

(No Model.)

3 Sheets—Sheet 1.

C. L. HARMON.

CARDING ENGINE.

No. 339,097.

Patented Mar. 30, 1886.

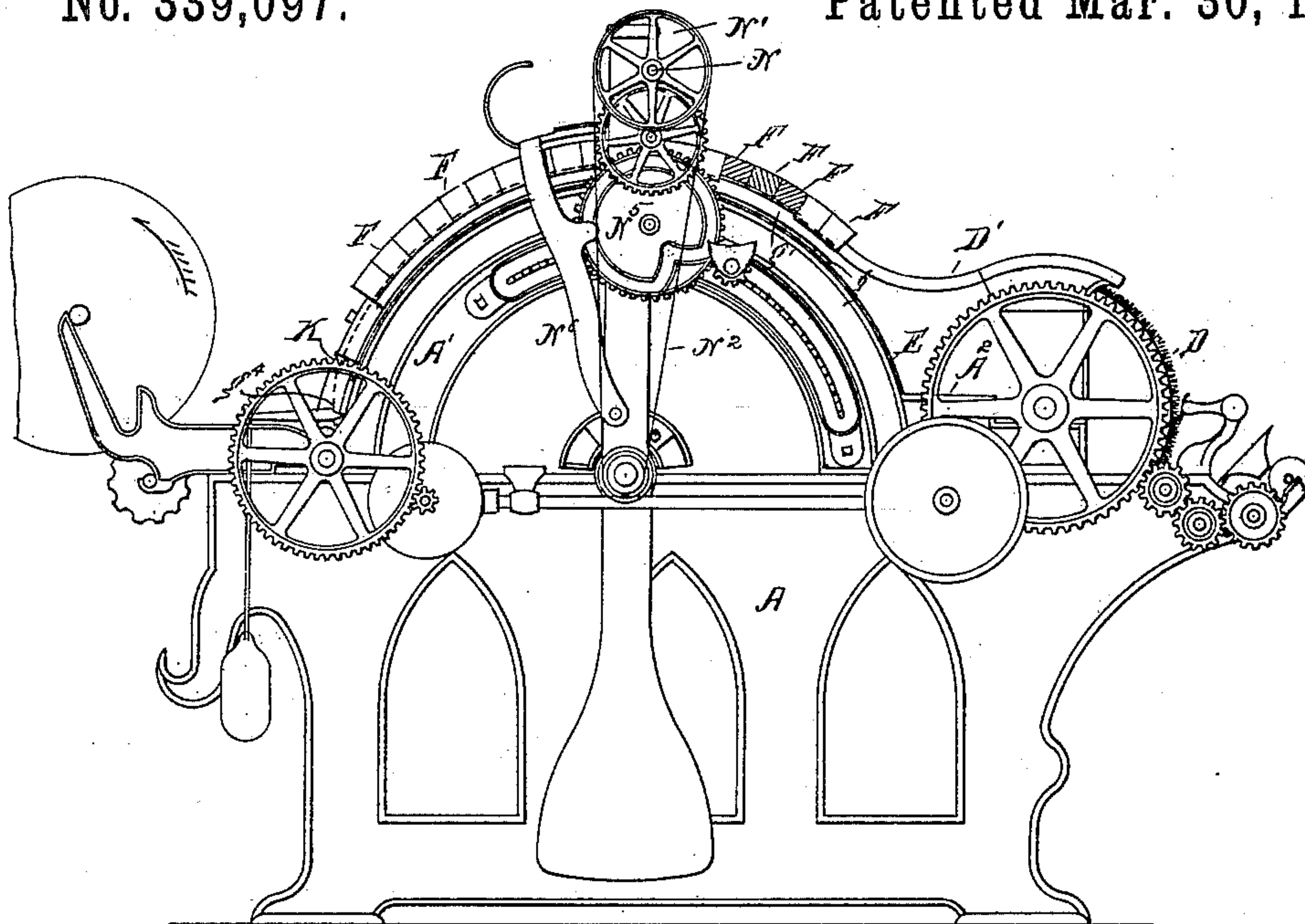


Fig. 1.

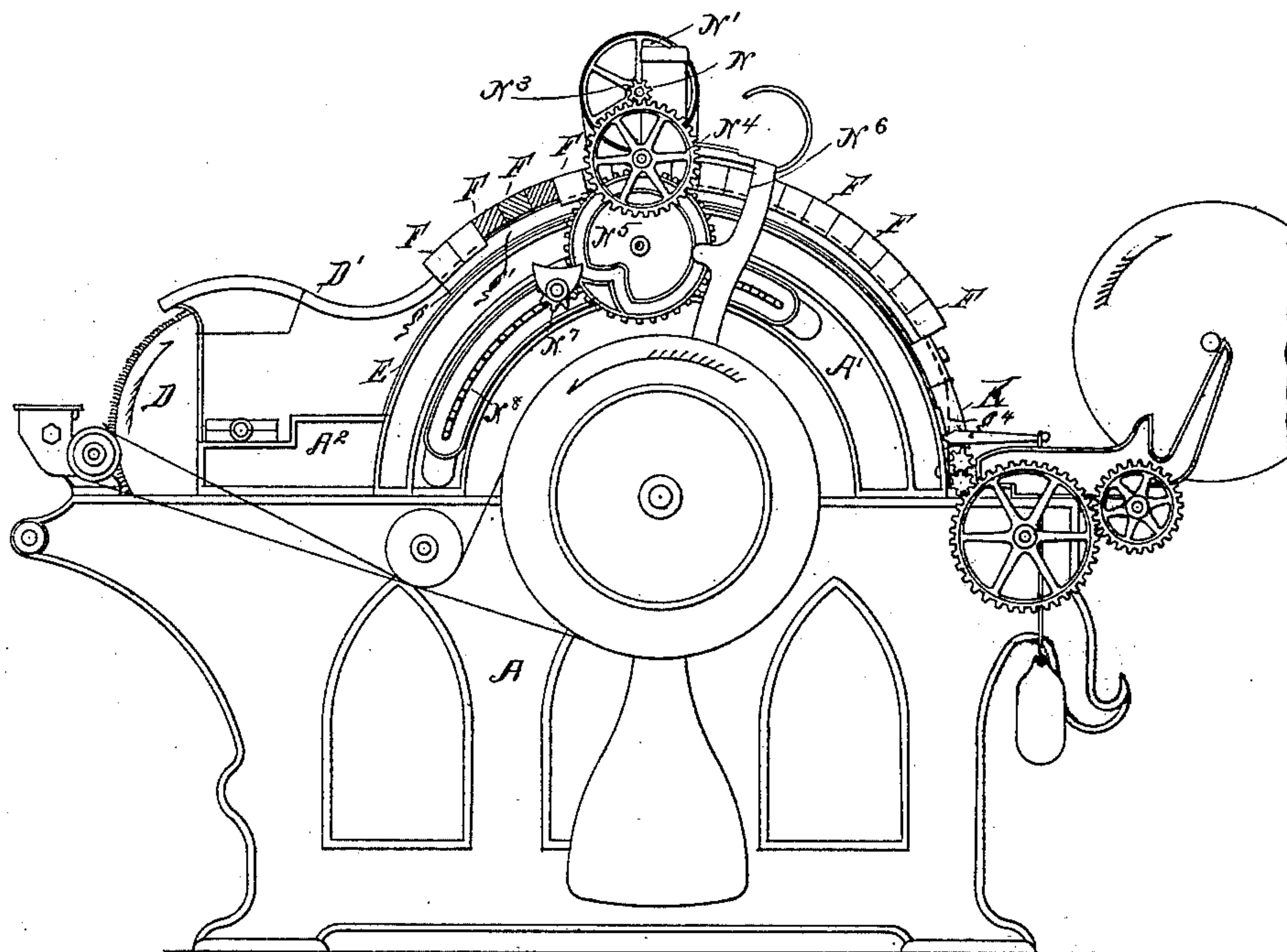


Fig. 2.

Witnesses—

Kirkley Hyde
Herbert R. White

Inventor—

Charles L. Harmon,
By Albert M. Moore,
His Attorney.

(No Model.)

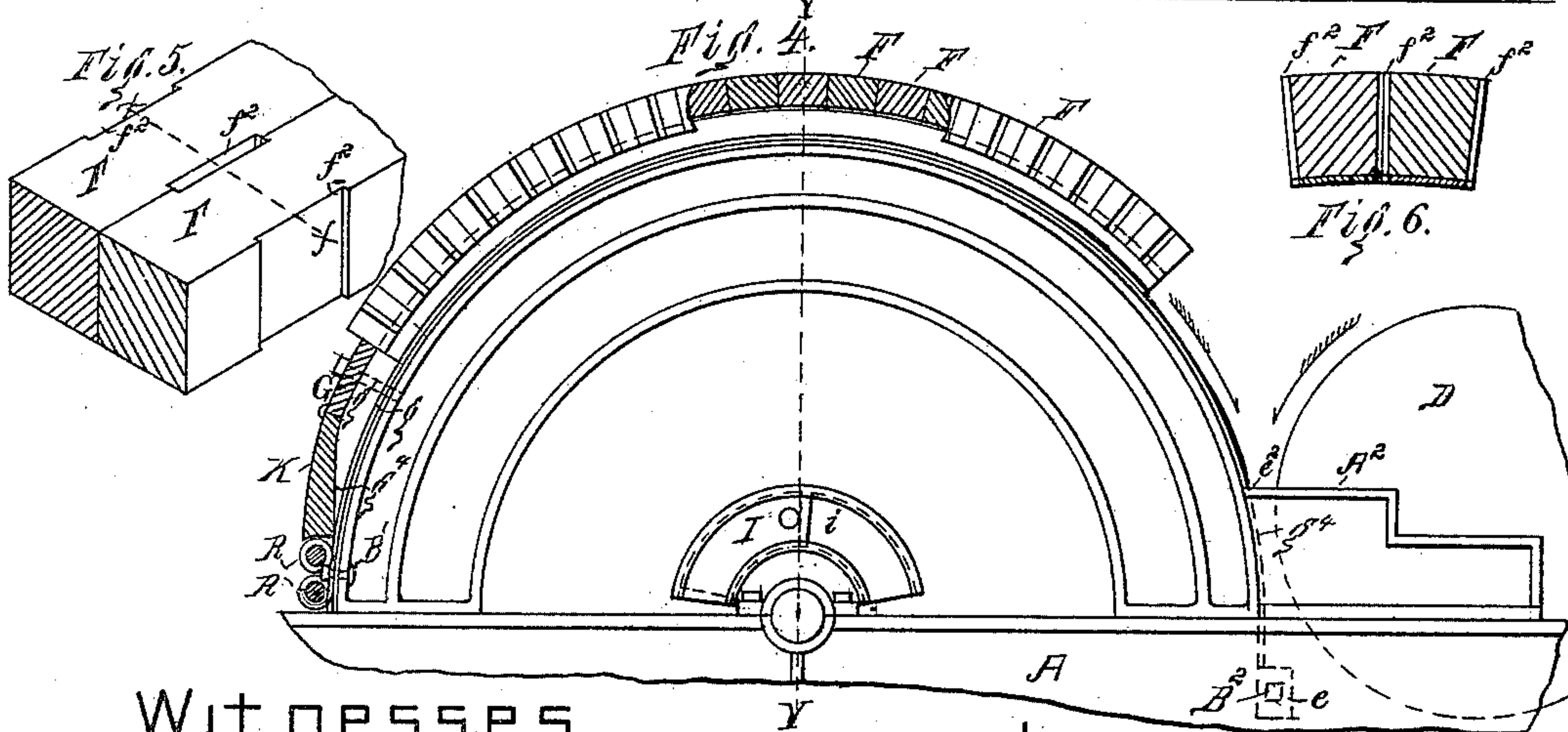
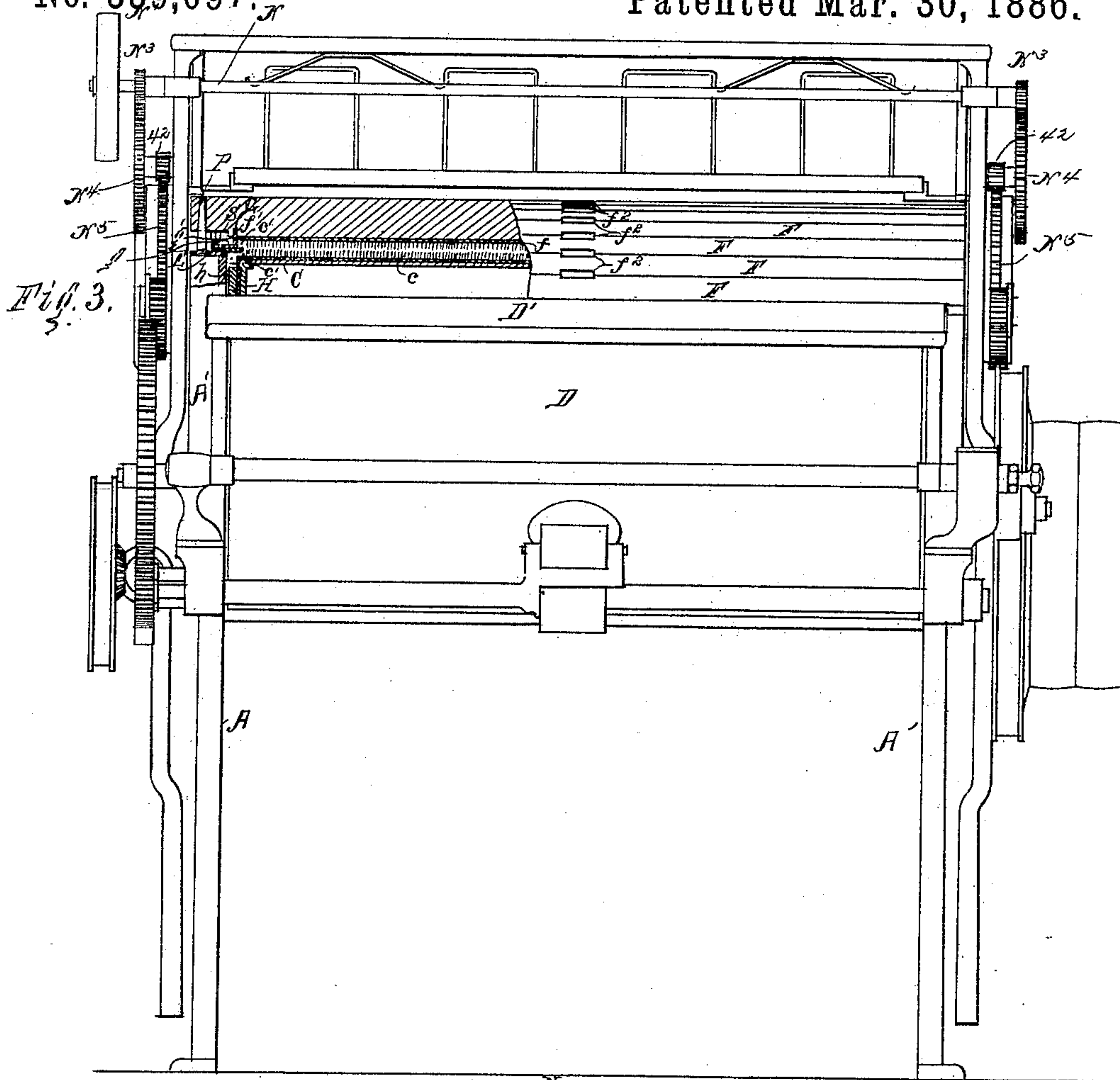
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3 Sheets—Sheet 3.

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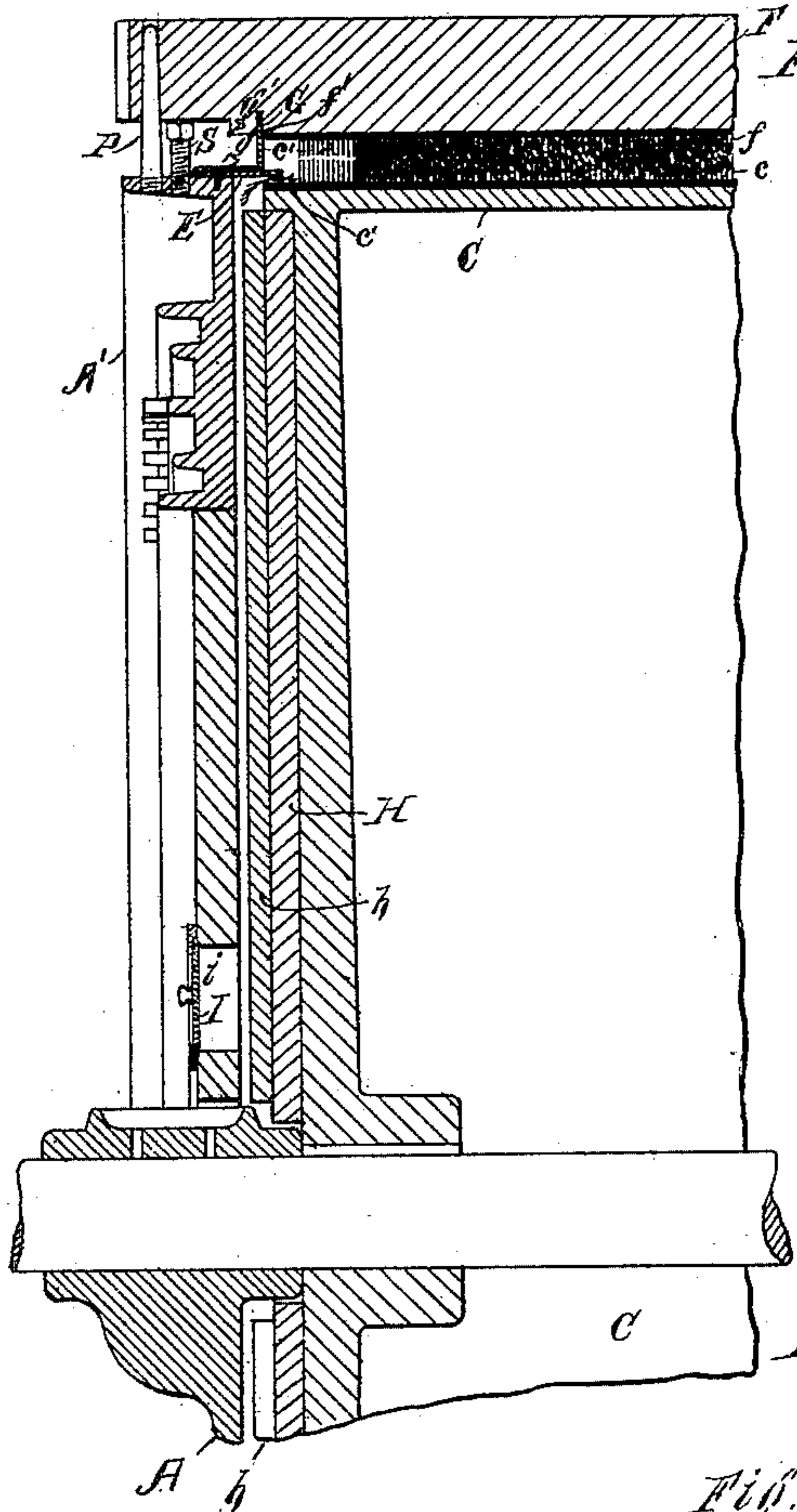


Fig. 7.

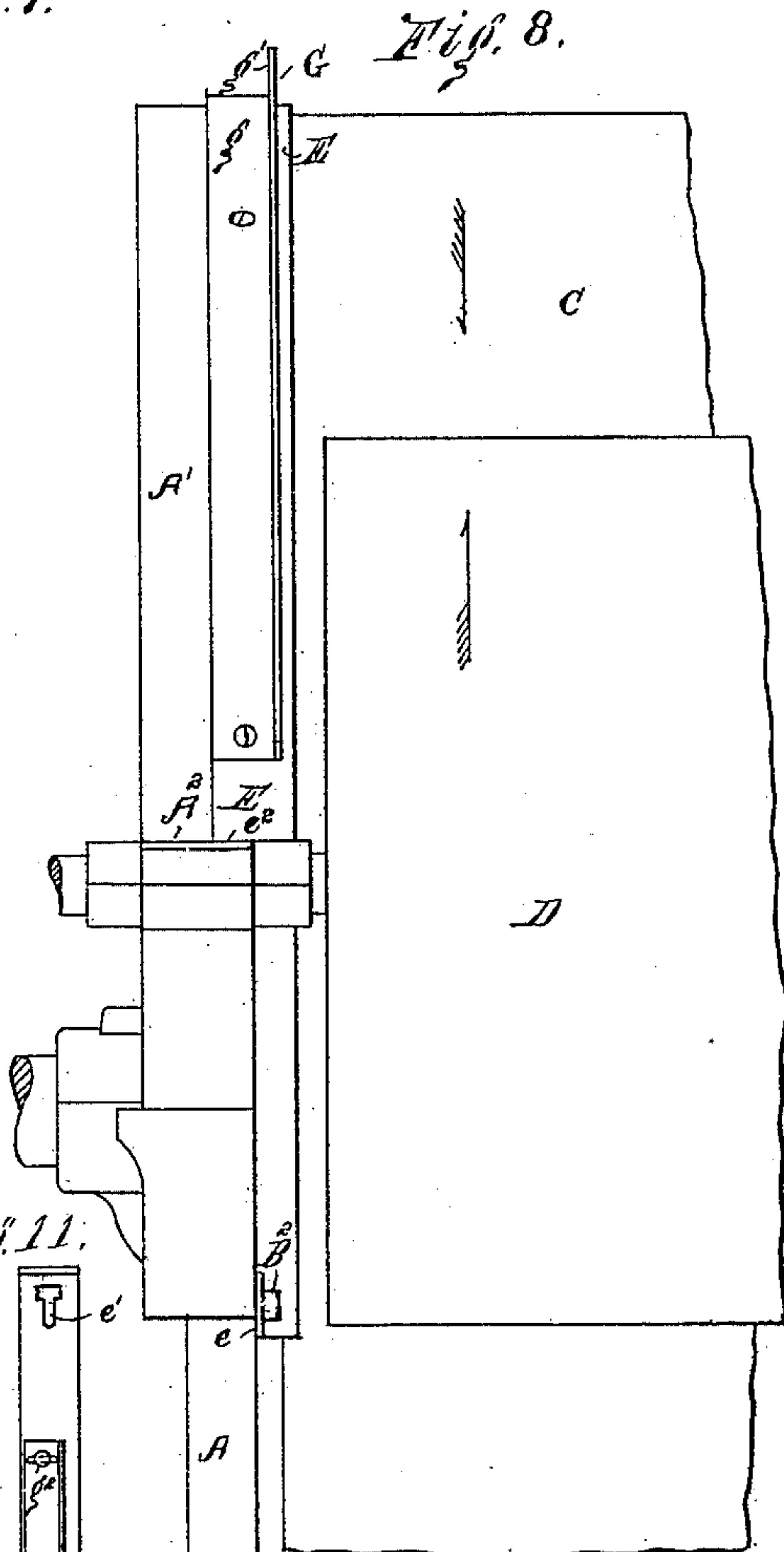


Fig. 8.

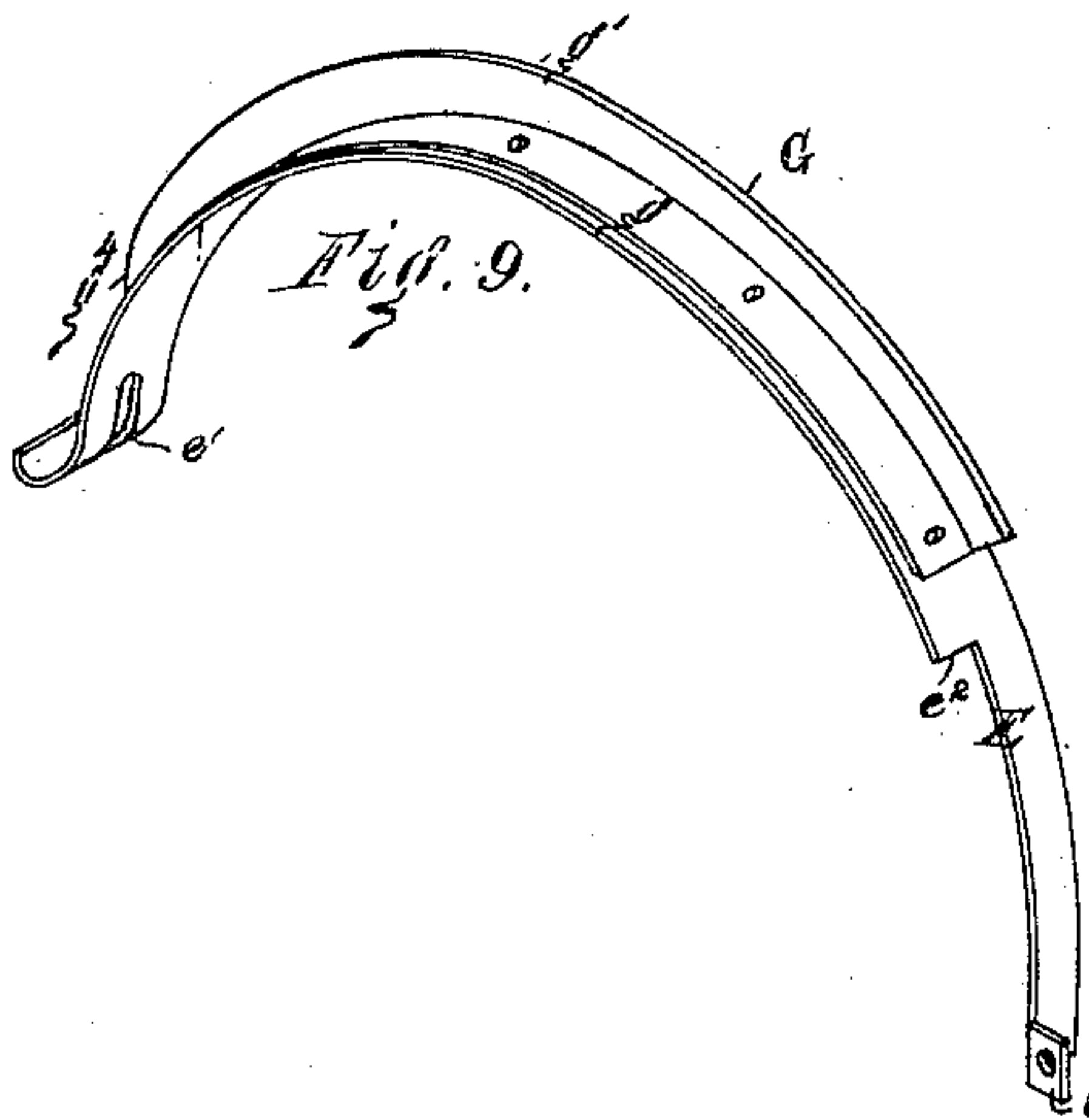


Fig. 9.

Fig. 10.

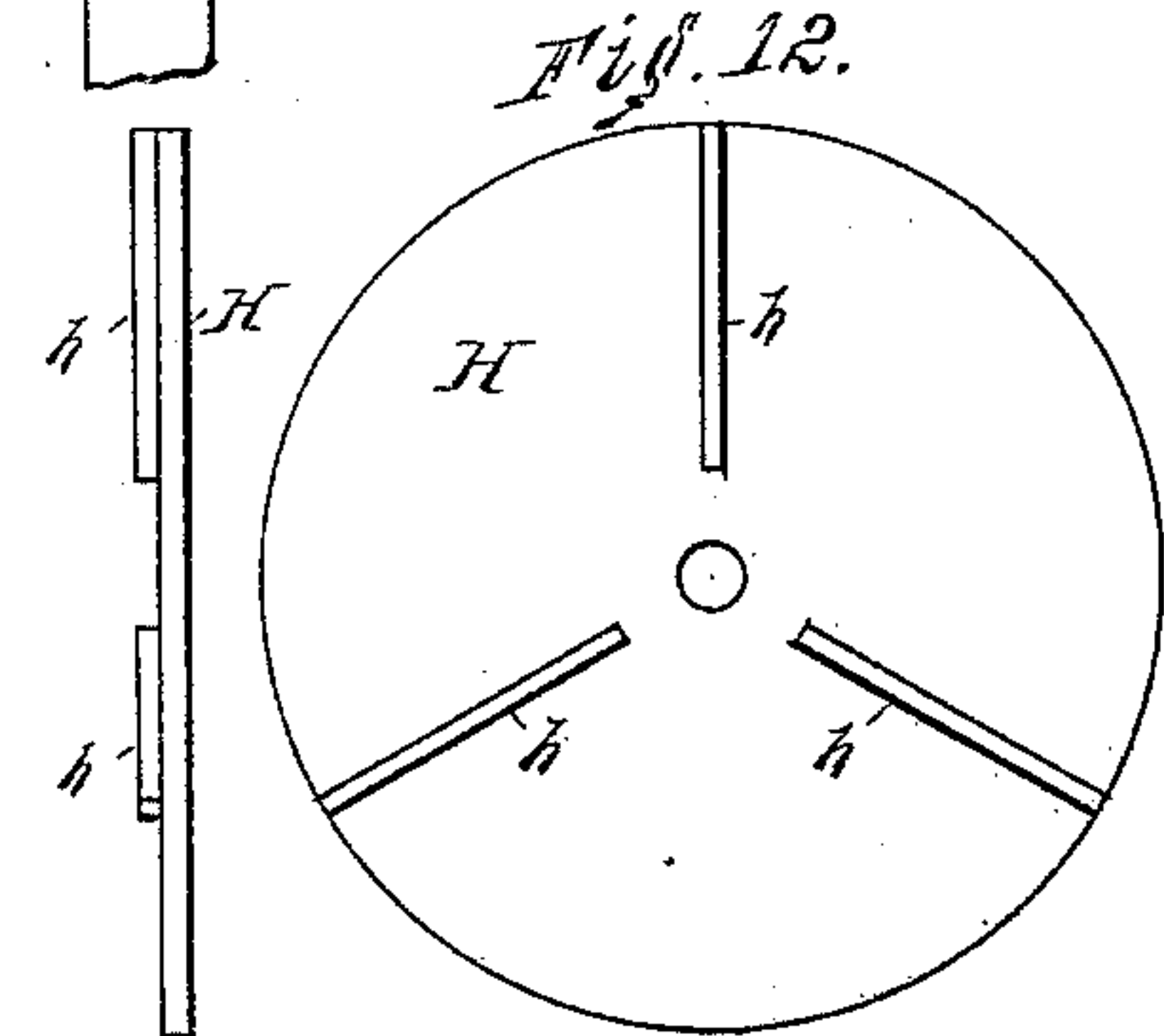


Fig. 12.

Fig. 13.

WITNESSES—

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UNITED STATES PATENT OFFICE.

CHARLES L. HARMON, OF LOWELL, MASSACHUSETTS, ASSIGNOR TO EDWARD
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CARDING-ENGINE.

SPECIFICATION forming part of Letters Patent No. 339,097, dated March 30, 1886.

Application filed October 16, 1884. Serial No. 145,629. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. HARMON, a citizen of the United States, residing at Lowell, in the county of Middlesex and Commonwealth of Massachusetts, have invented a new and useful Improvement in Carding-Engines, of which the following is a specification,

In carding-machines now generally in use the card-clothed main cylinder is rotated between side frames and underneath a series of card-clothed top-flats, adjustably supported at their ends by radial adjusting screws or screw-stands erected on the arched top of the side frames, or on the "arch," as it is called. In this class of machines the main cylinder draws air in with the cotton at the feed-rolls, forming an air-current, denominated by me as the "machine current," which is made to travel in volume through the machine between the main cylinder and top-flats, the strength of the said current depending upon the speed of rotation of the main cylinder, and at fast speed the said air is sufficient to much more than fill the space between the main cylinder and top-flats, which space is not fully filled with cotton, and in such condition the proper direction and manipulation of the fiber is interfered with.

The top-flats, more or less surrounding the main cylinder, usually lie close together, so that but little, if any, air can escape between them when in place; but the ends of the top-flats extend beyond the ends or heads of the main cylinder and across the spaces between the cylinder and arches and rest on the adjusting screws or stands a little above the arches, leaving an open space between the said arches and the under sides of the flats, near their ends, for the escape laterally from the machine of a part of the machine-current, drawn in chiefly at the feed-rolls, and in its outward movement laterally, as stated, the machine-current takes with it much of the fiber which is not attached to the card-clothing, but is in the condition of floating fiber, and the result is that such fiber blown from between the card-clothing of the cylinder and flats is made into waste or knots or bunches.

The top-flats, to be operative in the best manner, have to be supported with such relation to the card-clothed surface of the main

cylinder as to enable the card-clothed surfaces of the said top-flats to almost touch the card-clothed surfaces of the main cylinder, thus leaving, it is obvious, a very small space between the card-clothed surface of the main cylinder and the card-clothed surfaces of the top flats. In practice I have found this space to be insufficient to accommodate the cotton and the volume of air or machine current set in motion by the main cylinder, and the machine-current drawn into the machine at the feed-rolls with the cotton or other fiber soon fills up the said space and then seeks an outlet, entering the spaces between the side frames and the ends or heads of the main cylinder and passing out under the ends of the top-flats, taking with it much of the floating fiber. For the best results, in carding the fiber should travel through the machine by a movement derived from the card-clothing on the main cylinder, and the speed of rotation of the main cylinder might be such as not to create a current of air sufficiently powerful to materially disturb the condition of the fiber in its passage through the machine; but a machine run at such slow speed would not be profitable.

The rapid revolution of the main cylinder, inclosed as described, generates a strong or machine current of air, which, as stated, seeks an outlet in the space at the ends of the main cylinder and takes fiber with it, and the fiber so diverted outward by the said air-current and entering the spaces between the main cylinder and frame sides, is kept in motion by the said current and centrifugal action until it is rolled up into small knots or balls.

The machine-current, passing from the middle portion of the clothed surface of the main cylinder outward across its ends, acts to carry a very considerable amount of fiber beyond the outer line of teeth of the card-clothing, which fiber clinging to the said clothing covers a considerable part of the usual unclothed space or margin at the periphery of the main cylinder near its heads or ends, and the fiber, being carried rapidly by the machine-current about in the space between the ends of the cylinder and frame sides, attaches itself to and pulls from the main cylinder the fiber

extended laterally over the unclothed margin or space thereof, as stated, making bunches, which are soon rolled into knots or balls.

In ordinary carding-machines the fiber not actually held by the card-clothing, but taken by the machine-current, and therefore truant, besides collecting in the space between the ends of the main cylinder and side frames, as stated, and forming knots and balls, frequently catches fire, owing to heat and friction, or escaping at spaces at or near the doffer and feed-rolls becomes wound about the journals of the doffer and feed-rollers, and if the latter produces uneven feeding of the fiber, necessitating frequent stopping of the machine, which is also a very serious evil, for whenever one card of a series of cards delivering sliver to one railway-head is stopped, the combined sliver is much lighter so long as the card is stopped.

In some carding-machines the amount of waste is so great that an apartment has had to be provided in the main cylinder to collect a large part of the waste or small bunches, to thus obviate stopping the machine as frequently as would otherwise be necessary.

In my experiments to improve carding-machines I have discovered that the difficulties above alluded to may be obviated, provided the machine-current generated by the rapid rotation of the main cylinder be overcome by a more powerful secondary or independent air-current discharged into the space between the ends or heads of the cylinder and the side frames, and provided the said more powerful secondary current be controlled and diverted from the said space over the ends or heads of the main cylinder toward its center line from a point commencing at or near the feed-rollers to a point at or near the doffer, a secondary independent current of air established in the direction stated and of greater strength or velocity than the machine-current preventing the fiber which is loose or unattached to the card-clothing from passing from between the clothed part of the main cylinder and the top-flats laterally and becoming waste, as stated, the secondary current compelling the fiber to travel with the main body of the fiber in the direction of rotation of the main cylinder and in the space between its card-clothed surface and the card-clothed surface of the top-flats.

To enable the secondary or independent current to be introduced and become effective in accordance with my invention, I have provided a shield or deflector, which is so located as to overlap the ends of the main cylinder from a point at or below the feed-rolls to a point at or near the doffer, the said shield or deflector extending horizontally across and bridging the space between the ends of the main cylinder and the inner faces of the side frames, and directing or diverting the stronger or more powerful secondary current from the space at the ends of the main cylinder over the latter toward the middle of its curved sur-

face, the said "stronger" or "secondary" current of air, as I shall call it, being produced and controlled, as herein shown, by fan-blades having their axes of rotation coincident with that of the main cylinder, and, as herein shown, being attached to the heads or ends of the said main cylinder, the shaft of the main cylinder serving as the shaft for the fan.

In accordance with my invention the floating fiber or cotton is prevented from passing laterally beyond the card-clothed edges of the main cylinder, for the stronger secondary current of air operative in the space between the ends of the main cylinder and the sides of the frame or arch, and coming over the unclothed margin of the periphery of the main cylinder under the shield, prevents the fibers from coming over upon the said unclothed margin of the main cylinder, and consequently the formation, as described, by friction of balls of waste cotton is prevented. So, also, I provide an auxiliary shield or deflector, which is interposed between the main shield or deflector and the inner sides of the top-flats to prevent the escape of loose fiber into the surrounding atmosphere.

My invention in carding-machines consists, essentially, in the side frames or arches, the card-clothed main cylinder, the series of card-clothed flats, and a main shield or deflector arranged to divert a current of air against the side edges of the card-clothing, combined with means to generate or maintain a secondary or independent current of air to overcome the machine-current and aid in keeping the loose fiber on or in the space between the card-clothed surfaces.

My invention also consists in the combination, with the main card-clothed cylinder and a series of top-flats, of two shields or deflectors, one bridging the space between the inner faces of the side frames of the machine and the heads or ends of the main cylinder to or near its card-clothing, and coming between the said main cylinder and top-flats, the other shield or deflector bridging the space between the main shield or deflector and the under sides of the series of top-flats, substantially as will be hereinafter described.

Other features of my invention will be hereinafter set forth in the claims at the end of this specification.

Figure 1 is a right-hand elevation, viewing the doffer as the front, of a carding-machine embodying my invention, three of the top-flats being in section in the line of the groove which receives the auxiliary shield or deflector. Fig. 2 is a rear side elevation of Fig. 1, three of the top-flats being in like section. Fig. 3 is a front view of the machine shown in Fig. 1, a part of the arch and a part of the top-flats being broken away to show the shields or deflectors, to be described. Fig. 4 is an enlarged right-hand side elevation of part of the side frame and its arch, part of the frame, feed-rolls, top-flats, and the feed-roll cover being in section. Fig. 5 is an enlarged isometric view, partly in sec-

tion, of parts of two top-flats to show air-passages between them; Fig. 6, a section in the line *xx*, Fig. 5; Fig. 7, a partial section through the carding-machine in the line *yy*, Fig. 4.

5 Fig. 8 is a detail of the front end of the machine, showing part of the side frame, the doffer, the main cylinder, and the main and auxiliary shields or deflectors; Fig. 9, an isometric view of the main and auxiliary shields or deflectors; Fig. 10, a plan view of part of the main shield or deflector to show the slots therein; Fig. 11, a plan view of Fig. 9; Fig. 12, an elevation of the head or end of the main cylinder, and Fig. 13 an edge view of Fig. 12.

15 The frame-work *A*, having the arch *A'*, the main cylinder *C*, the doffer *D*, the feed-rolls, the feed-roll cover *K*, the hood or bonnet *D'* for the doffer, the said hood being seated upon the part *A''* of the frame, and the devices for lifting the top-flats and stripping the same, as well as the means for operating the same, are substantially as in the well-known Wellman stripper.

25 The shaft *N*, having the pulley *N'*, the belt *N''*, to rotate the shaft, the pinion *N'''* thereon, the toothed gears *N''''*, pinions 42, the cams *N''''''*, rotated by the pinions 42, each having at its front side a groove to vibrate the stripper-carrying arms *N''''''''*, and at their rear sides with the usual projections (not shown) by which to effect the lifting of the top-flats, the gear *N''''''''''*, and rack *N''''''''''''*, engaged by it to traverse the swinging frame, are all common to the said Wellman stripper, and their operation being well understood will not be herein further described.

35 The main cylinder *C* is provided with usual card-clothing, *c*, having wire teeth, the said card-clothing being fastened upon the surface of the said main cylinder by tacks or otherwise in usual manner, so as to leave at the ends of the periphery of the main cylinder an unclothed margin, *c'*.

45 The top-flats *F* are provided with usual card-clothing, *f*, secured thereto at the ends and along the sides. The top-flats usually lie close together, so that there is little, if any, chance for the escape of air between them, except when one is raised. The ends of the top-flats project beyond the ends of the main cylinder *C* and rest upon the adjusting-screws or screw-stands *S*, which may be turned in the arches *A'* of the side frame to regulate or adjust the distance between the card-clothing of the top-flats and of the main cylinder, the top-flats being held from longitudinal displacement by guide-pins *P*, projecting from the arches, there being ordinarily a considerable space between the said arches and the lower sides of the top-flats.

60 To obviate the discharge of the fiber from the central portion of the main cylinder outward into the space between the heads or ends of the said main cylinder and the side frames and the arches thereon, where it becomes waste, as stated, and to maintain an even line of fiber corresponding with the width of the card-clothing on the main cylinder, thereby

insuring a sliver of uniform width to present a substantially-uniform selvage or margin, I have provided the machine with shields or deflectors *E*, (herein shown as curved strips of metal,) one located at each end of the main cylinder, each shield or deflector being so shaped and supported as to bridge and cover the spaces between the inner sides of the side frame or arches, *A'*, and the heads of the main cylinder, the said shields or deflectors extending horizontally over upon the periphery of the main cylinder at its unclothed margin and nearly to the line of teeth of the clothing of the main cylinder. The main shields or deflectors are long enough to extend about the ends of the main cylinder from a point at or just below the feed-rollers to a point at or near the under line of the doffer *D*, where it is provided with an ear, *e*, which, by a bolt, *B''*, is bolted to the inside of the frame, the said shield or deflector being cut away or made narrow (see Fig. 9) to form a shoulder, *e''*, to rest upon the part *A''* of the frame, which forms a seat for the doffer hood or bonnet. Near its other end the said shield or deflector *E* is provided with a longitudinal slot, *e'*, through which and into the arch *A'* is passed a screw-bolt, *B'*, the end of the said shield or deflector being curled up under and nearly half-way around the neck of the lower one of the feed-rolls, thus preventing the cotton, both that in the lap and that also controlled by the air-current in the machine, from being blown against and wound around the said necks. The effect of the cotton winding upon the neck of the feed-rolls is to crowd the rolls apart and allow the lap to be drawn too rapidly into the machine by the main cylinder.

105 Above the main shield or deflector *E*, at each side of the machine, I have placed an auxiliary shield or deflector, *G*, (herein shown as a thin segment of metal) having a foot, *g*, resting upon and secured by suitable screws or bolts, *g''*, extended through the said foot and through slots *g'''* in the main shield or deflector, the slots permitting the lateral adjustment of the auxiliary shield or deflector upon the main shield or deflector.

115 The auxiliary shield or deflector is of such shape as to bridge or close the space between the top of the main shield or deflector *E* and the under side of the top-flats *F*, and preferably the upper curved edge of the auxiliary shield or deflector will enter grooves *f'*, made transversely across the under sides of the top-flats in line with the said auxiliary shield or deflector.

125 The employment of shields and deflectors substantially such as described, to control the secondary or more powerful current of air, prevents the escape of air from the interior of the carding-machine outward over the ends of the main cylinder from its peripheral center, provided the outward tendency of the air and fibers flying loosely in the carding-machine is overcome by a more powerful secondary current of air established in the machine

and flowing from the spaces between the ends of the main cylinder and the arches over the ends of the main cylinder, and the teeth near its ends toward the central portion thereof.

5 As herein shown, this more powerful or secondary current of air is generated by means of fan-blades attached to each head H of the main cylinder, the said fans substantially filling the spaces between the heads of the main
10 cylinder and the inner sides of the side frames of the machine.

The fan-blades and the heads H of the main cylinder practically constitute a fan-blower, having its axis of rotation coincident with that
15 of the main cylinder.

The supply of air to the apparatus for generating the secondary or more powerful machine-current of air to overcome the strength of the current at the surface of the main card
20 is admitted in regulated quantities through suitable inlets, *i*, at the arches, the said inlets being covered by doors or slides I, so constructed and supported as to permit the air to be introduced in the desired quantities, variations in the effective size of the inlets, taken
25 in connection with the speed of the machine, enabling the secondary current to be made just enough stronger than that of the machine-current to prevent the discharge of air and
30 fiber laterally from the ends of the main cylinder into the spaces between the heads of the said cylinder and the arches and side frames, thus almost completely obviating the formation of balls or rolls of fiber, which become
35 waste and necessitate frequent stoppage of the machine, and which are frequently caused to take fire by friction.

In accordance with my invention the air coming into the carding-machine is discharged
40 at the bottom of the machine below the bottom line of the doffer, where it has no disturbing action upon the fiber being carried through the machine.

The fan-blades *h* will act with more or less
45 force, according to their inclination from true radial lines with relation to the shaft actuating them. If desired, or considered necessary—as, for instance, with very heavy carding, or when carding a heavier lap—outlets for the
50 air may be provided between the flats, substantially at the middle portion thereof, as at *f*², the said outlets being made radially through the flats.

It is evident that the improvements above
55 described may be readily applied to cards which have under-flats as well as top-flats and where the feed is below the delivery, as in the well-known Foss and Pevy card, (see United States Patent No. 166,089,) the shields or de-
60 flectors being made of suitable length.

The secondary current of air established and coming over the ends of the main cylinder inward toward its middle will keep the teeth at the edges of the card-clothing of the main cylinder and next to the unclothed margin there-
65 on free from fibers.

By the term "top-flat" I desire to include

usual card-clothed surfaces arranged about the arch of the machine and co-operating with the main cylinder and its card-clothing.

I am aware that the end of a card-clothed cylinder or roller has been completely encircled by an annular flange, as in English Patent No. 941 for 1864; but the space between the head of the said cylinder and the disk or
70 plates carrying the flange has not been supplied with air, which is delivered therefrom in an established current, the air supplying the current being taken from outside the frame of the machine.

I do not desire to limit my invention to the exact means shown for generating and supplying the secondary current of air, as it is obvious that my invention would be substantially embodied were other usual well-known equivalent apparatus employed to establish and
85 keep up the air-current as needed.

I believe the method of preventing waste herein described to be novel, and have therefore filed another application, Serial No. 166,939, wherein I have claimed the herein-described method or process.

I claim—

1. The side frames or arches, the card-clothed main cylinder, and the series of card-clothed flats, combined with a stationary shield or deflector arranged about the unclothed margin of the main cylinder between the feed-rolls and the doffer and bridging the spaces between the heads of the main cylinder and the inner sides of the frame or arches to deflect inward over the ends of the cylinder a current of air, substantially as described.

2. The side frames or arches, the card-clothed main cylinder, the series of card-clothed flats, and a main shield or deflector arranged to divert a current of air against the side edges of the card-clothing, combined with means to generate or maintain a secondary or independent current of air to overcome the machine-current and aid in keeping the loose fiber on or in the space between the card-clothed surfaces, substantially as described.

3. The frame sides or arches, the card-clothed main cylinder, the card-clothed flats, and the main shields or deflectors to overlap a portion of the periphery or unclothed margin of the main cylinder near its ends and bridge the spaces between the ends of the said main cylinder and the inner sides of the side frames or arches, combined with an auxiliary shield or deflector to bridge the space between the main shield or deflector and the inner sides of the flats, and to operate substantially as described.

4. The frame sides or arches, the card-clothed main cylinder, the card-clothed flats, and the main shields or deflectors to overlap a portion of the periphery or unclothed margin of the main cylinder near its ends and bridge the space between the ends of said main cylinder and the inner sides of the side frames or arches, combined with an auxiliary shield or deflector to bridge the space between the

- main shield or deflector and the inner sides of the flats, and with mechanism, substantially as described, to generate or maintain a secondary current of air and discharge it from the space between the ends or heads of the main cylinder under the said main shield or deflector over and upon the main cylinder from its ends or heads toward its peripheral center, to operate substantially as described.
5. The side frames or arches, the main cylinder, and the series of flats provided at their under sides with transverse grooves, combined with the main and auxiliary shields or deflectors, the auxiliary shield or deflector entering the said grooves, substantially as described.
6. The side frames or arches, the main cylinder, the flats, the doffer, and the feed-rolls, combined with the main shield or deflector, one end of which is made to embrace and shield the necks of the upper feed-roll, to operate substantially as described.
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