

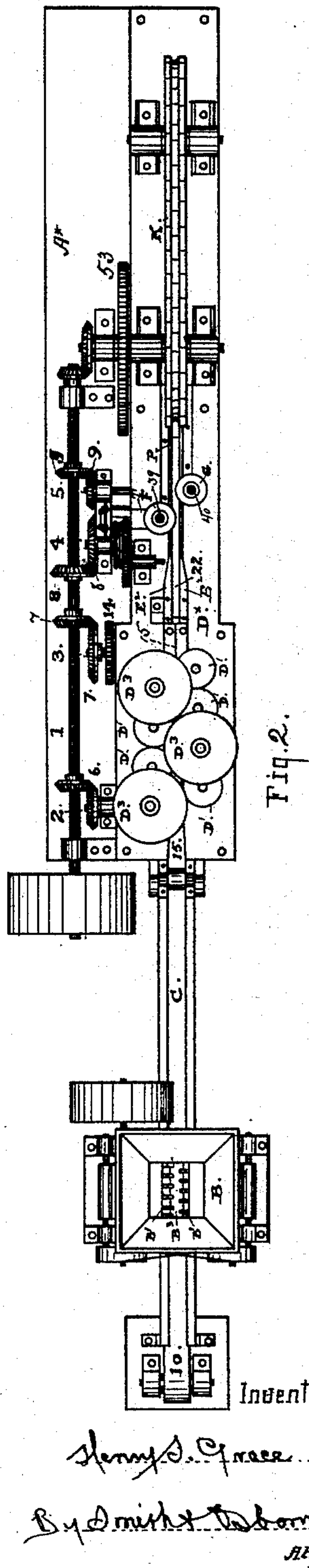
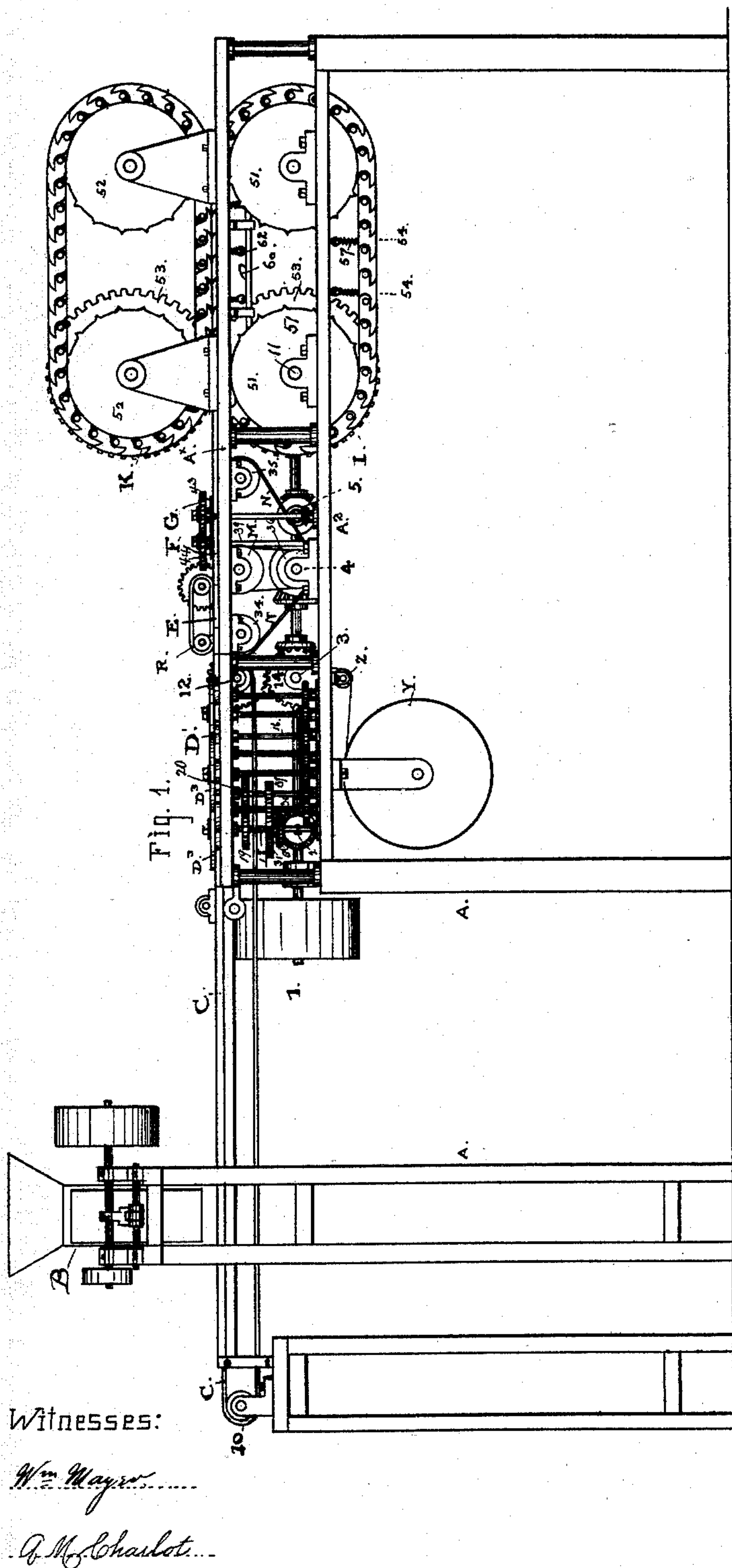
(No Model.)

6 Sheets—Sheet 1.

H. S. GRACE.  
CIGARETTE MACHINE.

No. 483,380.

Patented Sept. 27, 1892.





(No Model.)

6 Sheets—Sheet 2.

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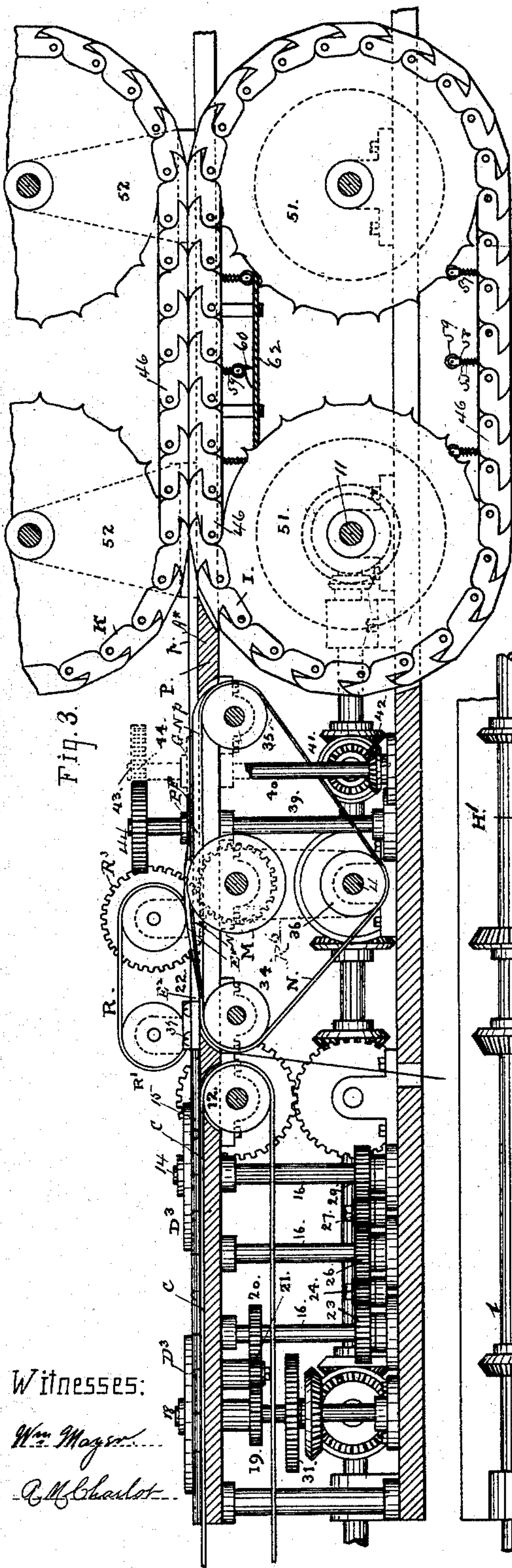


Fig. 3.

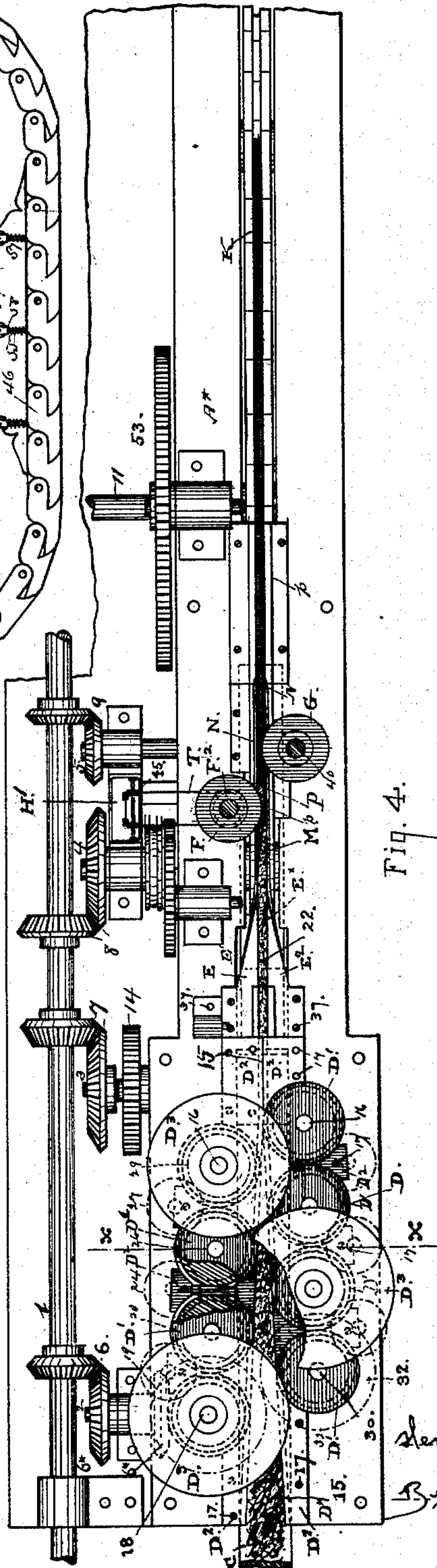


Fig. 4.

Witnesses:

Wm. Mason  
C. M. Charlot

Inventor:

Henry S. Grace  
By Smith & Dobson  
Att'y's.



(No Model.)

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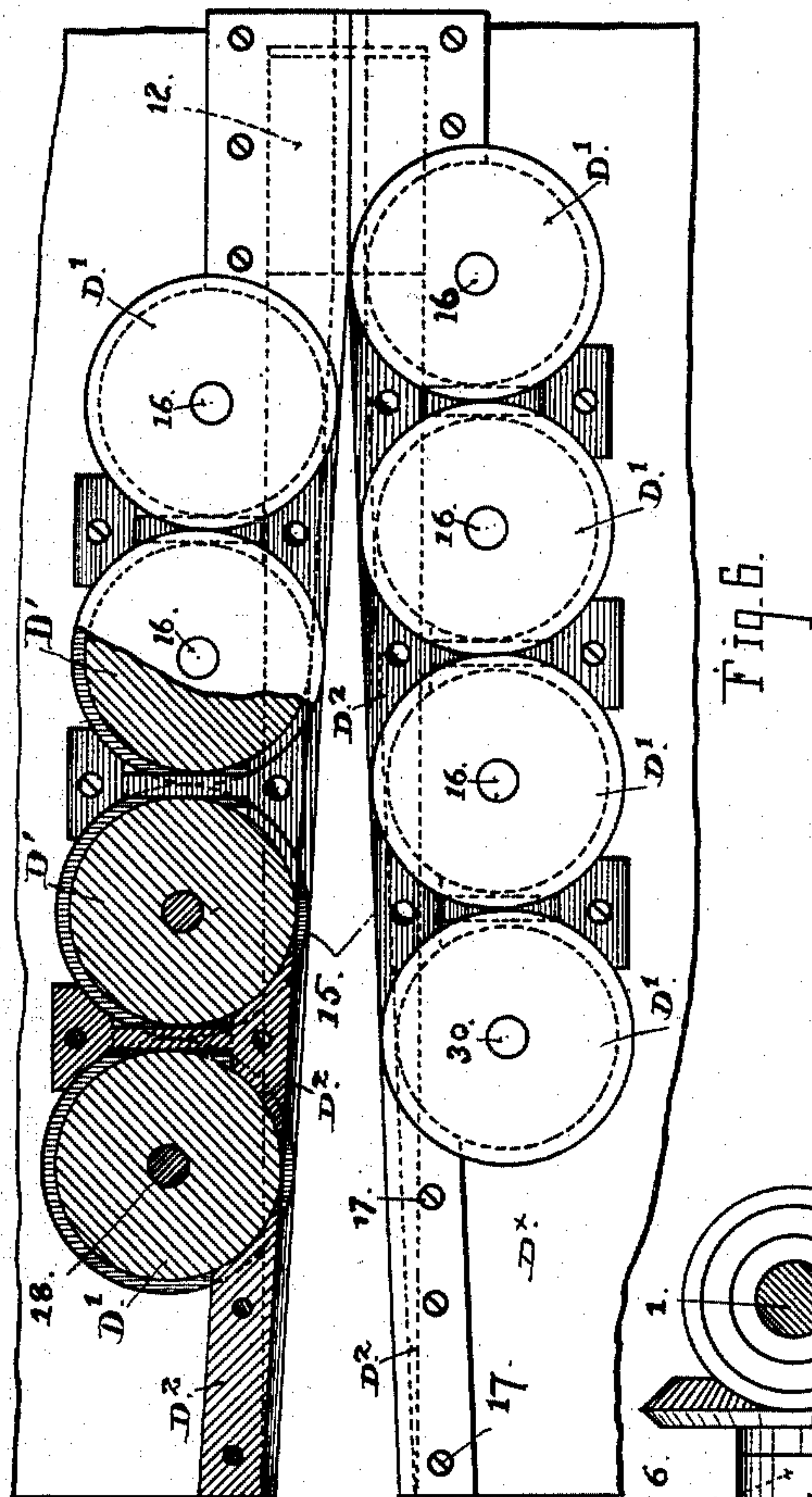


Fig. 6.

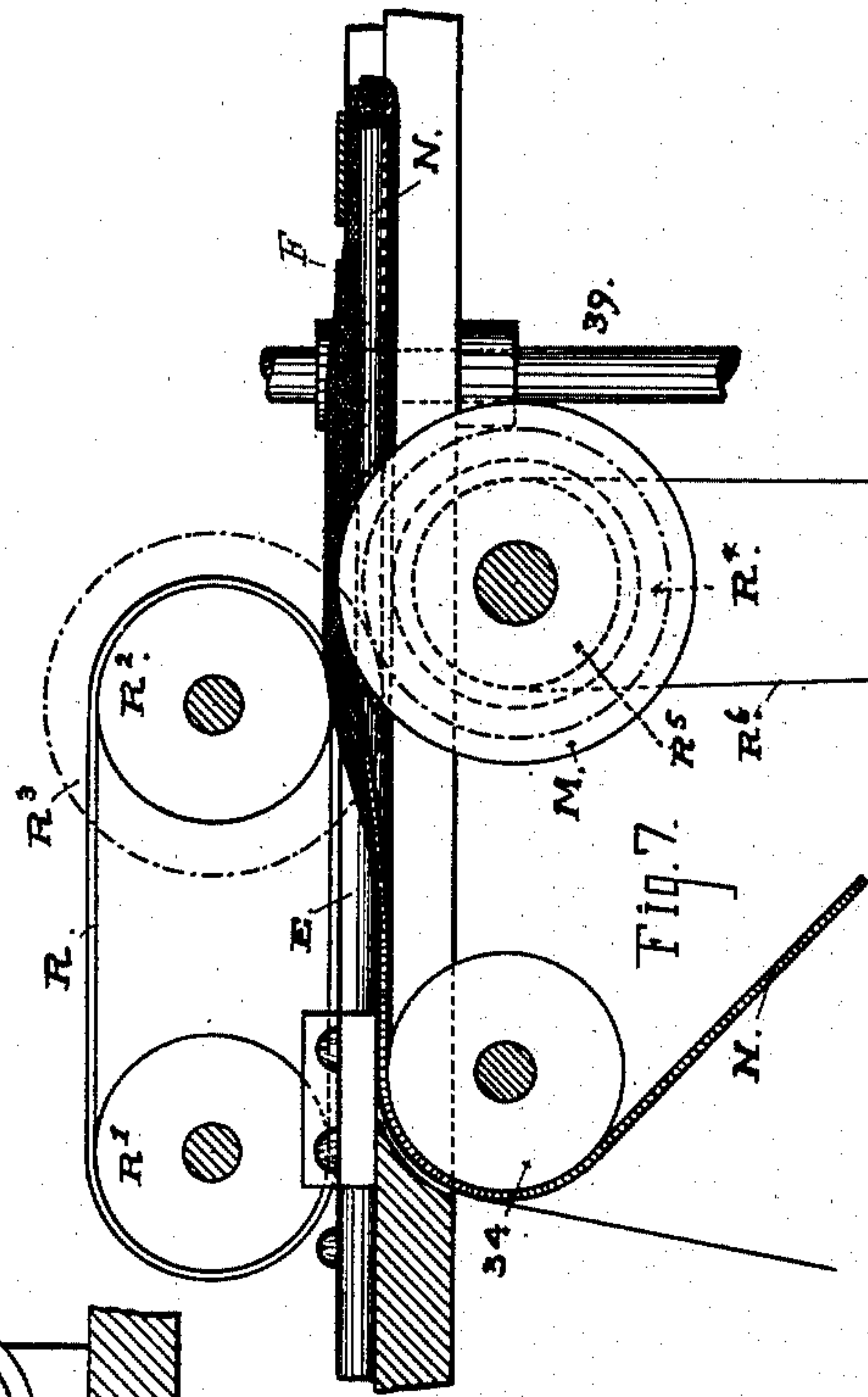


Fig. 7.

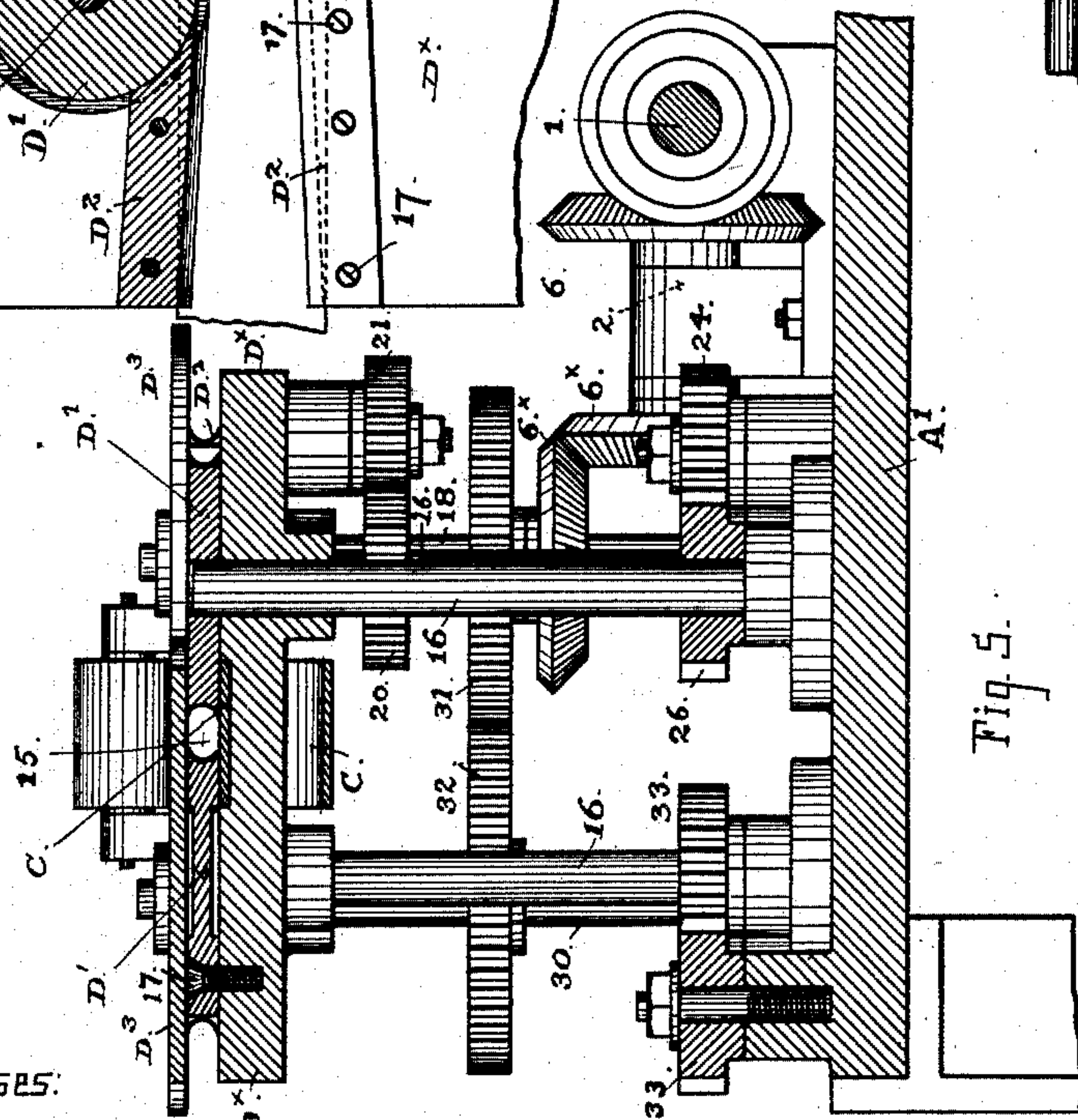


Fig. 5.

Witnesses:

W. J. Meyer  
A. M. Charles

Inventor:

Henry S. Grace  
By Smith & Brown  
his Attys.



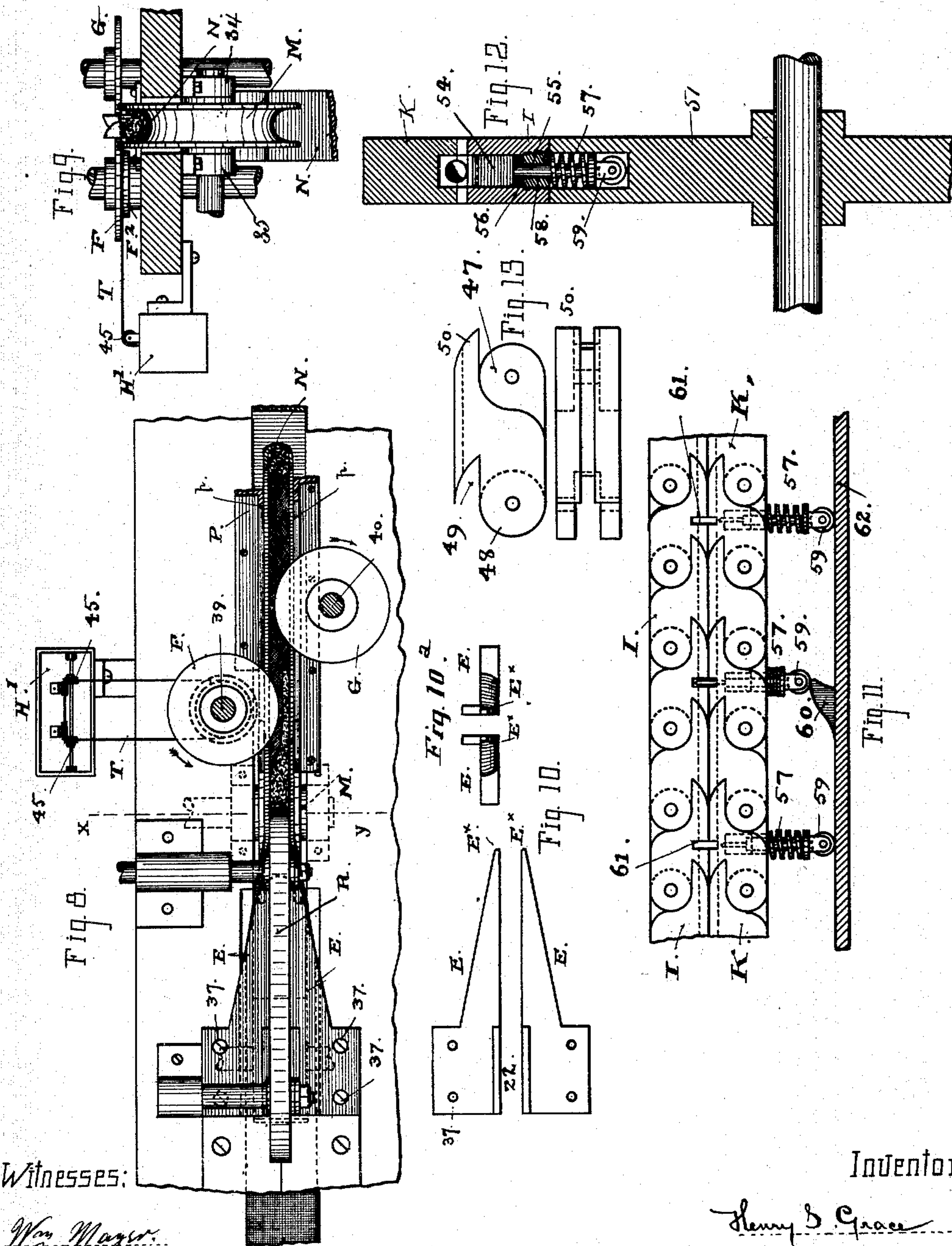
(No Model.)

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Witnesses:

Wm. Meyer.  
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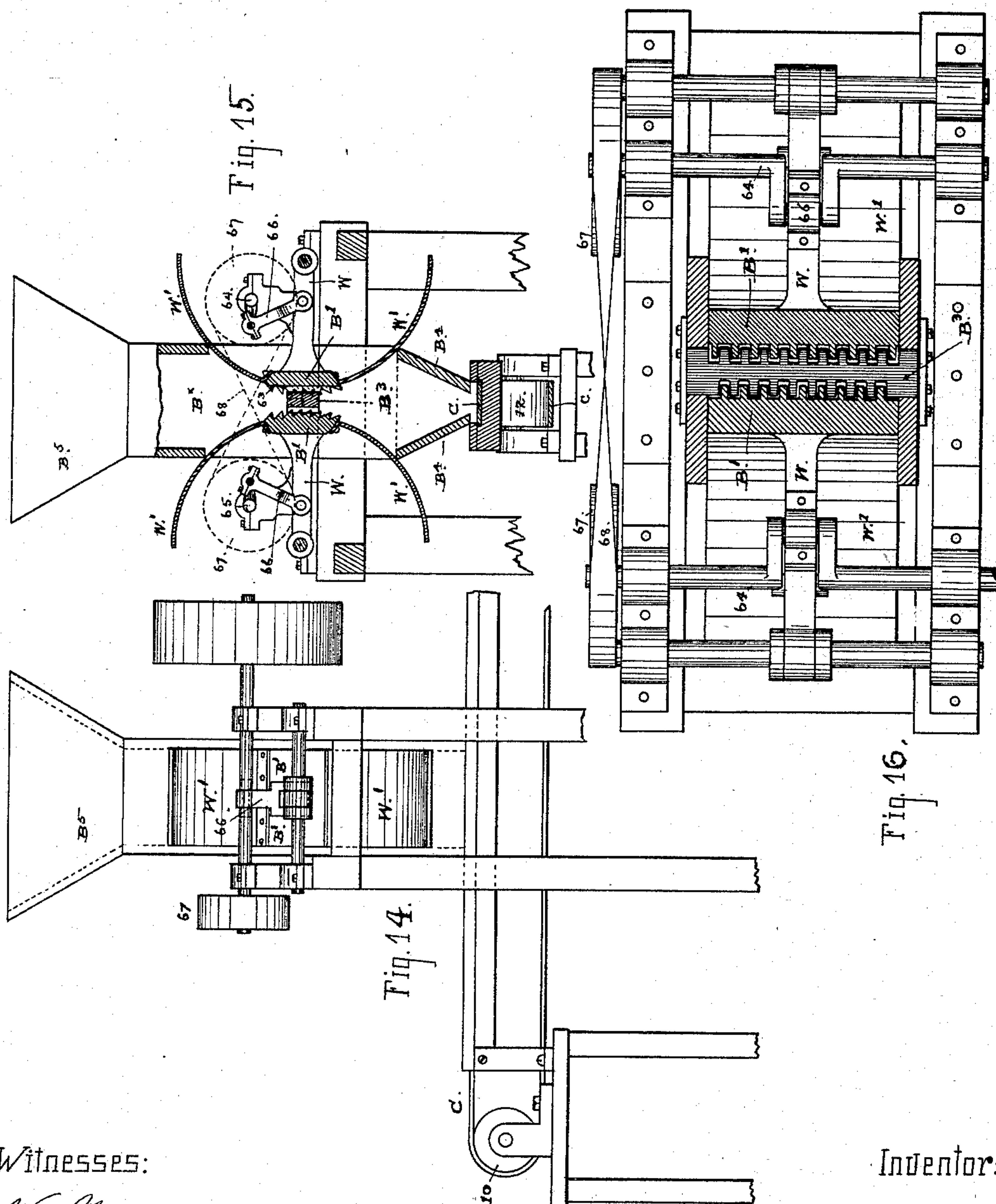
(No Model.)

6 Sheets—Sheet 5.

H. S. GRACE.  
CIGARETTE MACHINE.

No. 483,380.

Patented Sept. 27, 1892.



Witnesses:

*W. H. Mayer*  
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(No Model.)

6 Sheets—Sheet 6.

H. S. GRACE.  
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Patented Sept. 27, 1892.

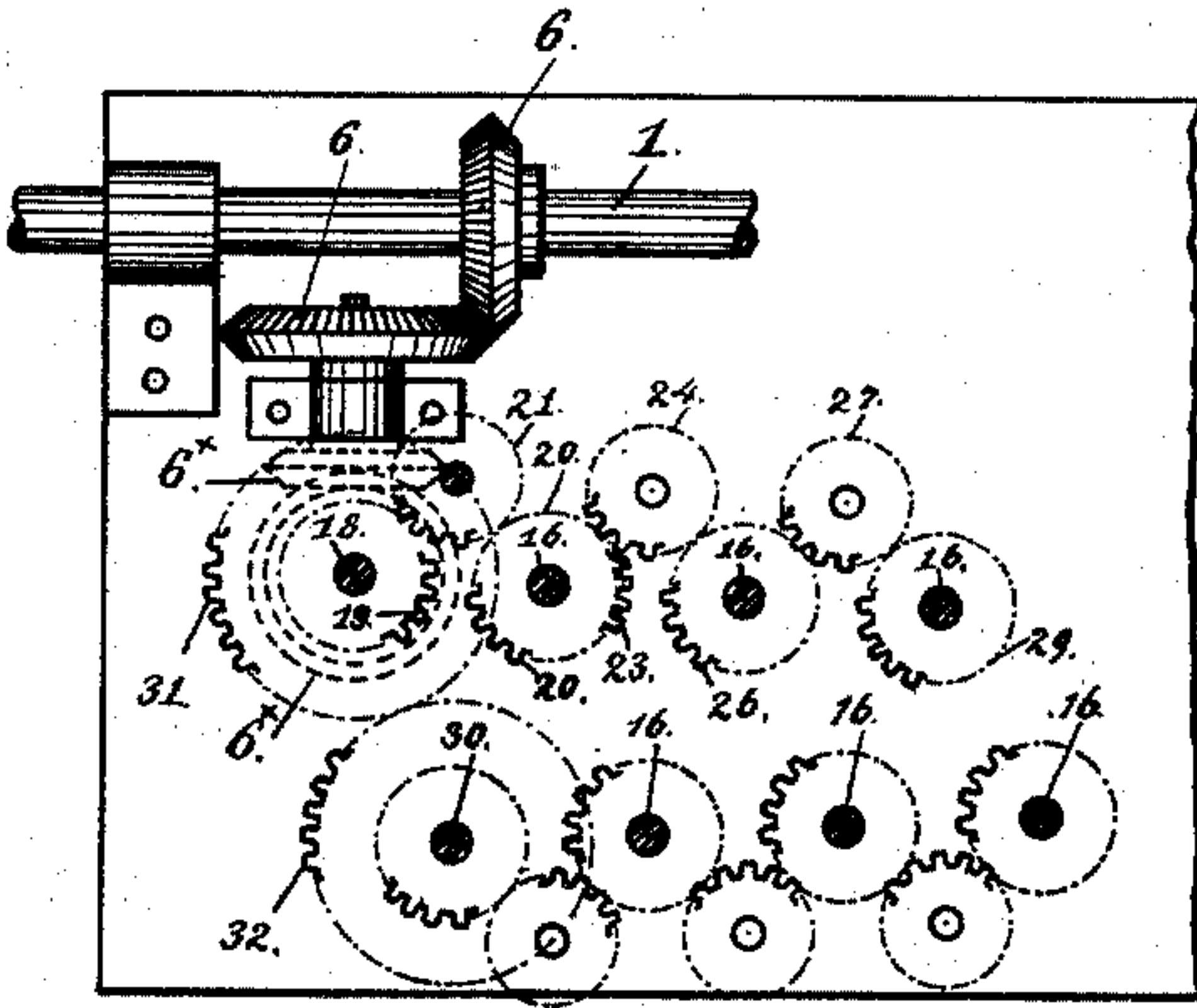


Fig. 17.

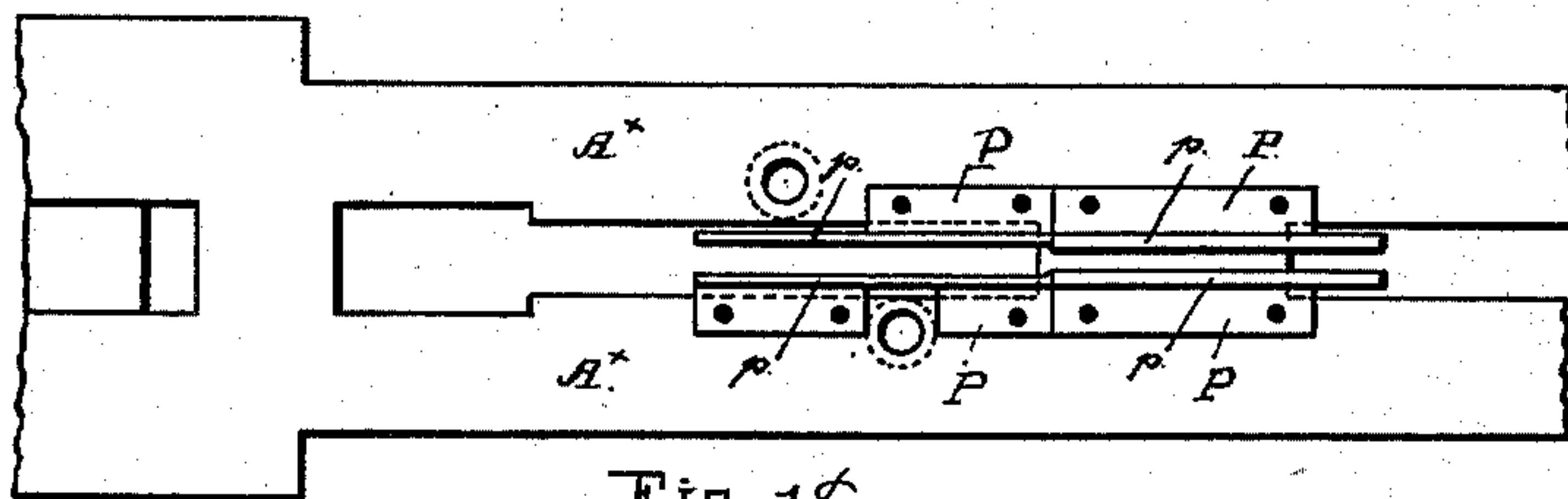


Fig. 18.

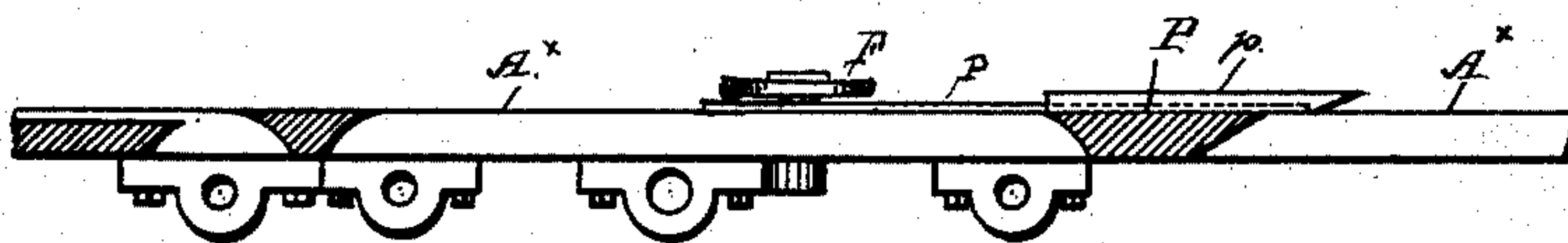


Fig. 19.

Witnesses:

Wm. Mayer  
J. E. Gibson

Inventor:

Hewitt D. Grace  
By Smith & Babson  
his Agent



# UNITED STATES PATENT OFFICE.

HENRY S. GRACE, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO JACOB A. FISCHER, OF SAME PLACE.

## CIGARETTE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 483,380, dated September 27, 1892.

Application filed June 2, 1890. Serial No. 354,068. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY S. GRACE, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Cigarette-Machines, of which the following is a specification.

This invention has for its object to produce a cigarette-machine of that class in which a continuous filler is formed of cut tobacco and is covered with paper and cut into cigarettes; and to such end it consists in certain novel mechanism or apparatus to loosen and otherwise prepare the tobacco and distribute it evenly upon an endless traveling belt or apron in condition and in quantity suitable for the filler, in mechanism of novel construction and operation to compress the tobacco and form it into a continuous filler of uniform size, in novel mechanism to apply and fold the paper wrapper, and, finally, in a novel cutting apparatus to separate the continuous cigarette into measured lengths, all as hereinafter more fully described.

The nature of these improvements and the manner in which I proceed to construct and combine the same in the production of a machine to form a continuous cigarette and cut it into lengths are explained in the following description and the drawings that accompany and form part of this specification.

Figure 1 represents the machine in front elevation. Fig. 2 is a top view with the top belt R and adjacent parts broken away. Fig. 3 is an elevation, on an enlarged scale and partly in longitudinal section, of the filler shaping and feeding mechanism and the paper wrapping, pasting, and cutting devices. Fig. 4 is a top view of Fig. 3, but with some parts broken away and the top belt removed. Fig. 5 is a vertical cross-section through the parts at the line  $x x$ , Fig. 4, but on a larger scale, looking toward the left of said figure. Fig. 6 is a top view of the filler-forming channel and grooved wheels, the top disks being removed. Fig. 7 shows in side elevation and partly in section the wrapper-folding mechanism at the part where the filler and wrapper are brought together. Fig. 8 is a top view of the same parts with the pasting device added to those in Fig. 7. Fig. 9 is a vertical

cross-section taken at the line  $x x$ , Fig. 8, on the left-hand side of that line. Fig. 10 is a top view of the wrapper-turning guide, showing the parts in the position they assume when the paper wrapper is turned up around the filler. Fig. 10<sup>a</sup> is an end view of the same, taken from the right-hand end of Fig. 10. Fig. 11 is a view of a portion of the endless chain belts and cutters that divide the endless cigarette into measured lengths and carry them out of the machine. Fig. 12 is a vertical cross-section through the two chain belts at one of the cutters and showing, also, one of the lower grooved wheels that drive the chain belts. Fig. 13 shows a link such as compose the chain. Fig. 14 is an elevation of the tobacco-dressing device, enlarged from Fig. 1. Fig. 15 is a central vertical section of Fig. 14. Fig. 16 is a horizontal transverse section of Fig. 14, taken through the vibrating jaws. Fig. 17 is a plan or top view of the system of gears that operate the filler-forming wheels and top disks. Fig. 18 is a plan view of the angle-plates. Fig. 19 is a central longitudinal section of Fig. 18.

Similar letters and figures of reference denote corresponding parts in the several views.

A A<sup>2</sup> are parts constituting the frame of the machine, on which are mounted a tobacco-dressing apparatus, a feed-belt, a filler-shaping mechanism, wrapper folding and pasting apparatus, and a cutting mechanism, the parts operating together to produce a continuous cigarette and cut it into measured lengths.

The principal shaft 1 of the machine is mounted in bearings on the table A<sup>x</sup> and is driven from a power-shaft or a motor by a belt and pulleys. Its motion is applied to the filler-shaping wheels by the counter-shaft 2, to the feed-belt by shaft 3, and to the wrapper-folding mechanism by counter-shafts 4 and 5.

C is an endless feed-belt mounted on pulleys 10 and 12 and traveling with regular continuous movement from the outer end under the tobacco-dresser B and through a filler-shaping channel formed by horizontal grooved wheels D' D', stationary plates D<sup>2</sup>, and the top disks D<sup>3</sup>. Motion is given to the feed-belt roller 12 by the spur-gears 14 14, connecting it with



the counter shaft 3, the roller being located under the plate  $D^x$  and the edges of the wheels and of the plates that form the sides of the channel 15 being arranged to overlap the belt.

5 The wheels and plates are arranged, also, to form a gradually-converging channel, and at the forward end, or that part next the wrapper-folding device, the plates set closely together to form a cylindrical passage. The  
10 top of this channel 15 is covered by flat disks  $D^3$  of suitable diameter to overlap the channel and run closely together. The grooved wheels  $D'$  are fixed on upright spindles 16, and the first or leading wheels are mounted  
15 on spindles 18 and 30. In the present construction there are four grooved wheels in each row with three overlapping top disks fixed on the spindles of the grooved disks; but this number will vary according to the  
20 size of the wheels employed and the length of the channel required. I do not confine the construction to any exact size or special number of wheels and disks.

The plates  $D^2$  are secured by screws 17 to  
25 the bed-plate  $D^x$  and are grooved on the front edge to correspond with the grooves of the wheels, and they are arranged to produce a continuous converging channel with grooved edges or sides, as shown in Fig. 6. Continu-  
30 ous movement is given to all these wheels and disks from shaft 2 by gears connecting the two outer spindles 18 and 30 with the spindles of the remaining wheels. Shaft 18 is driven by bevel-gears  $6^x$ —one on shaft 2 and the other  
35 on the shaft 18—and shaft 30 is connected to shaft 18 by spur-gears 31 32. The remaining wheels on one side of the channel are connected by spur-gears 23, 26, and 29 and the idle-pinions 24 27, while those on the other  
40 side are connected in similar manner to be driven by the spindle 30.

The grooved wheels and the top disks, with the intermediate plates and the feed-belt, form a passage that converges and finally takes a  
45 cylindrical shape in cross-section at the discharge end, where the shaped filler is carried forward by the feed-belt into the wrapper-folder. This part or device is formed of two blocks E E with straight inner edges and  
50 rounded outer edges or sides that taper toward and finally meet the inner edges in a point or nose at the forward end, the inner edges standing parallel with each other and at suitable distance apart to let the filler pass  
55 between them. The bottom of the channel 15, between the blocks E, is closed by a belt on which the paper for the wrapper is brought under and in contact with the filler that is confined between the blocks and a short top  
60 belt R. These two belts N and R travel at the same rate of speed, the former being mounted on pulleys 34 35 36 and driven by pulley 36 from the shaft 4, while the top belt R is carried by pulleys  $R'$   $R^2$ , the latter of  
65 which is driven from the shaft  $M'$  of the grooved roller M by spur-gears  $R^3$   $R^4$ . The roller M is located between the two rollers 34

35 and sets in close relation to but below the nose of the blocks E, so that the belt N, running in the grooved rim of this roller is turned  
70 up against and is brought gradually into a trough-like shape by the tapering outer sides of the blocks E. These two parts E M and belt N act upon the paper to bring it from the flat to a trough-like shape preparatory to the  
75 folding operation by which the standing edges of the paper are turned and lapped over the filler. Grooved roller M is driven from the shaft 4 by belt  $R^6$  and pulley  $R^5$ , which pulley is indicated in dotted lines in Fig. 7, with the same  
80 rate of speed as the belt N and the pulley 34, grooved roller M and pulley 35, set in an opening in the top plate  $D^x$  to bring the face of the paper-carrying belt up to the surface of the top plate. This opening has standing  
85 sides formed of the standing edges  $p$   $p$  of the plates P, that form a channel to confine the wrapper-filler, and the edges  $p$  are cut away at points between the grooved pulley and the belt-carrying pulley 35 on opposite sides of  
90 the channel to let in the wrapper-folding disks F G, the first one F of which projects from behind the channel to the front and lies over the top, while the second one G is placed on  
95 the front or outer side and extends an equal distance in the opposite direction over the channel. In passing under these two disks, which are set to run flat against the top of the filler, the back or inner edge of the wrapper is first turned down by the disk F and after-  
100 ward the front or outer standing edge is folded over and pressed down by disk G, as may be seen in Fig. 8. To join the lapped edges of the wrapper, a line of paste is applied along the top of the first-folded side by the  
105 first disk before the second side of the wrapper is turned down. The folding-disks are fixed on the upper ends of upright spindles 39 40, that pass through the top plate  $D^x$  of the table from below, and are driven at equal  
110 speed from the counter-shaft 5 by the bevel-gears 41 42, that connect spindle 40 to the driving-shaft, and the spur-gears 43 44 of equal size that connect the two spindles together. Paste is applied to the folding-disk  
115 F by a paste-trough and carrier-belt so arranged that the bottom face of the disk is constantly coated with a thin body of paste by the belt or cord that travels through the trough and against the face of the disk. The paste-  
120 trough H' is fixed against the back of the table behind the folding-disk F and has guide-pulleys 45 on the bottom and also at the top, around which a narrow belt T is carried from a pulley or hub (not shown) on the lower side  
125 of the disk F. The guide-pulleys serve to carry the belt into and out of the body of paste in the trough, while the hub drives the belt and causes it to travel against the bottom face of the disk. The belt thus charged or  
130 constantly covered with paste is caused to pass across the face of the folding-disk as the latter rotates. It will be noticed in this operation that the face of the disk passes across



the belt with a rubbing movement that tends to lay the paste evenly upon the disk and prevents excess or accumulation at any point. The standing edges *p p* of angle-plates *P P* are carried beyond the pulley 35 to confine the cigarette after the belt *N* leaves it to return over the pulley and to guide it into the cutting apparatus. After passing through the folding and pasting apparatus the wrapped filler in the form of a continuous cigarette is ready to be cut into uniform lengths, and from said folding and pasting mechanism it then moves forward into a cylindrical groove formed by the two endless sides of a carrier composed of links *I K*, mounted on two sets of upright sprocket-wheels 51 52—one above the other—to travel in contact. Each endless-chain side has a half-round groove, and the two belts set closely together, so that the continuous cigarette is seized between and drawn along by both belts. Each side is formed of hinged links having knuckles so shaped that a close joint is produced, and the groove or cylindrical passage between the belts when they are traveling together in a straight line is without break. The construction of the links is shown in Fig. 13. Each link has a knuckle 47 on one end and an eye 48 on the opposite end, and the top or outer edge at one end is undercut on a curve concentric with the pin of the joint, as at 49, Fig. 11, while the opposite end is similarly shaped with projecting lips 50 to fit into the recess 49 when two links are joined together. The sprocket-wheels 51 52 are driven from the counter-shaft 11, to which one of the sprocket-wheels is keyed, while the corresponding wheel of the other side of carrier is connected to the same shaft by spur-gears 53. The two sides of the carrier are thus driven positively from the principal shaft.

Combined with one of the link sides of carrier, and preferably the lower one, is a cutting device that separates the continuous cigarette into measured lengths while it is confined between and is being carried along by the two sides. Figs. 3, 11, and 12 illustrate the operation and arrangement of the cutters. They consist of reciprocating cutters fixed in the lower belt at regular intervals of distance apart, corresponding to the length of the finished cigarette, and each one is formed of a thin blade 54 with a beveled top cutting-edge standing across the groove and fixed on the end of a push-pin 55 in a recess 56 in the back of the link. The lower end of the push-pin is furnished with a friction-roller 59, that is set to strike against and ride over a stationary incline 60, and a spiral spring 57, bearing against a collar 58, holds back the cutter below the bottom of the groove in the link. The sprocket-wheels that carry the lower belt are grooved to let in the projecting ends of the push-pins, and the incline 60 is set between the two wheels of the bottom belt, so that as each push-pin strikes against

and is drawn over the machine it is pressed up and caused to force the cutter upward through the cigarette held in the groove. A slot or recess 61 in the upper belt takes the cutter at such time, the two belts being properly driven to bring a slot in line with the cutter as it is pressed upward. The incline is fixed on the stationary plate 62.

Over the endless traveling belt is mounted the apparatus to dress and prepare the tobacco for the filler and also distribute it in a continuous line and in regular quantity for a filler of any required size or thickness. The hopper *B* of the tobacco-dresser has a chamber *B<sup>x</sup>*, open at the top and bottom, and in its sides are set vibrating jaws *B' B'*, carrying on their faces a number of saw-tooth projections 63 in spaced rows. Each jaw is mounted on the end of a vibrating arm *W*, pivoted at the end on a frame outside of the chamber, and the face of the jaw is struck on a curve, having this point for a center. The jaw, having the same width of the chamber *B<sup>x</sup>*, sets closely against the inside at the ends, and the open spaces at the top and bottom between the jaw and the top and bottom edges of the opening through which it plays are closed by curved plates *W' W'*, having the same width as the jaw and a curvature corresponding to the circle in which the jaw vibrates. The length of the upper and lower plate is determined by the length of the vibratory motion, as the outer edge of the plate should not pass inside the edge of the chamber. Between the two jaws thus arranged there is a fixed bar or plate *B<sup>3</sup>*, having along both edges spaced teeth like those of the vibrating jaws and alternating with them, so that the teeth on one part pass between the teeth on the other part with suitable clearance, and the moving jaws and stationary cross-bars divide the upper or receiving end of the chamber from the lower or distributing end. The sides of the chamber at the bottom slope inwardly and produce a contracted outlet corresponding in width to the breadth of the feed-belt to be covered with the tobacco, and the bottom of the outlet stands above the face of the belt to clear the tobacco. Vibrating motion is given to the jaws by two crankshafts 64 65 and connecting-rods 66 66, as seen in Figs. 13 and 14, the two shafts being connected by a cross-belt and pulleys 67 68.

In the operation of this distributor the tobacco is introduced into the chamber through the hopper *B<sup>5</sup>* and, falling upon the vibrating jaws, is drawn in between the stationary and the vibrating teeth into the chamber below, where it falls in a shredded and finely-dressed condition upon the traveling feed-belt.

Instead of making the inclined sides *B<sup>4</sup>* solid, they may be made of wire-netting or finely-perforated plates, and an air-blast pipe may be placed outside against one of the plates to direct a strong current of air across the space. By this means the dust and fine particles can



be expelled from the tobacco before it passes out of the chamber.

Having thus fully described my invention, what I claim, and desire to secure by Letters

5 Patent, is—

1. In a cigarette-machine, the combination, with the endless traveling feed-belt, of the grooved wheels  $D'$   $D'$ , having continuous rotation at a regular speed, stationary plates, 10 and the top disks  $D^3$ , forming with the feed-belt a converging passage, substantially as described.

2. In a cigarette-machine, the combination, with a feeding device forming the bottom of 15 a channel, of horizontal grooved wheels and intermediate stationary plates forming the sides of said channel and flat rotatory disks forming the top thereof, as set forth.

3. The combination, with means for supporting the wrapper in U shape, of two folding-disks F and G, set to act upon the opposite sides or edges and fold them upon each other, the disk F, having a hub or collar  $F^x$ , the paste-trough H, and a paste-delivering 25 belt T, running through the trough and around the collar of the disk and in contact with the bottom face of said disk F from the collar outward to the periphery and adapted to spread the paste upon the surface of the disk, as set 30 forth.

4. In combination with the folding-disk F, having a hub or collar  $F^x$ , the paste-trough H, and a paste-delivering belt T, running through the trough and around the collar of the disk 35 and in contact with the bottom face of the disk from the collar outward to the periphery and adapted to spread the paste upon the surface of the disk, as set forth.

5. The combination, with mechanism adapted to produce and wrap a continuous filler of tobacco, of the endless carriers I K, formed of hinged links with grooved faces and set together to form a continuously-traveling passage of cylindrical shape in cross-section or 45 approximately the shape of a cigarette, and spring-controlled cutters carried in the links,

and means for operating them to sever the continuous cigarette into lengths while it is confined in and being carried along by the carrier, as set forth.

6. The combination, with the grooved endless carrier formed of jointed links, of a cutting device consisting of a reciprocating knife mounted in a slot in a link, a slide pin or plunger projecting from the back of the link 55 and adapted by its movement to operate the knife, and a fixed incline or stop located in the path of said pin, for operation as set forth.

7. The combination, with the endless traveling feed-belt, of the tobacco-receptacle  $B^x$ , having a fixed center-bar  $B^3$ , with alternate notches or recesses and teeth or projections, and the curved vibrating jaws having corresponding recesses and projections adapted to 65 work in close relation with said fixed bar across the chamber, as set forth.

8. In a cigarette-machine, the combination, with the carrying-belt forming the bottom of a filler-forming channel, of grooved converging 70 sides for said channel having grooved wheels adapted to rotate and forming a portion of each side thereof and revoluble disks forming the top of said channel arranged on opposite sides of said channel to overlap the 75 same, as set forth.

9. In a cigarette-machine, a filler-forming channel having grooved converging sides provided with wheels adapted to rotate and forming a portion of each grooved side, a feed- 80 ing device under said channel, horizontally-arranged rotary disks forming the top of said channel, and a closed cylindrical passage or portion at the discharge end thereof, as set forth.

In testimony that I claim the foregoing I have hereunto set my hand and seal.

HENRY S. GRACE. [L. S.]

Witnesses:

ANDREW G. MAGUIRE,  
EUGENE W. LEVY.