charles E. Roberts.  
By Munday, Evarts & Aldcock  
his Attorneys.



# UNITED STATES PATENT OFFICE.

CHARLES E. ROBERTS, OF CHICAGO, ILLINOIS.

## MACHINE FOR SPLITTING SCRAPS OF LEATHER.

SPECIFICATION forming part of Letters Patent No. 373,196, dated November 15, 1887.

Application filed October 12, 1885. Serial No. 179,643. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES E. ROBERTS, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Machines for Splitting Scraps of Leather, of which the following is a specification.

Pieces of leather which are too small for use may be utilized for various purposes by cutting or squaring one of their edges, and then splitting the piece of leather almost to its squared edge and opening and pressing it out flat, thus doubling its original area, the narrow uncut margin at the squared edge serving to unite the two leaves or split parts together. In machines heretofore devised for this purpose two pair of feed-rollers have usually been arranged one above or opposite the other, the one pair serving to feed or force the scrap past and against the edge of the squaring-knife and the other pair serving to feed or force the scrap past and against the splitting-knife. A machine of this kind is shown, for example, in Patent No. 319,357, of June 2, 1885, to Tyler. Though the edge-squaring knife be properly adjusted from the extreme end or corner of the splitting-knife, so as to leave a narrow margin of the scrap at its squared edge unsplit, great difficulty is experienced in the practical operation of such machines, owing to the fact that by reason of the necessary space between the two pair of rollers small pieces of leather will often be released by the one pair before its front edge is properly caught by the other pair, and consequently the scrap will not be properly presented to the splitting-knife, so as to leave a continuous uncut margin at its squared or straightened edge.

The object of my invention is to obviate this difficulty and provide an efficient and automatic machine for splitting and opening scraps of leather, of a simple, cheap, durable, and convenient construction, and whereby leather scraps of any size and of different thickness at different edges may be accurately split in the middle throughout, and so as to leave a hinge or uncut margin at its straightened edge, and at the same time open and press out flat the two leaves or split parts; and to this end my invention consists, primarily, in connection with the edge-straightening and splitting

knives, of three feed-rollers, the middle and upper ones of which serve to feed and carry the scrap by and against the edge-straightening knife, while the middle one and the one horizontally opposite it serve to feed or force the scrap by and against the splitting-knife. A curved guide or guard between the rollers serves to press and curve the scrap against the surface of the middle roller and guide its front edge between the middle roller and its horizontally-opposite roller. By this means it will be observed that the scrap is carried continuously upon the surface of the same roller (the middle one) from the time its edge is straightened until it is split, so that there is no danger of its being presented in a different relation or position to the splitting-knife from what it had when it passed the edge-straightening knife. This feature of my invention, which consists in carrying or the means for carrying the scrap by and against both the edge-straightening and splitting knives upon the surface of the same feed-roller, is of great importance to the successful and practical operation of the machine.

The invention also consists in the means I employ to accurately and automatically adjust the position of the splitting-knife, so as to split scraps of different and varying thicknesses always in the middle—that is to say, it also consists, in connection with a stationary feed-roller, of a movable feed-roller and a movable splitting-knife or splitting-knife carriage or slide connected to said movable feed-roller by a suitable mechanism to give the knife just half the motion of the movable feed-roller. The fixed and movable feed-rollers being pressed apart by the scrap of leather passing between them, according to its thickness, and the knife, which is arranged just below and between the two feed-rollers, having thus just half the movement of the movable feed-roller, it is obvious that the scrap will be split exactly in the middle by the knife.

The invention also consists in connecting each end of the movable feed-roller independently of the other with the corresponding end of the movable knife-carriage, so that in case the scrap should be of different thicknesses at different edges the knife will be correspondingly adjusted and split the scrap in the middle throughout.



It also consists in the novel devices and novel combinations of devices or parts herein shown and described, and more particularly pointed out in the claims.

5 In the accompanying drawings, which form a part of this specification, and in which similar letters of reference indicate like parts, Figure 1 is a front elevation of a machine embodying my invention. Fig. 2 is an end view. 10 Fig. 3 is a section on line 3 3 of Fig. 1. Fig. 4 is a detail plan view of the splitting knife carriage or slide. Fig. 5 is a detail section, taken transversely through the sliding box, of the movable roller and its guides; and Figs. 6 and 15 7 are detail views of the edge-straightening knife and the hinged frame to which it is secured. Fig. 8 is an edge view of a scrap of leather as split by the machine. Fig. 9 is a plan view. Fig. 10 is a front elevation showing the hinged frames A' and C' both raised or turned back. Fig. 11 is a section on line 11 11 of Fig. 10. Fig. 12 is a detail cross-sectional view of the rollers and splitting-knife, illustrative of their operation. Fig. 13 is a 25 detail horizontal sectional view taken above the rollers B D and showing the operation of the edge-straightening knife. Fig. 14 is a section on line 14 14 of Fig. 12; and Fig. 15 is a section on line 15 15 of Fig. 12, showing the 30 operation of the spreading-block and flattening-roller. Fig. 16 is a detail elevation of certain gears; and Fig. 17 is a side elevation of the splitting-knife, spreading-block, and gage-plate.

35 In said drawings, A represents the frame of the machine.

B and C are two feed-rollers, between which the scrap is fed and by which it is forced past and against the edge cutting or straightening 40 knife E, which is secured to the hinged frame C' of the machine in a suitable slot therein, and D is a third feed-roller, between which and the middle roller, B, the scrap is forced by and against the splitting-knife F. The 45 roller C may preferably be arranged about vertically over the roller B and the roller D horizontally to said roller B.

G is a guide-plate fixed to the rigid frame of the machine, or to a suitable bracket or 50 cross-bar,  $g^6$ , thereon, against which the cut or straightened edge of the scrap abuts as it issues from the knife E and as it is fed or forced down upon the splitting-knife F.

The shaft B' of the middle roller, B, is journaled in suitable bearings,  $b$ , mounted rigidly or immovably upon the frame of the machine. The shaft of the upper roller, C, is journaled in a movable frame, C', hinged or pivoted to the cross-shaft H, which is mounted in suitable bearings upon the hinged or pivoted part 60 A' of the frame A. The part A' of the frame is pivoted to the main frame A at  $a$ , so that it may be turned or swung back for convenience in getting at the knives and interior parts of 65 the machine. This hinged frame A' is secured to the main frame at its front edge by bolts  $a^1$ . These bolts are pivoted in suitable slots,  $a^2$ , in

the main frame by the pins  $a^3$  and fit in slots  $a^4$  in the frame A', so that by simply loosening the nuts  $a^5$  on the bolts the bolts may be swung 70 forward on their pivots, and thus release the frame A' without the necessity of either removing the bolts from the frame or the nuts from the bolts. The swinging or movable frame C', which carries the roller C, is pro- 75 vided with a projecting foot or stop,  $c$ , which rests upon the top face of the main frame, and thus prevents the rollers B C from quite touching each other when there is no leather or scrap between them, and thus injuring each 80 other.

The rollers B and C are forced together, so as to produce the requisite pressure upon the leather passing between them, by means of a spring,  $c'$ , the ends of which fit against suitable projections,  $c^2$ , on the hinged frame A', and which bears near its middle, through a set-screw,  $c^4$ , thereon, against a projection,  $c^3$ , on the swinging roller-frame C'. The set-screw  $c^4$  serves to regulate the tension of the spring. 90 The end of the set-screw simply bears against the projection  $c^3$ , as do the ends of the spring against the projection  $c^2$ , so that the spring can be removed bodily by merely loosening the set-screw, when the frame C', with its roller C, 95 can be swung back, which is a matter of great convenience in giving ready access to the rollers B and D and the splitting-knife F.

The edge-straightening knife E is secured in a suitable guide or slot cut in the under 100 side of the frame C' at the end of the roller C, being fixed therein by the set-screws  $e$ .

The horizontal roller D, between which and the roller B the scrap is forced against the splitting-knife, is journaled in suitable bear- 105 ings,  $d$ , which are adapted to slide back and forth on suitable ways or guides,  $d'$ , on the frame A, so that the roller D may spread or separate from the roller B sufficiently to permit the scrap to pass between them, whatever 110 its thickness. The bearings  $b$  and  $d$  of the rollers B and D each have grooves  $b'$  in their upper and lower faces to correspond to the ways  $d'$  on the upper face of the frame A and lower face of the frame A', which fits down 115 upon said bearings and holds them in place. The bearings  $b$  of the roller B are held immovable by lugs or pins  $b^2$  in the ways  $d'$ , which fit in suitable holes in the bearings. These holes may preferably be formed partly 120 in the bearings  $b$  and partly in bearings  $d$ , being a half-round groove in each. The grooves in the bearings  $d$  do not fit the guides or ways  $d'$  so closely but that one end of the roller D may move at a time or in advance of the other, 125 in case the scrap passing between them is thicker at one side or edge than the other.

The rollers B and D are forced together to produce the requisite pressure upon the leather passing between them by means of springs K 130 acting upon the ends of the levers K', the other ends of which levers are provided with adjusting or set screws  $k$ , that fit against the movable bearing  $d$  of said roller D. Each end



of the roller D is thus pressed up against the roller B independently of the other, so that one end of the roller may yield more than the other in case the scrap is thicker at one side than the other. Each of the springs K presses at one end against the frame A and at the other against an adjustable jam-nut,  $k'$ , on the threaded rod or stem  $k^2$ , which connects with the end of the lever  $K'$ . A sleeve,  $k^3$ , on the rod  $k^2$  serves to sustain the coil-spring. The lever  $K'$  is preferably a bent lever and is pivoted at its knee or angle to the main frame by a pin,  $k^4$ .

A pair of sliding bars, L, mounted in suitable guides or ways,  $L'$ , in the frame of the machine, are connected by pivoted links  $l$  to the upright arms  $K^2$  of the bent levers  $K'$ , at the middle point thereof, so that each of the slides L will always have just half the motion of its corresponding bearing  $d$  of the roller D.

The sliding frame or carriage  $G'$ , upon which the splitting-knife F is secured, is connected to the slides L L at each side by means of pivots or pins  $l'$ , secured in the slides L, preferably near the middle thereof, and which enter suitable holes in the blocks  $g$   $g'$ , which fit in recesses or notches  $g^2$   $g^2$ , cut in the frame  $G'$ . The block  $g'$  fits loosely in its recess or notch  $g^2$ , and the notch is made somewhat deeper than the block, so as to permit a slight transverse movement of the frame  $G'$ . The block  $g$  is secured to the frame  $G'$  by the set-screws  $g^3$   $g^4$ , the former of which passes through a smooth hole in the block  $g$  and enters a threaded hole in the frame, and the latter of which passes through a threaded hole in the block  $g$  and bears against the frame  $G'$ , so that the frame  $G'$  may be adjusted laterally to bring the end of the splitting-knife F in proper relation to the edge-straightening knife E and the gage or guide G. The loose block  $g'$  also permits the sliding frame  $G'$  to turn slightly askew without binding when one of the slides L is advanced farther than the other, owing to the scrap passing between the rollers B and D being thicker at one edge than the other. The distance between the two pivot-pins  $l'$   $l'$  in the slides L L of course slightly varies when one of said slides advances farther than the other, and the transverse movement of the loose block  $g'$  in its notch or recess in the frame  $G'$  compensates for such variation in the distance between said pivot-pins  $l'$   $l'$ .

The splitting-knife F is secured to its sliding frame  $G'$ , or to a vertical bracket,  $g^5$ , cast thereon, by means of a bolt,  $f$ , passing through a slot,  $f'$ , in the knife, so that the knife may be adjusted vertically. As it is very important that the end  $f^3$  of the knife and the spreading-block  $f^4$  secured thereto should always be exactly parallel to the gage-plate G, and to save the labor of making a nice adjustment every time the knife is removed and replaced, I provide the knife with a guide or groove,  $f^5$ , and the bracket  $g^5$ , to which it is secured, with a corresponding tongue or guide,  $f^6$ , so that the knife must always stand exactly vertical or

parallel to the gage-plate G. The body of the knife F is provided with a notch or shoulder,  $f^7$ , to receive the spreading-block  $f^4$ , the end face of which is spirally curved or wedging, so as to spread the two split parts or leaves of the scrap as they are forced down upon the knife F. The end  $f^3$  of the knife F is not sharp, but has simply a slightly rounded or wedging edge, so as to prevent the narrow margin at the straightened edge of the scrap being cut through.

The gage-plate G, against which the straightened edge of the scrap abuts as it issues from the knife E and passes down the knife F, is secured to a bracket or cross-bar,  $g^6$ , on the frame by a suitable screw. This gage should be just on a line with the cutting-edge of the knife E, and the knife F should be adjusted laterally, so that the space between its end and this gage will leave a sufficient uncut margin of the leather to hinge or unite the two split leaves or parts together. As the split scrap is forced down by the rollers B and D between the gage-plate G and the spreading-block  $f^4$ , the latter serves to open or divide the split leaves or the front edge thereof, and as the scrap advances its front edge is caught by the flattening roller O, arranged parallel to the face of the spreading-block, and pressed firmly against the same, so that the two leaves are opened or spread out flat.

The gage-plate G should extend down near to the periphery of the flattening-roller O, as clearly indicated in Fig. 17. The horizontal sectional views, Figs. 4 and 14, are taken on lines which cut the guide G, while Fig. 15 is on a line just below the end of the guide G.

The flattening-roller O is journaled in suitable boxes or bearings,  $o$ , which are mounted movably upon the knife-frame  $G'$  in suitable ways or guides thereon. Springs  $o'$ , pressing against the bearings  $o$ , serve to force the roller O with the requisite pressure against the leather. A stop,  $o^2$ , prevents the roller O from being forced against the spreading block when there is no leather between said block and roller.

A feed-table, P, having an upright flange,  $p$ , is secured to the swinging frame  $C'$ , or to its projecting foot  $c$ , and a curved finger guard or shield, R, is also secured to this frame  $C'$  and projects in front of the roller C, so as to leave only a narrow opening between said guard and feed-table to prevent danger of injury to the operator.

S is a chute by which the strips cut off by the edge-straightening knife are carried out of the way.

T is a belt-shifter, by which the belt may be instantly shifted from the fast to the loose pulley  $T'$   $T^2$ .

The frame  $C'$ , which carries the roller C, is provided on its underside with a curved guide,  $C^2$ , preferably made integral with said frame, to curve and guide the edge of the leather as it issues from the rollers B C between the rollers B D and to press the scrap around



against the surface of the roller B. As the scrap is thus bent around the roller B and grasped at the same time between the rollers B C and the rollers B D, it is obvious that it cannot get out of position or alignment as it passes through the machine.

The splitting-knife F is adapted to be reversed or turned end for end, and for this reason is provided with a guide-groove,  $f^5$ , on each side to fit the guide  $f^6$  on the bracket  $g^5$ .

The rollers B, C, D, and O may be driven in any suitable manner or by any suitable arrangement of gears. Preferably, however, the roller B or its shaft is operated by means of a gear,  $x$ , thereon, which meshes with a gear,  $x'$ , on the hollow shaft or sleeve of the driving-pulley T'. The roller C, which is mounted on the swinging frame C', is driven by means of a gear,  $x^2$ , on the shaft H, through an intermediate gear,  $y$ , which meshes with the gear  $x$ , and a second gear,  $x^3$ , on the shaft H, which meshes with the gear  $x^4$  on the shaft of the roller C. As the frame C' is also hinged to the shaft H, the gears  $x^3$  and  $x^4$  will properly intermesh, whatever the position of the swinging frame C'. The roller D is driven by a spur-gear,  $x^5$ , on the shaft H, which meshes with a spur-gear,  $x^6$ , on the shaft of said roller D. The roller O is operated by means of a spur-gear,  $x^7$ , on the driving-pulley sleeve, which meshes with a spur-gear,  $x^8$ , on the shaft  $x^9$ , which carries on its opposite end a bevel-gear,  $x^{10}$ , that meshes with a bevel-gear,  $x^{11}$ , on the stud  $x^{12}$ , which stud has a spur-gear,  $x^{13}$ , that meshes with a spur-gear,  $x^{14}$ , on the shaft of the roller O.

To prevent the rollers B and D being forced together and thus injured when there is no leather between them, the adjusting-screws  $k$  are provided with stops or jam-nuts  $k^5$ , that fit against the frame of the machine, surrounding the openings therein through which said screws  $k$  project.

In my invention the spreading-block or opener  $f^4$ , which is secured to the end of the splitting-knife F, has a flat face and operates in conjunction with the single flattening-roller O, the split scrap being pressed between the flat face of the stationary spreading-block on the one side and the periphery of the flattening-roller O on the other, and it is this particular combination of the stationary spreading-block and flattening-roller O, and the combination therewith of the splitting-knife, edge-trimming knife, the three feed-rolls, and gage-plate, which I claim as my invention.

I do not claim, broadly, a spreading-block or opener in combination with splitting-knife and rolls; nor do I claim, broadly, the combination of feed-rolls with a splitting-knife, a spreading-block or opener, a guide, and a pressing roll or roller.

I claim—

1. In a machine for splitting leather scrap without entirely severing the split parts of the scrap, the combination, with feed-rollers, of a straight splitting-knife and an edge-straight-

ening knife mounted on the frame of the machine at right angles to said splitting-knife, and with a slight space between its cutting-edge and the end of said splitting-knife, so as to leave a narrow margin of the scrap unsplit at its straightened edge, and both said knives mounted on the machine with their cutting-edges projecting in operative position about or against the periphery of one and the same feed-roller, so that both said knives will operate upon the scrap while it is carried upon said feed-roller, substantially as specified.

2. In a machine for splitting leather scrap without entirely severing the split parts of the scrap, the combination, with feed-rollers, of a splitting-knife and an edge-straightening knife mounted on the frame of the machine at right angles to said splitting-knife, and with a slight space between its cutting-edge and the end of said splitting-knife to leave a narrow margin of the scrap unsplit at its straightened edge, and both said knives mounted on the machine with their cutting-edges projecting in operative position about or against the periphery of one and the same feed-roller, so that both said knives will operate upon the scrap while it is carried upon said feed-roller, and a gage-plate for the straightened edge of the scrap to abut against, mounted on the frame of the machine with a space between it and the end of said splitting-knife, substantially as specified.

3. The combination, with a fixed and a movable feed-roller, of a splitting-knife arranged between said feed-rollers and mounted upon a movable carriage or slide, and a lever or equivalent mechanism connecting said movable feed-roller with said knife carriage or slide, whereby said knife is given half the movement of said movable roller, substantially as specified.

4. The combination of a pair of feed-rollers with a splitting-knife and a splitting-knife carriage or slide independently movable at each end, and mechanism, substantially as described, for adjusting the position of said knife carriage or slide independently at each end by the movement or separation of said feed-rollers, substantially as specified.

5. The combination, with a fixed feed-roller, B, of a movable feed-roller, C, an edge-straightening knife, E, a movable feed-roller, D, and a splitting-knife, F, substantially as specified.

6. The combination, with a fixed feed-roller, as B, of a movable feed-roller, as C, an edge-straightening knife, as E, a movable feed-roller, as D, a splitting-knife, as F, and a gage-plate, as G, substantially as specified.

7. The combination, with a fixed feed-roller, as B, of a movable feed-roller, as C, an edge-straightening knife, as E, a movable feed-roller, as D, a splitting-knife, as F, a gage-plate, as G, and a spreading-block, as  $f^4$ , substantially as specified.

8. The combination, with fixed feed-roller B, of movable feed-roller D, splitting-knife F, automatically-moving knife carriage or slide G', each end of said knife carriage or slide be-



ing independently movable, and mechanism connecting said knife carriage or slide with said movable feed-roller at each end, whereby said splitting-knife is automatically adjusted  
5 in position transversely between said feed-rollers by the movement of the movable feed-roller to or from the fixed feed-roller, substantially as specified.

9. The combination, with fixed feed-roller  
10 B, of feed-roller D, independently movable at each end, splitting-knife F, movable knife-carriage G', slides L, pivoted to said carriage G', and lever-arms K<sup>2</sup>, connected to said slides L and operated by said movable feed-roller D,  
15 substantially as specified.

10. The combination, with a pair of feed-rollers, of a splitting-knife, a knife carriage or slide, and independent slides L, pivoted to said knife-carriage, substantially as specified.

11. The combination of independent slides  
20 L L with splitting-knife F and knife-carriage slide G', having notches g<sup>2</sup>, and blocks g g', pivoted to said slides L L, said block g' fitting loosely in the recess or notch in said slide G',  
25 and the other block, g, being adjustably connected to said slide G', substantially as specified.

12. The combination, with an edge-straightening knife, of a splitting-knife, feed-rollers  
30 by and upon which the scrap is carried against both of said knives, both said knives being mounted on the machine with their cutting-edges projecting in operative position about or against the periphery of one and the same feed-roller, a gage-plate at the end of said splitting-knife for the straightened edge of the scrap to  
35 abut against as it passes said splitting-knife, and a spreading-block secured to the end of said splitting-knife, substantially as specified.

13. The combination of gage-plate G with  
40 splitting-knife F, having guide f<sup>5</sup>, and frame bracket or projection g<sup>5</sup>, having guide f<sup>6</sup>, substantially as specified.

14. The combination of main frame A with  
45 a hinged frame, A', pivoted at one end or side

to said main frame and secured at the other by a bolt, a', pivoted to one of said frames and fitting in slots a<sup>2</sup> a<sup>4</sup> in said frames, the nut on the free end of said bolt fitting over a foot or ledge on one of said frames, substantially as  
50 specified.

15. The combination, with frame A and roller B, journaled thereon, of swinging frame C' and roller C, journaled thereon, and a removable spring, c', substantially as specified. 55

16. The combination of frame A, having guide d', with hinged frame A', roller B, having removable journal boxes or bearings b, provided with guide b', and roller D, having removable sliding journal boxes or bearings d, provided with a guide to fit said guide d', substantially as specified. 60

17. The combination of frame A, having guide d', with hinged frame A', roller B, having removable journal boxes or bearings b, provided with guide b', and roller D, having removable sliding journal boxes or bearings d, provided with a guide to fit said guide d', bent levers K', and springs K, for pressing said roller D independently at each end against said roller  
70 B, substantially as specified.

18. The combination of frame A, hinged frame A', swinging frame C', roller B, journaled on frame A, roller C, journaled on frame C', roller D, journaled in sliding bearing d, mounted in said frames A A', edge-straightening knife E, secured to said swinging frame C', splitting-knife F, knife-slide G', slides L L, and lever-arm K<sup>2</sup>, substantially as specified. 75

19. The combination, with a horizontal feed-table, of feed-rollers B C, arranged vertically, roller D, arranged horizontally to roller B, and a vertical splitting-knife, F, mounted on a horizontal and automatically-sliding frame, substantially as specified. 80

CHARLES E. ROBERTS.

Witnesses:

H. M. MUNDAY,  
EDMUND ADCOCK.