

No. 639,333.

Patented Dec. 19, 1899.

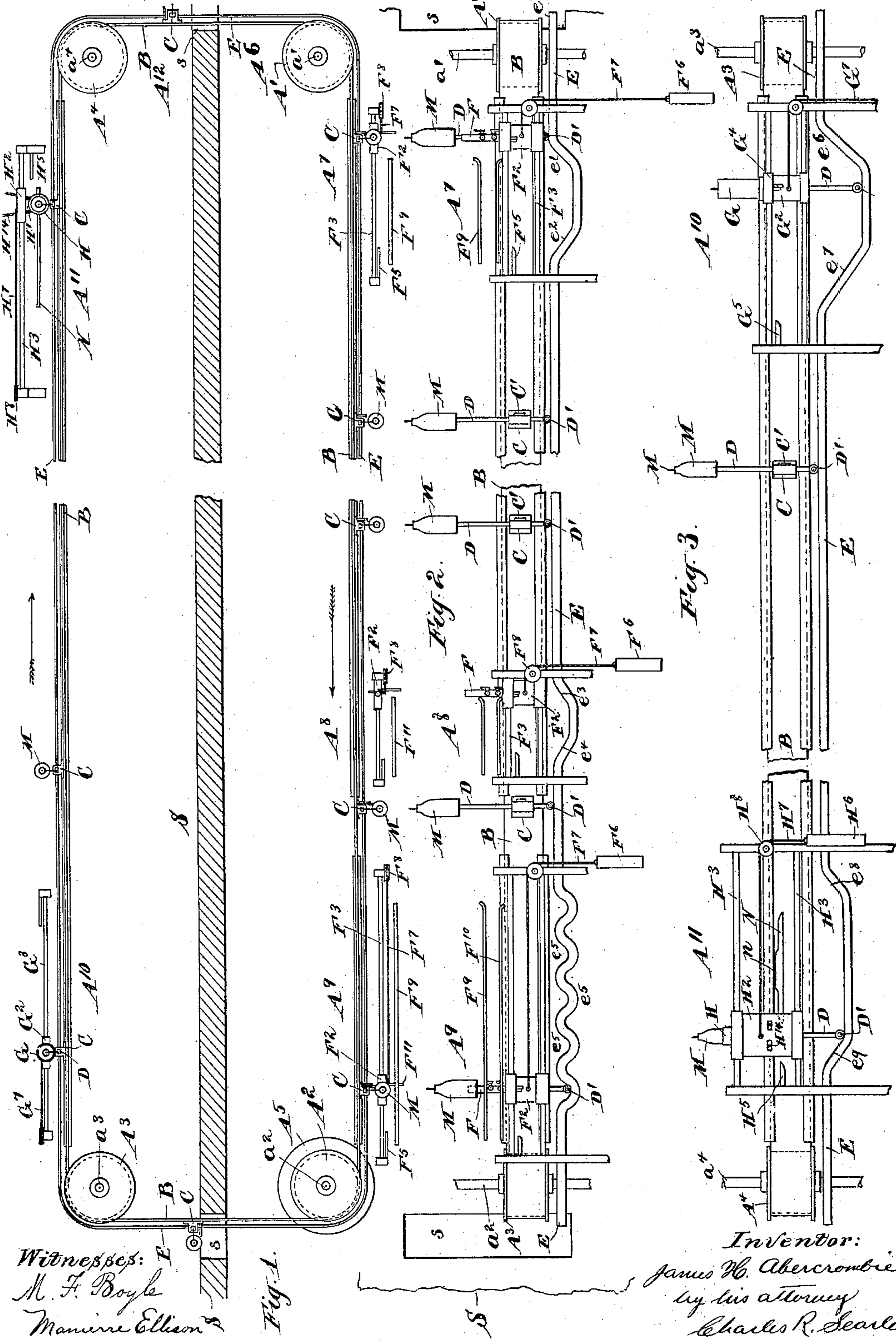
J. H. ABERCROMBIE.

MACHINE FOR TREATING INCANDESCENT MANTLES.

(Application filed Sept. 5, 1899.)

(No Model.)

4 Sheets—Sheet 1.



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4 Sheets—Sheet 2.

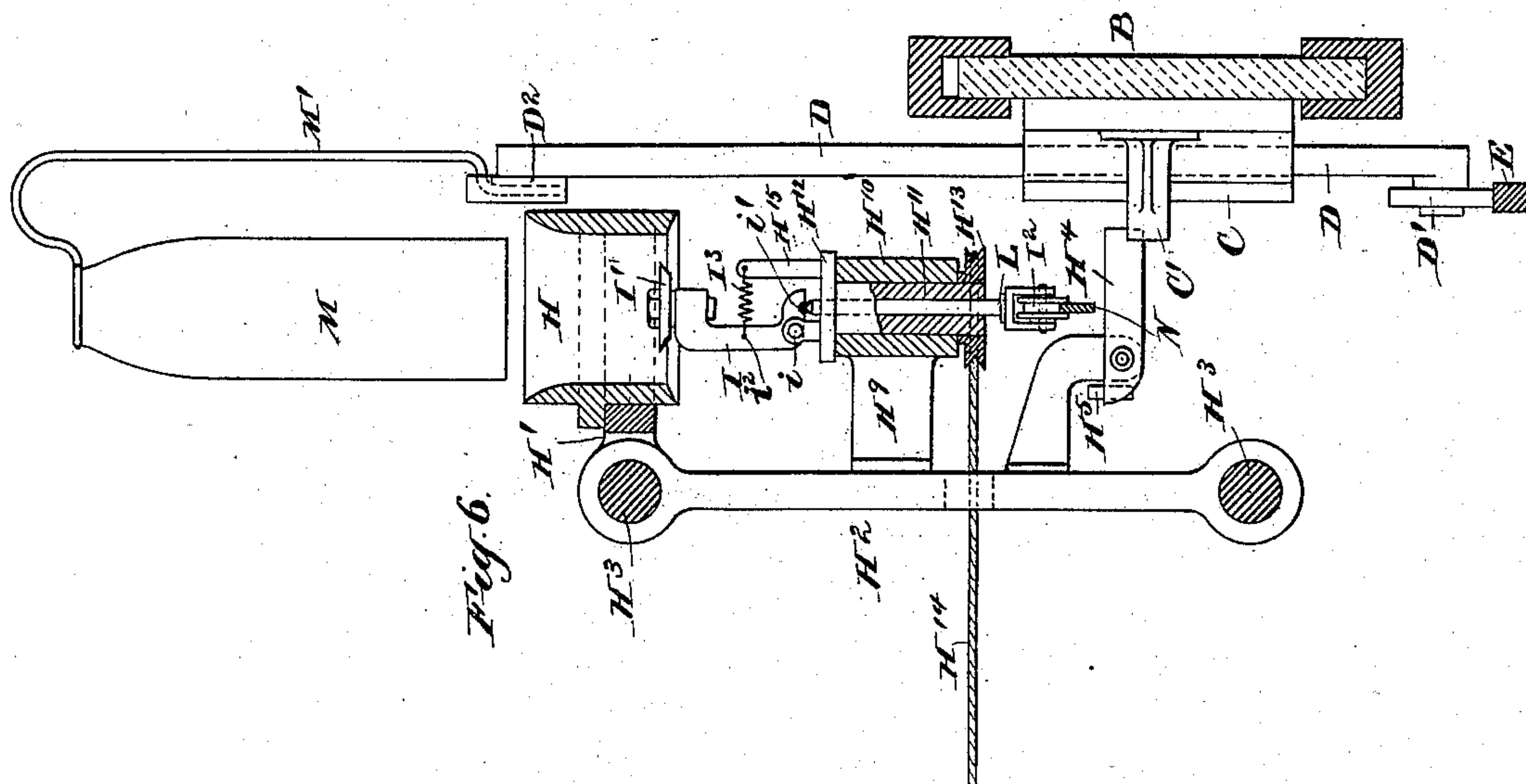


Fig. 6.

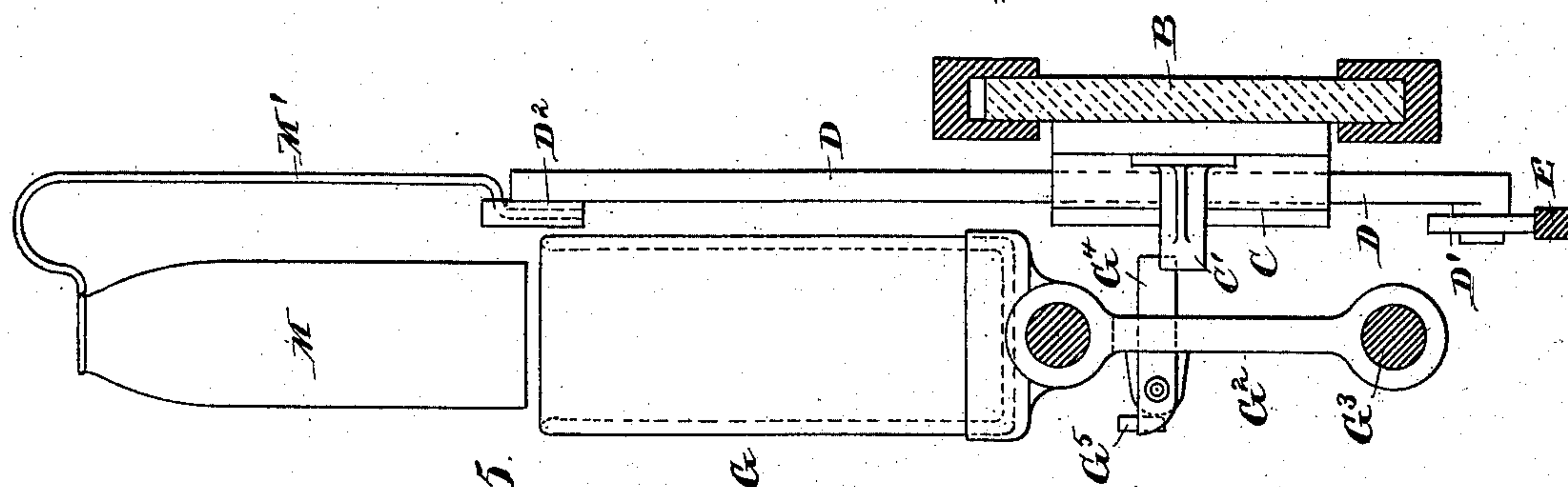


Fig. 5.

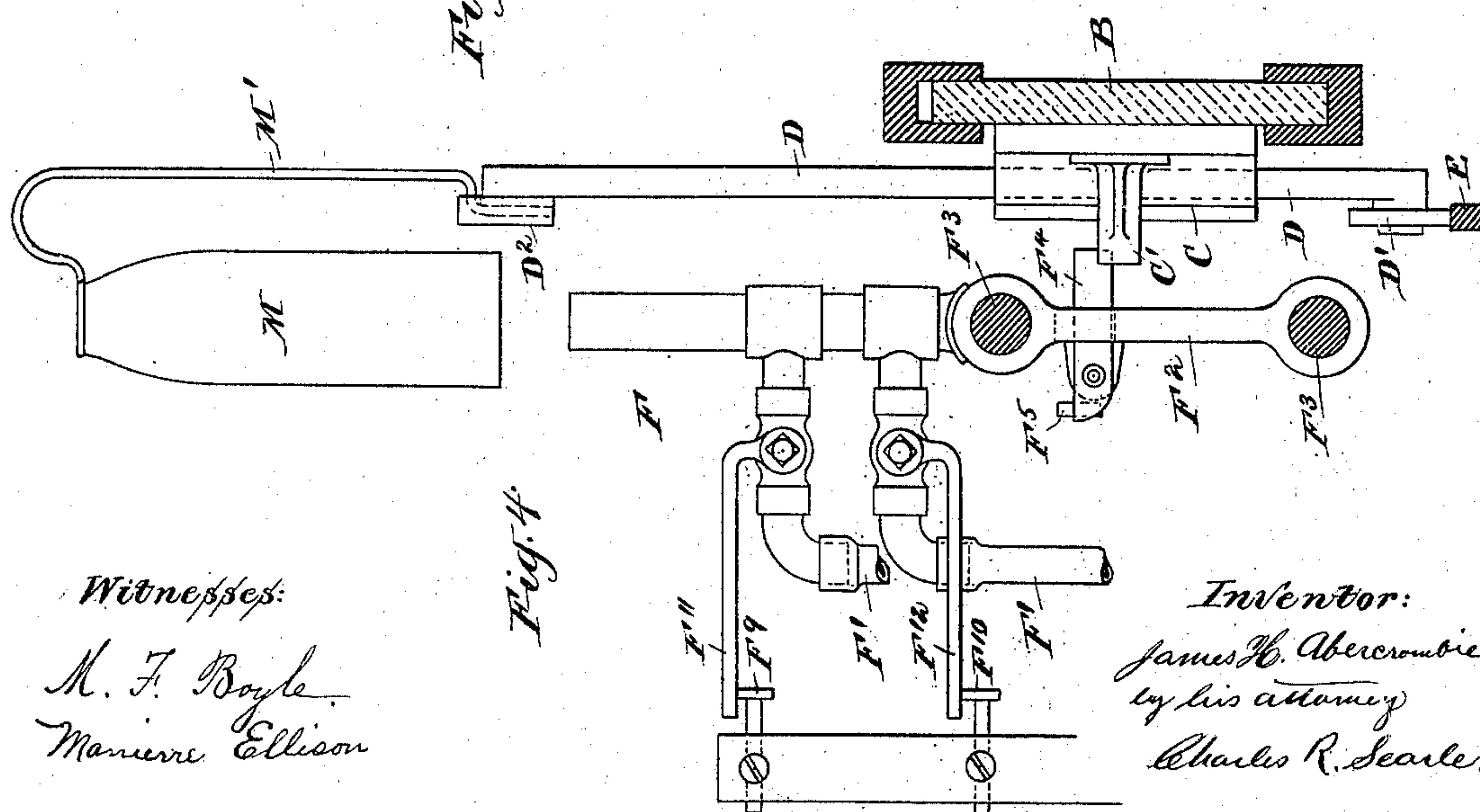


Fig. 4.

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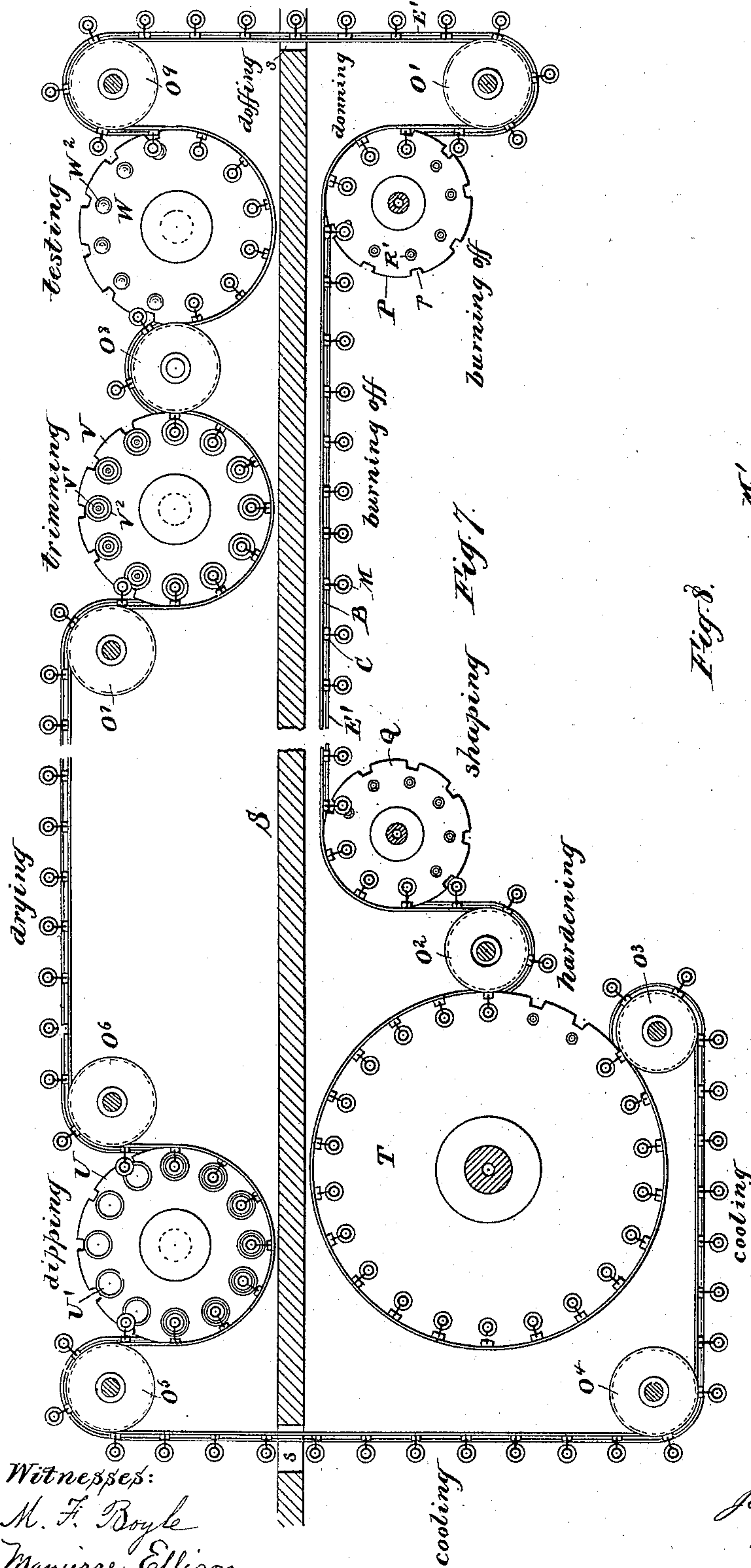


Fig. 7.

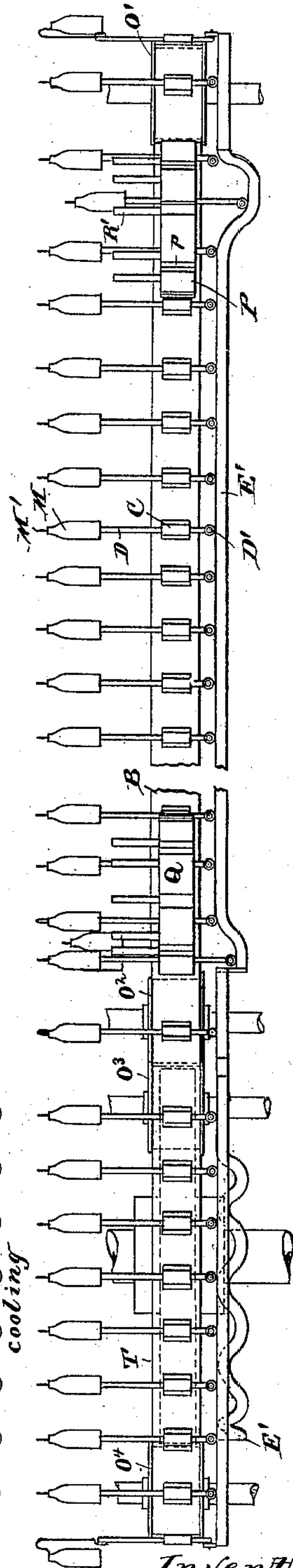


Fig. 8.

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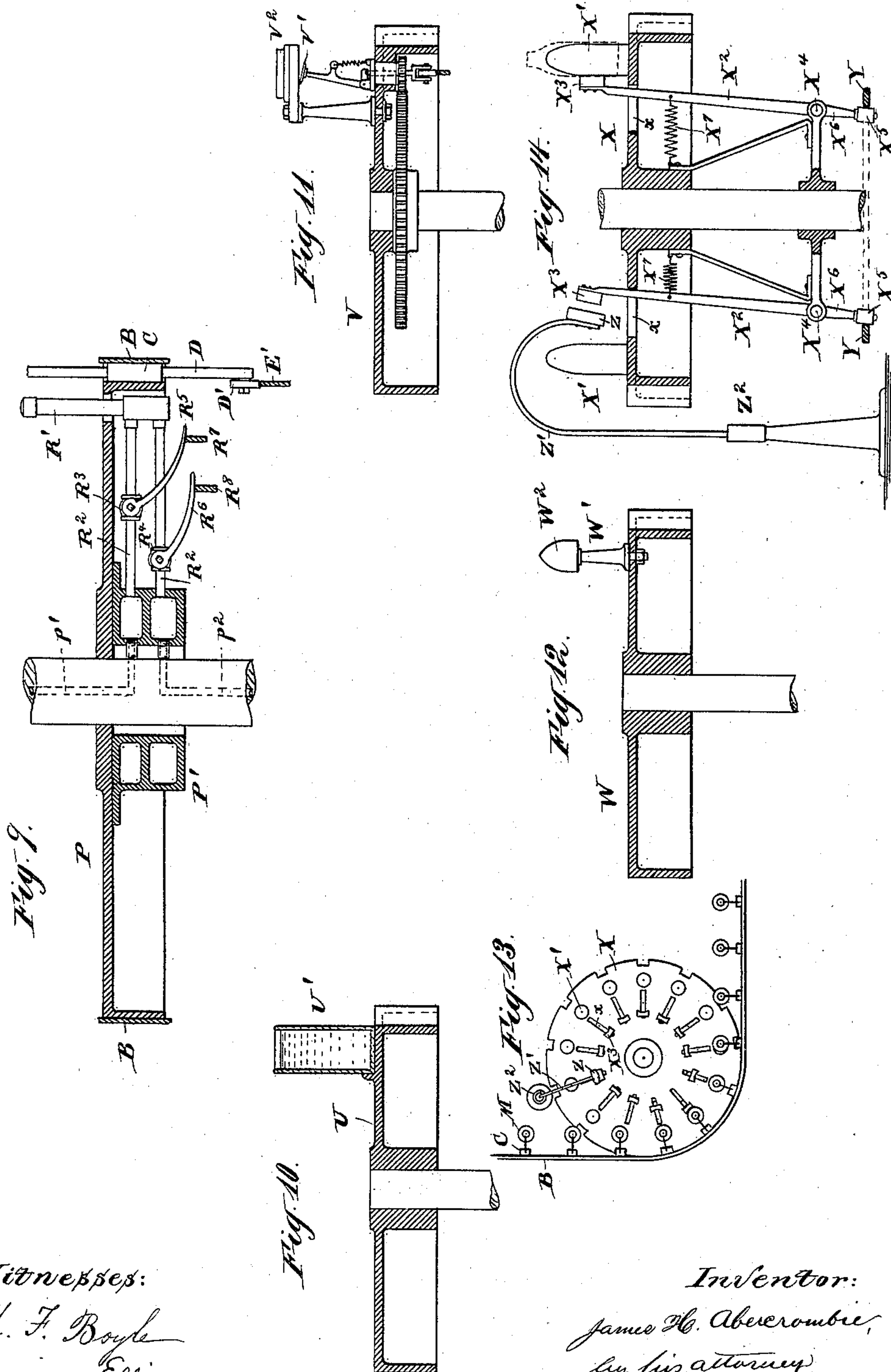
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4 Sheets—Sheet 4.



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UNITED STATES PATENT OFFICE.

JAMES H. ABERCROMBIE, OF NEWARK, NEW JERSEY, ASSIGNOR TO HIMSELF
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MACHINE FOR TREATING INCANDESCENT MANTLES.

SPECIFICATION forming part of Letters Patent No. 639,333, dated December 19, 1899.

Application filed September 5, 1899. Serial No. 729,426. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. ABERCROMBIE, a subject of the Queen of Great Britain, residing in Newark, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Machines for Treating Incandescent Mantles, of which the following is a specification.

The object of the present invention is to provide a single machine in which a number of steps in the manufacture of mantles—as, for example, the “burning off,” “shaping,” and “hardening,” and also the “dipping” and “trimming”—may be automatically performed upon each of a series of mantles in succession, and thus effect a saving in labor and insure greater uniformity in the finished articles.

The invention consists of an endless carrier or belt running on suitable pulleys equipped with a series of holders, each adapted to support a mantle in position for treatment, and a series of treating devices located in the path of the mantles in such relation thereto as to be properly presented to each and so mounted as to accompany each mantle through a portion of its travel, performing its part in the treatment and then returning to repeat the action with a succeeding mantle. A portion of the treatment—as the burning off, shaping, and hardening—requires the agency of a heating-flame, while at a later stage the mantle is dipped in a bath of collodion or analogous inflammable solution. It is obvious that to avert danger of accidental fire great care must be taken to effectually separate these portions of the treatment. This is accomplished by traversing the belt through small openings in a partition, on one side of which the steps requiring the presence of flame are performed, and on the other side of the partition, completely isolated from the flame, are the dipping-tank and the other devices for acting upon the mantle after it has received its inflammable coating.

The invention also consists in certain details of construction and arrangement of parts to be hereinafter described.

The accompanying drawings form a part of this specification and show a preferred form of the invention.

Figure 1 is a plan view of the machine, showing the partition-wall in horizontal section. Fig. 2 is a corresponding elevation showing the portion on the near side of the partition, and Fig. 3 is a similar view of the portion on the far side of the partition. Of the remaining views, Figs. 4, 5, 6, 9, 10, 11, 12, and 14 show portions of the mechanism on a larger scale. Fig. 4 is an elevation, partly in vertical section, showing the arrangement of the device for burning off. Fig. 5 is a similar view showing the dipping-reservoir and the immediately adjacent parts, and Fig. 6 is a corresponding view of the trimming mechanism. The remaining figures show an arrangement adapted for more rapid working. Fig. 7 is a plan view of the entire machine. Fig. 8 is a side elevation. Fig. 9 is a vertical section, partly in elevation, showing a portion of the mechanism and the arrangement of the burners therein. Fig. 10 is a similar view showing the dipping wheel or carriage. Fig. 11 is a corresponding view of the trimming-wheel. Fig. 12 shows a section through the testing carriage or wheel. Fig. 13 shows in plan view a branding-wheel, and Fig. 14 is a vertical section of the same on a larger scale.

Similar letters of reference indicate like parts in all the figures.

Referring to Figs. 1 to 6, inclusive, A^1 , A^2 , A^3 , and A^4 are flanged pulleys fixed on the vertical shafts a^1 , a^2 , a^3 , and a^4 and revolving therewith in suitable bearings, (not shown,) one pair on each side of a partition-wall S having openings s , through which passes an endless belt or carrier B , running on all four pulleys, and thus forming an approximate rectangle divided lengthwise by the wall S . The belt is driven in the direction indicated by the arrows by a belt running on the pulley A^5 on the shaft a^5 , driven at the desired moderate speed from any suitable motor. (Not shown.) The belt B carries a series of holders C at equally-spaced intervals, each containing a vertical bar or slide D free to rise and sink therein and equipped at the lower end with a roller D' in contact with the upper face of a track E below the belt and parallel therewith, and at the upper end of each slide is a socket D^2 , receiving and holding the wire support M' of a mantle M ,

attached thereto, as usual, and hanging suspended in a line outside the belt. The several holders C, with their slides, travel with the belt in the direction indicated by the arrows, as will be understood, the vertical position of the mantles relatively to the belt being determined by the elevations and depressions in the track E.

F is a Bunsen burner located at A⁷, near the shaft a', receiving gas and air through flexible tubes F' and mounted on a carriage F², free to travel a short distance and return on the fixed guide-bars F³, parallel with the path of the mantles and presenting the burner-tube directly below them. A trip-lever F⁴ is mounted in the carriage and arranged to be struck by an arm C' on each of the holders C, and thus force the carriage to partake of the motion of the belt, with its burner immediately below the mantle, and accompany the latter until the trip-lever strikes the beveled face of the fixed stop F⁵ and is tilted to release its hold on the arm C', when the carriage, with its connections, is returned to its original position by the action of a weight F⁶, attached to the carriage by a cord F⁷ running over the pulley F⁸. F⁹ and F¹⁰ are bars attached to the fixed framework and serve by acting upon the arms F¹¹ and F¹² of the air and gas cocks to condition the flame, as required. There are three of these burners and carriages, each similar to the others, differing only in the length of travel and the adjustment of the flame. The above description will suffice for all. The one described is located at the burning-off station at A⁷. Another having a shorter travel is located at a considerable distance from the first and performs the shaping step at A⁸. The third at A⁹ has a considerably longer travel and performs the hardening process. It will be observed that all of the above steps requiring the use of a flame are performed on the near side of the partition-wall S. On the other side the first step at A¹⁰ is the dipping, in which a carriage G², similar to the carriage F² described, carries a vertical cylindrical reservoir G, containing collodion, located directly beneath the mantle and having a trip-lever G⁴ engaged by the arm C', as before, until released by the stop G⁵ and returned by the cord G⁷.

A long interval to allow the ether or other solvent to evaporate is provided for before the trimming operation at A¹¹ is reached. At this point a pair of guide-bars H³ support a carriage H², having an inwardly-projecting arm H', supporting a guide-ring H, having a flaring upper mouth presented in line with and a little below the mantle M. The internal diameter of this ring is a little larger than the external diameter of the mantle, so that the latter may be received therein, as will be described. The carriage H² is equipped with a trip-lever H⁴, operated by contact with a stop H⁵ and returned by a weight H⁶, cord H⁷, and pulley H⁸. On the inner face of the carriage, below the guide-ring, is a bracket

H⁹, having a tubular bearing H¹⁰ inclosing a sleeve H¹¹, flanged at the upper end at H¹² and provided with a grooved pulley H¹³ below the bearing. The flange supports a vertical bell-crank lever I, pivoted at i and carrying at its upper end a cutter-wheel I', arranged to lie normally in the center of the ring and adapted to coact with the properly-shaped lower face of the ring in shearing off the skirt of a mantle suspended therein. The cutter is rapidly rotated by a belt H¹⁴, running on the grooved pulley H¹³ from a pulley (not shown) located at a sufficient distance to allow the carriage to make the desired travel without greatly varying the tension on the belt. The bell-crank lever is thrown to bring the cutter-wheel into action by the rod L, mounted axially in the sleeve and having a conical upper end engaged in a correspondingly-shaped cavity i' in the short arm of the lever and its lower end equipped with a flanged roller I², resting on a track N, in which is a slight elevation n, serving when reached in the travel to elevate the rod L, and thus tilt the lever I against the force of the retractile spring I³, attached at one end to the lever at the point I² and at the other to a stud H¹⁵ on the flange H¹².

The operation is as follows: Mantles are supplied at the "donning-station" A⁶, each slide on its passage receiving one supported on its wire M' and properly positioned in the socket D². The track E is sufficiently elevated at this point e to hold the slide at a height to allow easy service. The mantle travels around the pulley A' and into the long forward portion of its journey, and as it reaches A⁷ its arm C' engages the trip-lever F⁴ at the time the mantle hangs directly above the burner F and moves the carriage F² forward upon the guide-bars F³ against the force exerted by the weight F⁶. As the roller D' descends the incline e' of the track the mantle is correspondingly lowered, inclosing the upper portion of the burner, and as soon as the forward movement has progressed sufficiently to bring the arms F¹¹ and F¹² into contact with the bars F⁹ and F¹⁰ air and gas are admitted in proper quantities to condition the flame, which was previously only sufficient to maintain ignition to fully ignite the mantle on the interior near the top. Then the roller begins to ascend the incline e² to free the mantle from the burner and the trip-lever F⁴ strikes the stop F⁵ and releases the carriage, which immediately returns to act on the next succeeding mantle. The ignited mantle now traverses a long stretch, during which it burns off, leaving only the delicate salts, and then reaches the station A⁸, where it is acted upon momentarily by a burner similar to that at A⁷, but conditioned to shape the mantle into the desired symmetrical form, the track E having at this point the inclines e³ e⁴, serving to bring the mantle into the required relation to the burner for this process. The next step or hardening operation at A⁹ consists of raising

and lowering the mantle over a suitably-conditioned flame and is accomplished by the undulations e^5 . The burner in this step accompanies the mantle through a longer travel than in any of the preceding. The mantle next turns the pulley A^2 and passes through an opening s in the partition S and then around the pulley A^3 and enters the return portion of its travel on the opposite side of the partition. It arrives thoroughly cooled at the dipping-station A^{10} , where its arm C' engages the trip-lever G^4 on the carriage G^2 and moves the latter with it, while the roller D' descends the deep incline e^6 and submerges the mantle in the solution contained in the reservoir G , holding it beneath the surface until all parts are fully wetted and then again rises on the incline e^7 to free the mantle and allow the carriage G^2 to return. The carriage G^2 and its guide-bars G^3 may be so arranged as to follow the mantle a short distance after the latter has been lifted, so as to catch any drip therefrom in the reservoir, as will be understood. Another long period ensues, during which the ether or other solvent evaporates and the mantle approaches the trimming-station at A^{11} in the dried condition. At this point the mantle is allowed to descend within the ring H , moving with the mantle, as before described, to the desired distance, governed by the incline e^8 , and when fully lowered the cam or elevation n on the track N raises the rod L and swings the cutter I , inclosed in the skirt of the mantle, into shearing relation with the lower face of the ring and trims off any surplus length of skirt, returning again to the central position before the roller D' reaches the incline e^9 and lifts the mantle clear of the ring and releases the carriage H^2 . The mantle is then removed at the doffing-station A^{12} , and the holder, with its empty socket, passes through the partition S to receive an untreated mantle and carry it through the cycle.

In the foregoing description the output of the machine is limited to that of the hardening-station at A^9 , and as the burner during that operation has to accompany each mantle a considerable distance before it can return for the next it is obvious that the holders must be correspondingly widely spaced. To provide for faster working or to allow the mantles to succeed each other more quickly, the preferred form of machine shown in Figs. 7 to 12, inclusive, is employed. In this form the belt B and holders C thereon are in all respects the same as those above described, excepting the omission of the arms C' ; but instead of single treating devices operating on each successive mantle I mount a number of each class of treating devices in suitable revolving carriages or wheels and present a mantle to each, the wheel revolving always in the same direction, so that the mantles may follow each other at short intervals, limited only by the space necessarily occupied

by the holder and the treating device. The wheels are preferably provided with notches in the periphery matching to the holders C , and thus insuring the correct placing of each mantle relatively to its adjacent treating device. Beginning at the donning-station, the holders on issuing from the opening in the partition S are filled with mantles, as before, and the belt passes around the idler-pulley O' , corresponding to the idler A' in the earlier figures, to the wheel or circular carriage P , having the equally-spaced peripheral notches p , in which are received the holders C , correspondingly spaced on the belt. The wheel is equipped with a series of burners R' , one for each notch, so disposed as to stand immediately below the mantle suspended from the adjacent holder when the latter has adjusted itself to the notch. The wheel is revolved by the belt B , so that its motion is uniform therewith, and the mantle maintains its relation laterally with the burner so long as the holder is fully engaged. The slides rest upon the track E' , as before, and it follows the belt at the proper distance therefrom through its whole course, the depressions and elevations serving, as first described, to lower and raise the mantles at the desired times and to the required extents, as will be understood without detailed description. A chambered casting P' , attached to the under face of the wheel, receives gas and air through the axial openings p' p^2 in the shaft and communicate from the chambers through the pipe R^2 with the burner. The flame is controlled and conditioned to the work to be performed by the cocks R^3 and R^4 , opened, closed, and regulated by the travel of the arms R^5 and R^6 over the upper surface of the circular tracks R^7 and R^8 , having elevations and depressions (not shown) properly located to partially turn the cocks, and thus govern the admission of gas and air to the burner. The arms R^5 and R^6 may be held in contact with their tracks by gravity or by a spring or additional weight, as will be understood. The first wheel or carriage of the series is at the burning-off station, where the mantle is ignited. A considerable space in which the burning is completed is provided between this wheel and the shaping-wheel Q , where the operation is performed by similar burners, but is almost momentary, and the mantle is then carried by the belt around an idler O^2 to the hardening-wheel T , also equipped with burners operated as before, but conditioned to perform this step. This wheel is preferably larger in diameter than the preceding, and the idlers O^2 O^3 are so placed as to cause the belt to follow nearly the entire circumference, so as to provide the required long period for this portion of the process. The belt then passes the idler O^4 corresponding to A^2 in the earlier figures and thence through the opening s in the partition to the treating devices on the opposite side, where

the mantles arrive sufficiently cooled to insure against accident and after turning the idler O^5 make a partial circuit of the dipping-wheel U , carrying a number of small tanks U' supplied with the usual inflammable coating solution, in which by a suitable depression in the track the mantles are immersed and again raised and, passing the idler O^6 , traverse a long straight stretch, consuming a period of sufficient length to insure the required evaporation of the solvent. The belt then turns the idler O^7 and presents the mantles to the trimming-wheel V , where the lower edge or skirt of each is cut to uniform length by the cutter-wheels V' and ring V^2 , mounted on the wheel and operated from the central stud by suitable gearing, the general construction and operation corresponding very closely to that shown in Fig. 6. The belt then passes the idler O^8 and reaches the testing-station, consisting of a wheel or carriage W , in all respects similar to the dipping-wheel, but having a series of posts W' , each carrying a sizing-cone W^2 instead of a tank. Each cone is smoothly finished and is of a diameter to match to the interior of a perfect mantle when the latter is lowered upon it. If the mantle is of standard size, it will admit the cone; but if too small it will be fractured and subsequently thrown aside. The rings V^2 on the trimming-wheel V may be relied upon to break any of the mantles that oversize, and both serve to destroy any that are sufficiently misshapen to warrant rejection. The belt then passes another idler O^9 to the doffing-station, where the holders are emptied and the perfect mantles carefully laid aside for packing.

The idlers are, as shown, preferably flanged to aid in holding the belt against sagging between the carriages and may be supplemented by other supporting-rollers or grooved guides if found necessary or desirable.

Figs. 13 and 14 show a step not embodied in the general plan view Fig. 7, but which may be performed before the burning off. In this operation the branding or printing of a name or trade-mark upon the mantle is accomplished. A wheel or carriage X , adapted to serve with the belt B and holders C thereon, is provided with a number of cones X' of a size to be easily received within the mantles and a corresponding number of levers X^2 , each carrying a block X^3 , on which are the letters or characters to be printed. Each lever is pivoted at X^4 and plays in a radial slot x , its motions being produced by a track Y , against which a roller X^5 on the short arm X^6 of the lever travels and is held in contact therewith by the force of a spring X^7 .

Z is an inking-pad mounted on the curved spring-arm Z' , fixed in a standard Z^2 and arranged in the path of the blocks X^3 . The latter travel through the main portion of the circuit in a path within the line of the inking-pad and mantles, but on arriving at the

pad are successively forced outward by a suitable inward swell on the track Y , as will be understood, and come in contact momentarily with the pad and are inked and upon arriving at that portion of the circuit where the mantles travel with the carriage are again forced outward and imprint the device or characters on the outer surface of the mantle, while the latter incloses its cone X' and is supported thereby. The block then falls back toward the center, and the mantle is lifted clear of the cone in the manner previously described in other steps and travels to the burning-off carriage and other portions of the treatment as before.

Modifications may be made in the forms and proportions, and parts of the invention may be used without the whole. Some of the steps may be omitted or varied and others may be substituted or introduced. Instead of the belt B described an endless sprocket-chain running on a suitable sprocket-wheel may be employed. Some of the reciprocating devices first described may be used with one or more of the wheel devices. As before stated, the hardening operation requires the longest treatment, and it is apparent that a machine constructed to use the sliding carriages for all the operations excepting the hardening will serve successfully with a hardening-wheel. Blocks similar in form to the holders may be secured to the belt to match to the notches in the revolving carriages, or other means of engagement may be substituted.

I claim—

1. In a machine for treating mantles, an endless belt or carrier, a series of mantle-holders mounted thereon, each adapted to support a mantle in position for treatment, in combination with a series of treating devices each adapted to perform a step in the manufacture and arranged to accompany a mantle through a portion of its travel and to return automatically to act on a succeeding mantle, all substantially as herein specified.

2. In a machine for treating mantles, an endless belt or carrier, a series of mantle-holders mounted thereon, each adapted to support a mantle in position for treatment, in combination with a treating device adapted to accompany each mantle through a portion of its travel and perform a step in the manufacture, and to return automatically to act on a succeeding mantle, all substantially as herein specified.

3. In a machine for treating mantles, an endless belt or carrier, a series of mantle-holders mounted thereon, each adapted to support a mantle in position for treatment, a partition through which said belt passes, and treating devices separated by said partition, each adapted to perform a step in the manufacture of the mantle, all combined and arranged to serve substantially as herein specified.

4. In a machine for treating mantles, an endless belt or carrier, a series of mantle-hold-

ers mounted thereon each adapted to support a mantle in position for treatment, a partition through which said belt passes, a burner adapted to perform a step in the manufacture and located on one side of said partition, and a dipping-reservoir located on the opposite side adapted to perform a succeeding step, all combined and arranged to serve substantially as herein specified.

5. In a machine for treating mantles, an endless belt or carrier, a series of mantle-holders mounted thereon each adapted to support a mantle in position for treatment, a partition through which said belt passes, a burner adapted to perform a step in the manufacture and located on one side of said partition, a dipping-reservoir located on the opposite side adapted to perform a succeeding step, and means for varying the vertical position of each mantle relatively to said burner and reservoir, all combined and arranged to serve substantially as herein specified.

6. The belt and pulleys on which it runs, a series of mantle-carrying slides mounted on said belt each adapted to support a mantle in position for treatment, a track for raising and lowering said slides, a carriage mounted in the path of said mantles and carrying a device for performing a step in the treatment, and means for engaging said slide and carriage so that the latter shall accompany the mantle through a portion of its travel, and means for automatically returning said carriage so that it may act with a succeeding mantle, all substantially as herein specified.

7. An endless belt or carrier, a series of mantle-carrying slides mounted thereon each adapted to support a mantle in position for treatment, and means for raising and lowering said slides, in combination with a partition through which said belt passes, a series of burners on one side of said partition adapted to automatically perform each a step in the manufacture of a mantle, and a dipping reservoir or tank and trimming mechanism located on the opposite side of said partition adapted automatically to serve in performing further steps, all substantially as and for the purposes herein specified.

8. In a machine for treating mantles, an endless belt, a series of mantle-holders thereon each adapted to support a mantle in position for treatment, in combination with a revolving carriage moving with said belt, and a series of treating devices mounted on said carriage and each adapted to accompany its mantle and perform a step in the manufacture, and on completing the revolution similarly act on a succeeding mantle, all substantially as herein specified.

9. A revolving carriage or wheel, a series of treating devices mounted thereon, a belt moving with said wheel and carrying a series of mantle-supporting holders, means for insuring vertical alinement between said devices

and mantles, and means for raising and lowering the latter relatively to said devices, all combined and arranged to serve substantially as herein specified.

10. A revolving carriage or wheel, a series of treating devices mounted thereon, a belt moving with said wheel and carrying a series of mantle-supporting holders, means of engagement between said wheel and belt whereby vertical alinement of said devices with said mantles is secured, and means for automatically moving said devices and mantles into operative relation with each other, all combined and arranged to serve substantially as herein specified.

11. A revolving carriage or wheel, a series of burners mounted thereon with means for automatically controlling the supply of gas and air thereto as the carriage revolves, in combination with a belt moving with said carriage and carrying a series of mantle-supporting holders, means of engagement between said carriage and belt whereby vertical alinement of said burners with said mantles is secured, and means for automatically moving said devices and mantles into operative relation with each other, all combined and arranged to serve substantially as herein specified.

12. A revolving carriage or wheel having notches in its periphery and carrying a series of mantle-treating devices, in combination with a belt having a series of mantle-supporting holders thereon spaced to match to said notches and adapted to engage therein, and means for automatically lowering and raising said mantles to bring them into operative relation with said devices, all substantially as herein specified.

13. A revolving carriage or wheel having notches in its periphery, a series of burners carried thereon, means for automatically controlling the supply of gas and air to said burners as the carriage revolves, an endless belt running on said carriage, a series of holders on said belt spaced to engage said notches, a mantle-carrying slide in each of said holders, and a track following the path of said belt and supporting said slides and having elevations and depressions for raising and lowering said mantles relatively to said burners, all combined substantially as herein specified.

14. A revolving carriage or wheel, a series of mantle-trimming devices carried thereon, a belt moving with said carriage, a series of mantle-supporting holders thereon, means for insuring register between said trimming devices and mantles, means for automatically operating said devices, and means for lowering and raising said mantles relatively thereto all combined substantially as herein specified.

15. A revolving carriage or wheel, a series of mantle-sizing devices thereon, a belt run-

ning with said carriage, a series of mantle-supporting holders thereon, means for insuring register between said sizing devices and mantles, and means for presenting said
5 mantles to said devices to indicate imperfections in size, all combined and arranged to serve substantially as herein specified.

In testimony that I claim the invention above set forth I affix my signature in presence of two witnesses.

J. H. ABERCROMBIE.

Witnesses:

CHARLES E. BALFOUR,
MICHAEL CLEARY.