(No Model.)

6 Sheets—Sheet 1.

W. H. SMYTH.

CAN SOLDERING MACHINE.

No. 573,423. Patented Dec. 15, 1896.

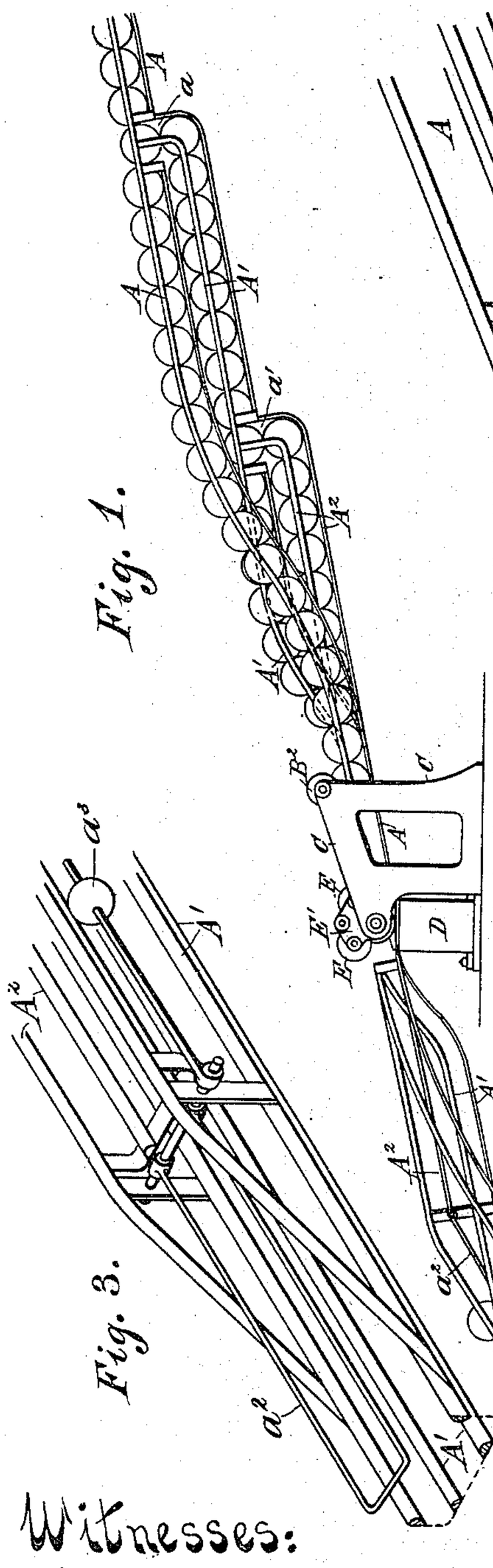

Fig. 1.

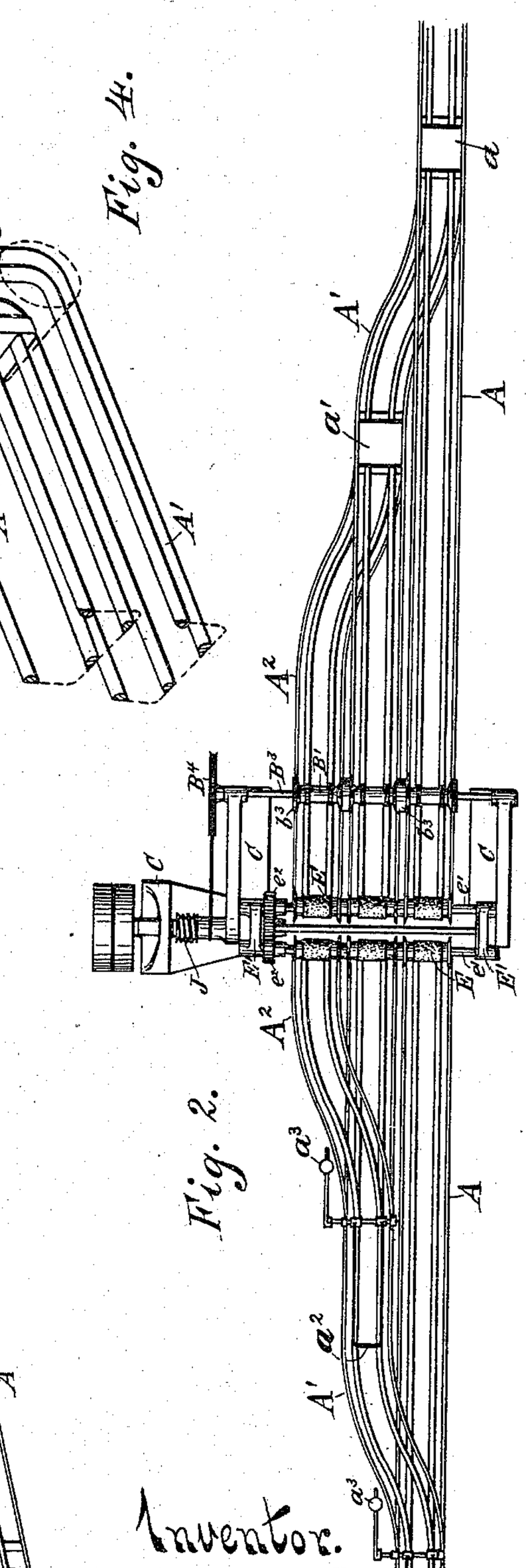

Fig. 4.

Fig. 2.

Fig. 3.

Witnesses:
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(No Model.) 6 Sheets—Sheet 2.

W. H. SMYTH.

CAN SOLDERING MACHINE.

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Fig. 5.

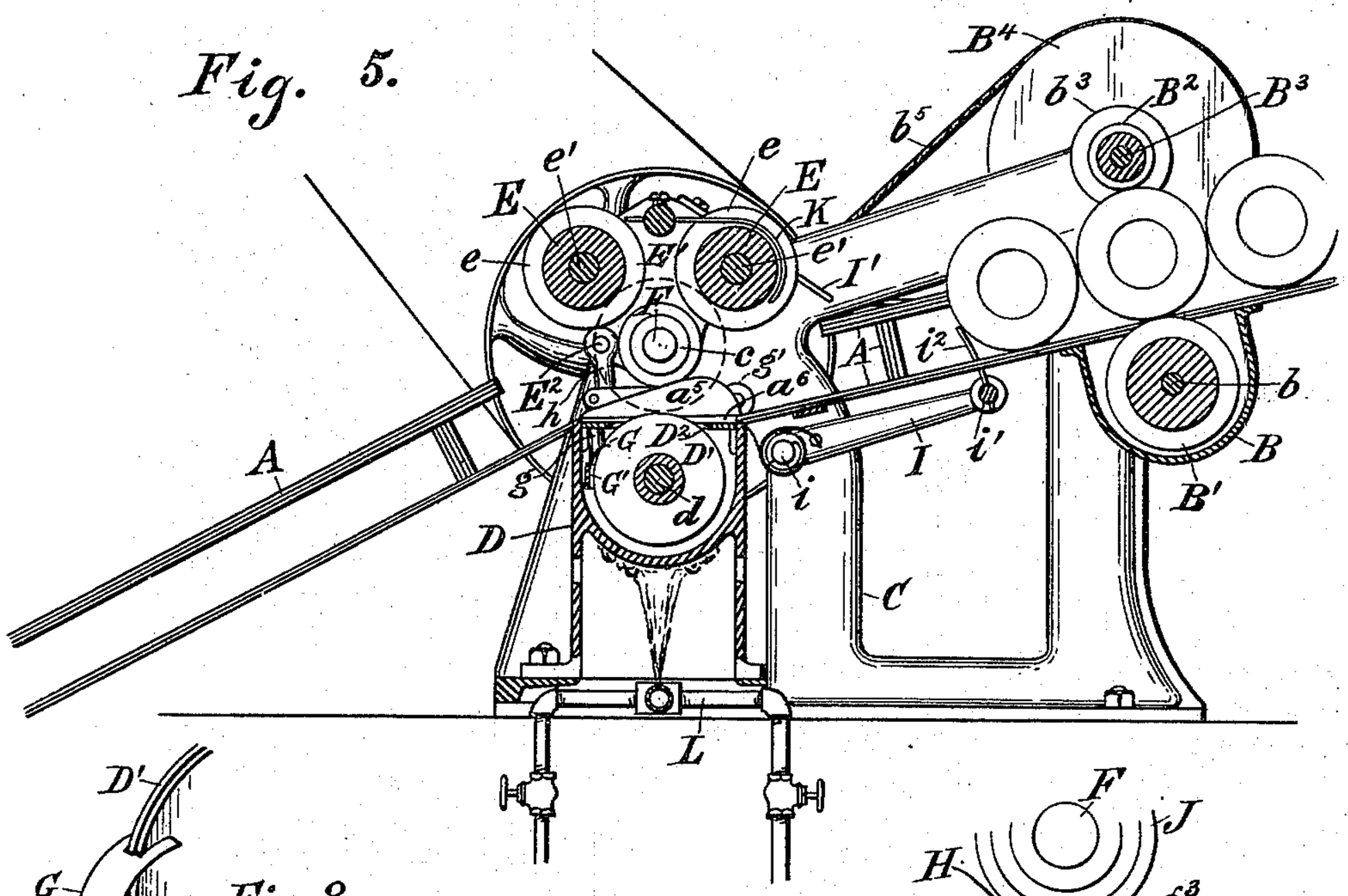

Fig. 8.

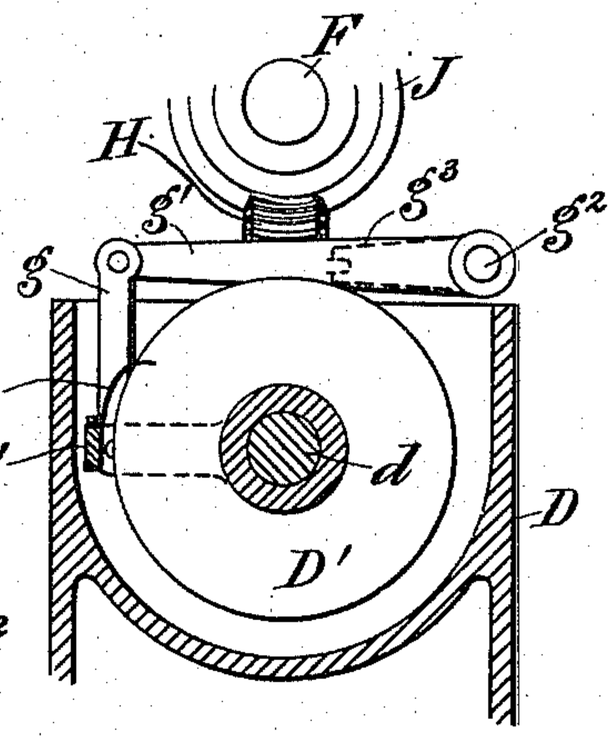

Fig. 7.

Fig. 6.

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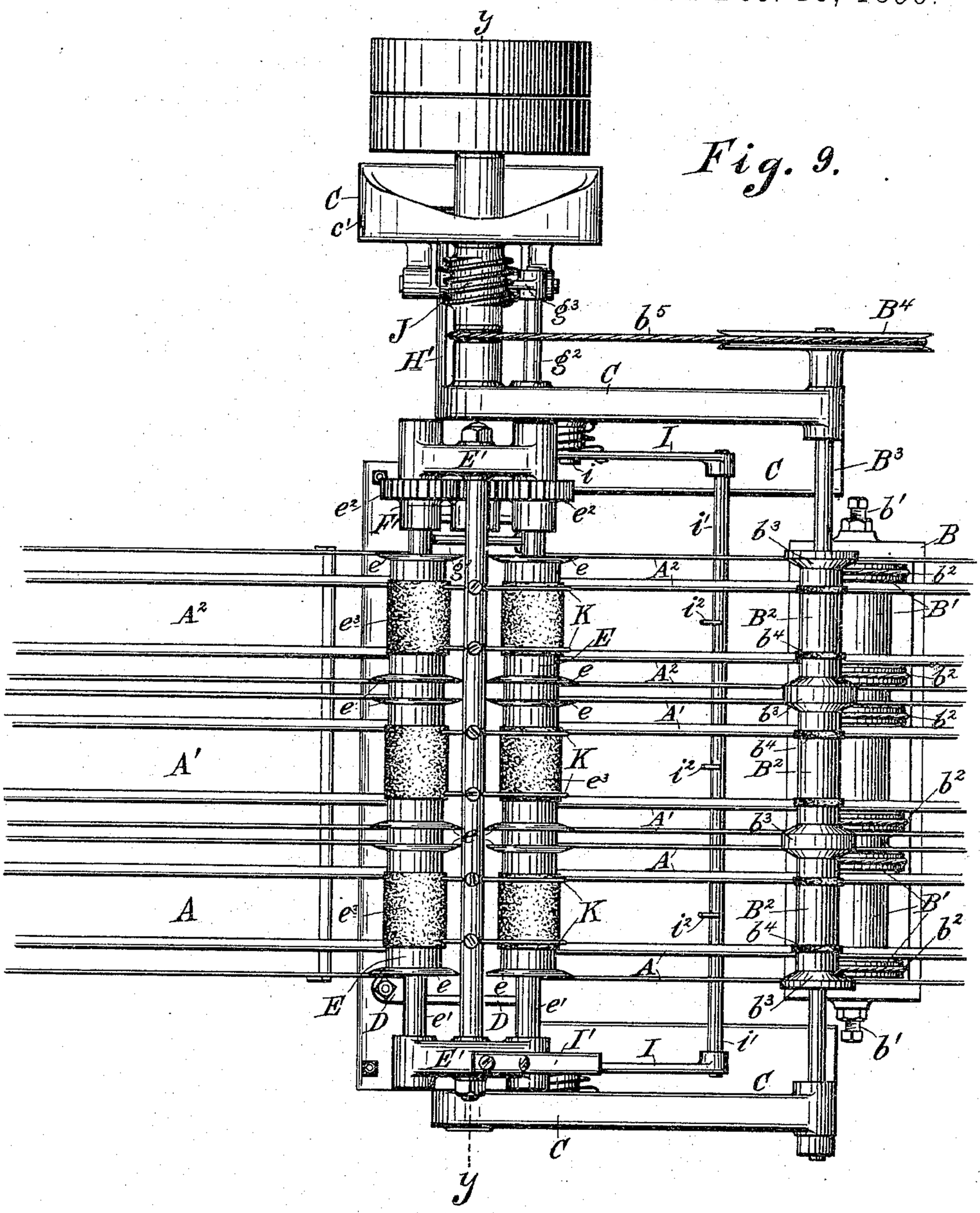

Fig. 9.

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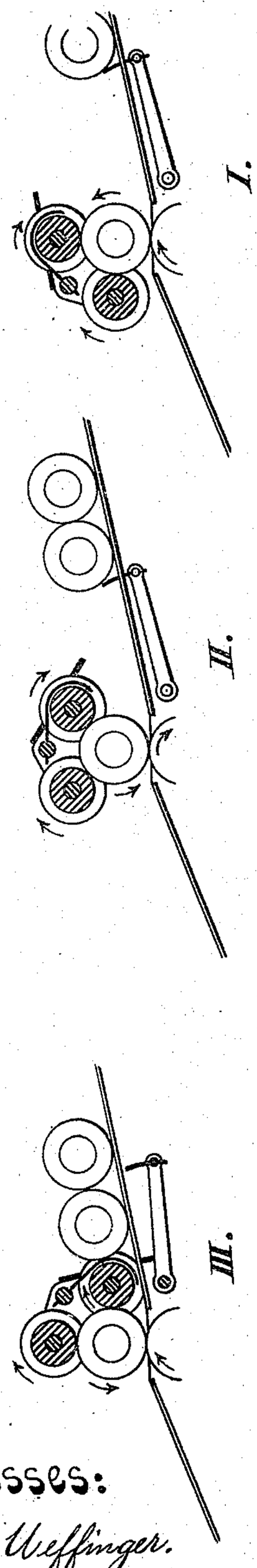

Fig. 12.

I.

II.

III.

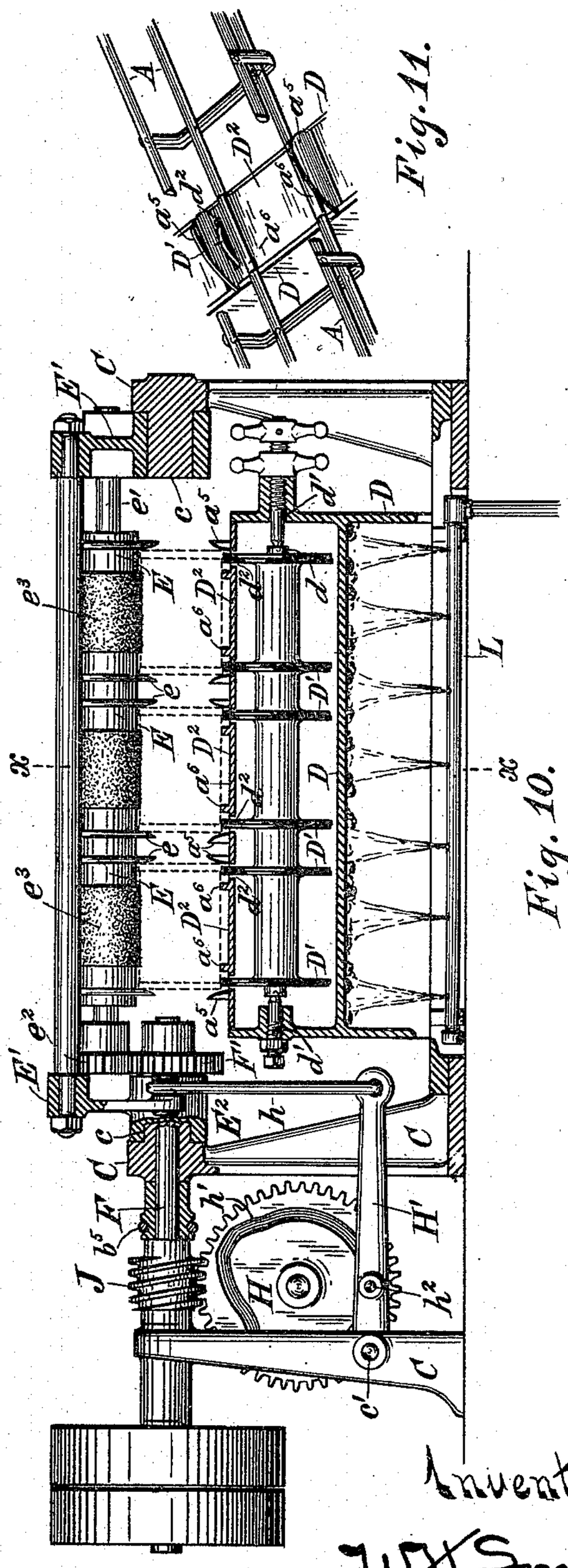

Fig. 11.

Fig. 10.

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CAN SOLDERING MACHINE.

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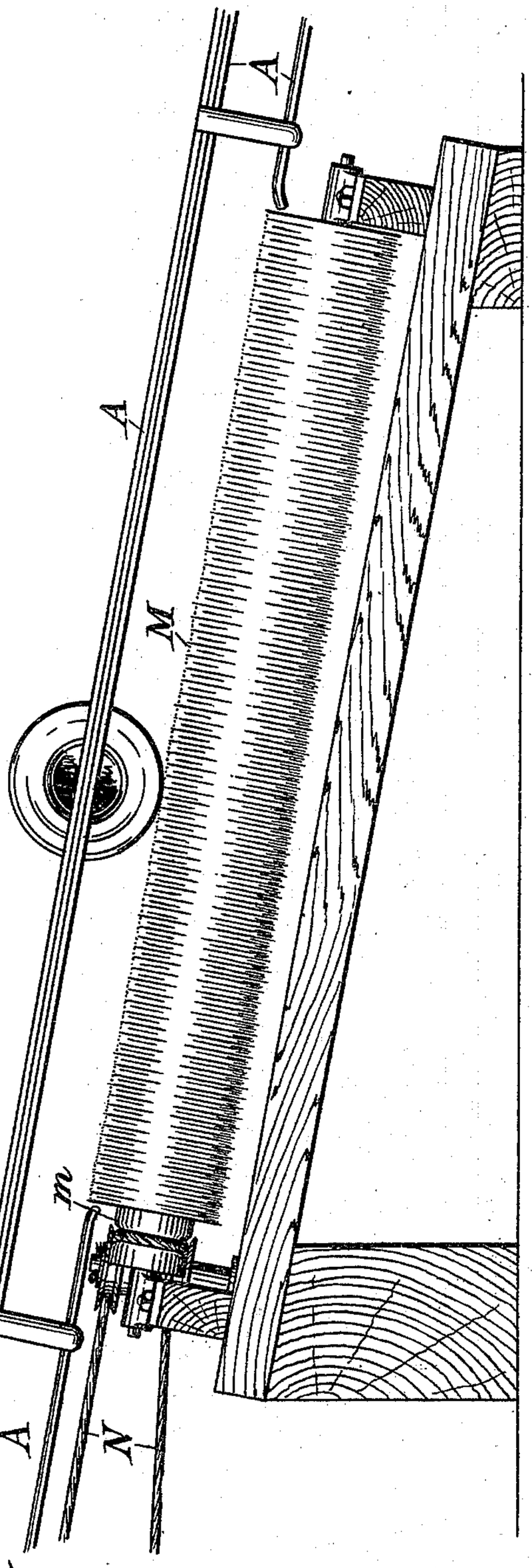

Fig. 13.

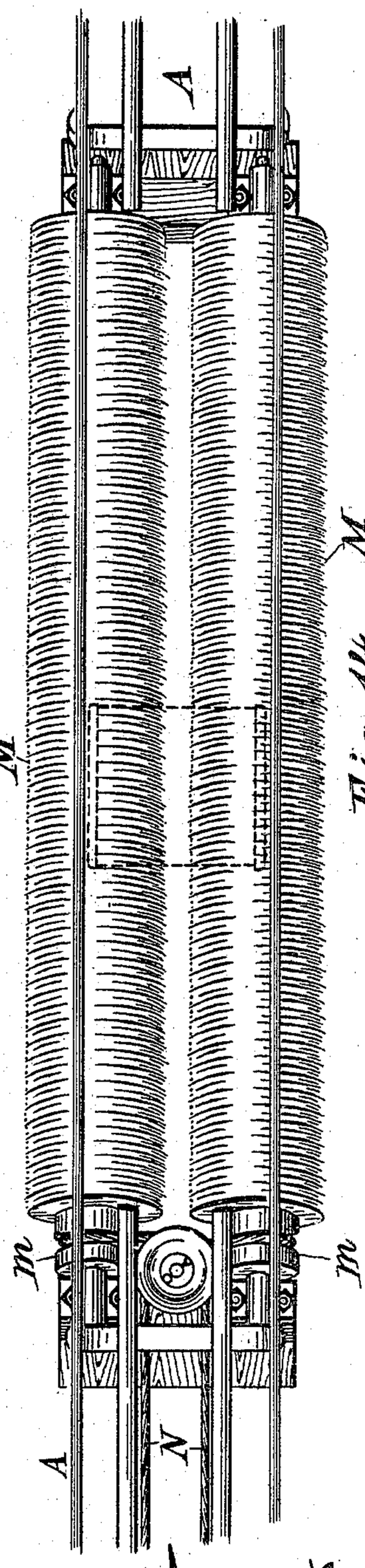

Fig. 14.

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CAN SOLDERING MACHINE.

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Fig. 15.

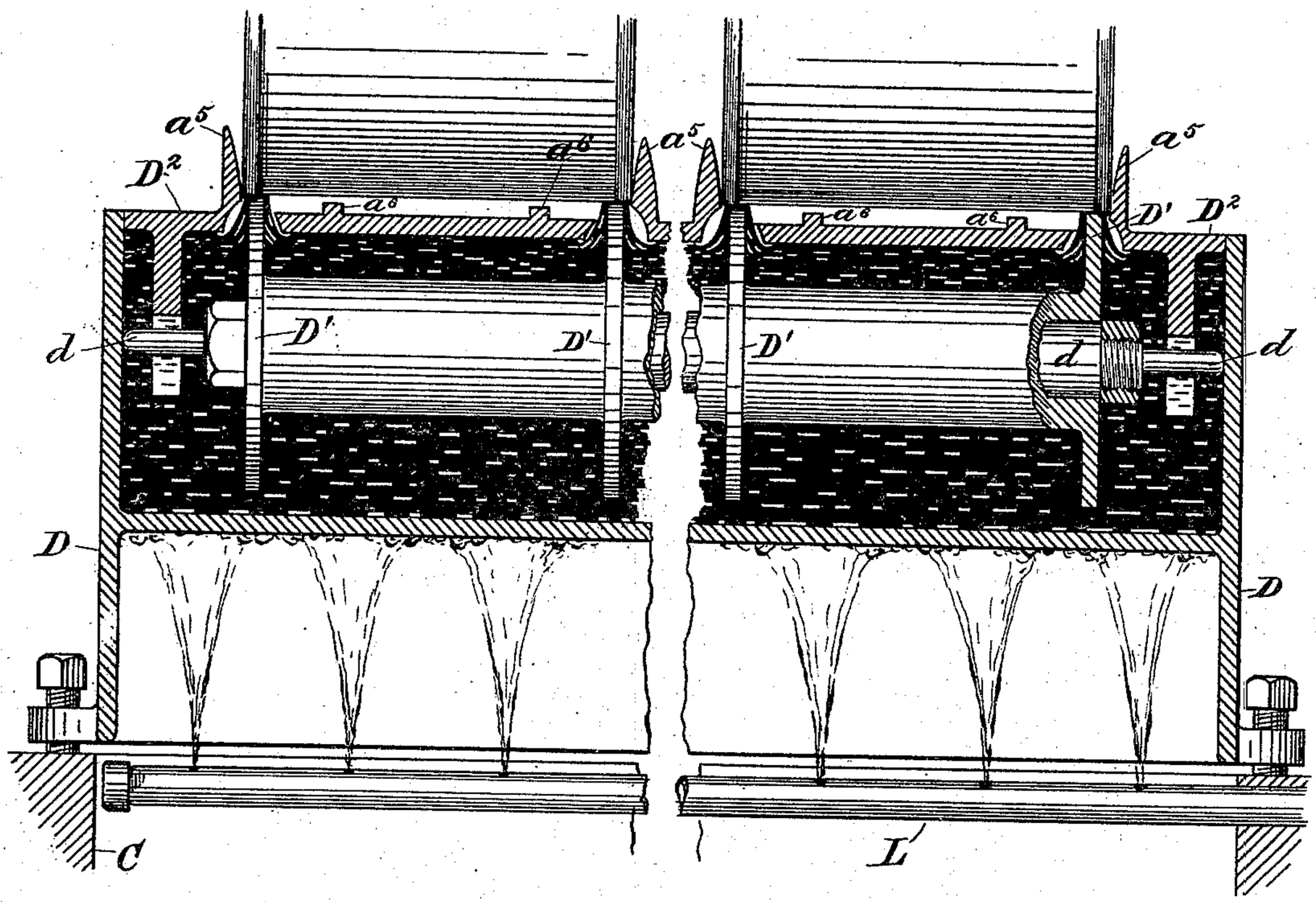


Fig. 16.

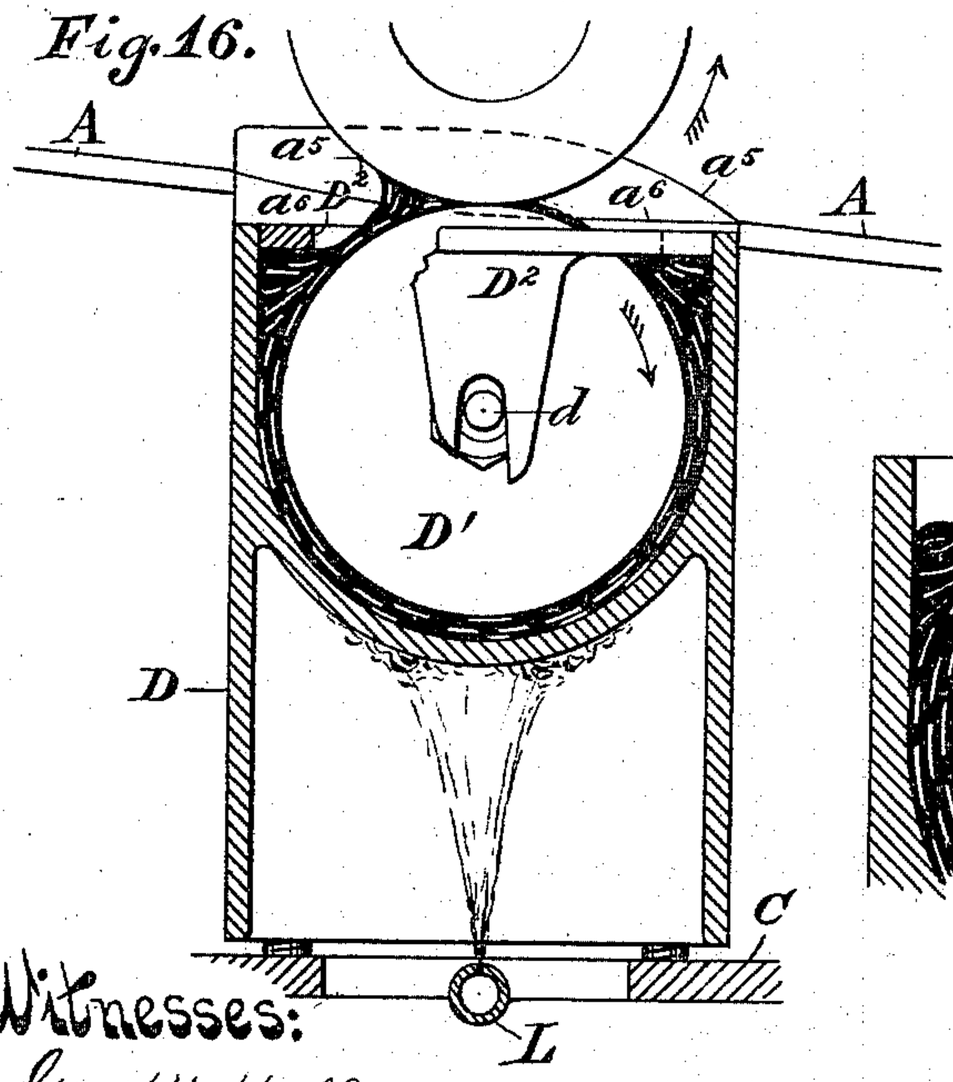
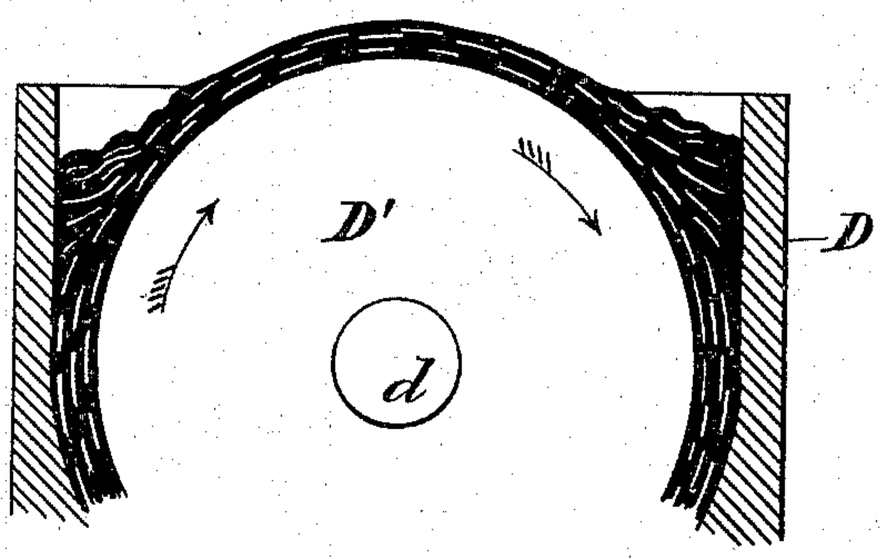


Fig. 17.



Witnesses:
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Inventor.
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UNITED STATES PATENT OFFICE.

WILLIAM HENRY SMYTH, OF BERKELEY, CALIFORNIA.

CAN-SOLDERING MACHINE.

SPECIFICATION forming part of Letters Patent No. 573,423, dated December 15, 1896.

Application filed October 24, 1893. Serial No. 489,050. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HENRY SMYTH, a citizen of the United States, and a resident of the town of Berkeley, in the county of Alameda and State of California, have invented an Improvement in Can-Soldering Machines, of which the following is a specification.

My invention relates to the class of machines for soldering the heads or covers on cans.

It consists, essentially, of feed and discharge runways adapted to marshal cans to and from axial alinement from and into single file in the direction of their diameters, flux and solder applying rolls or disks, and means for rotating cans in contact therewith, and solder-joint wipers and finishers for smoothing and removing excess of solder from the joints.

It also consists in the novel constructions and combinations hereinafter fully described and specifically claimed.

The object of my invention is to provide a simple, effective, and rapidly-operating machine for handling and soldering cans upon a large scale.

Referring to the accompanying drawings, Figure 1 is a side elevation of the marshaling devices to and from the solder-applying portion of the machine, which is shown sufficiently for this figure in general outline. Fig. 2 is a plan of the same. Fig. 3 is an enlarged detail of pivoted section of marshaling-tracks in perspective. Fig. 4 is an enlarged detail of trap of marshaling-tracks, shown in perspective. Fig. 5 is a sectional elevation on line X X, Fig. 10, of head soldering and fluxing portion of the machine. Fig. 6 is a side elevation of Fig. 5. Fig. 7 is an enlarged detail in section, showing section of solder-pot with solder disk and wiper. Fig. 8 is a detail in perspective of solder disk and wiper. Fig. 9 is a plan of fluxing and head-soldering portion of the machine, showing portion of the marshaling-tracks. Fig. 10 is a section on line Y Y of Fig. 9. Fig. 11 is an enlarged detail in perspective of track crossing solder-pot cover. Fig. 12 shows diagrammatic views, numbered I, II, III, of the successive positions of the feed and can-rotating rolls when receiving, operating on, and discharging a can. Fig. 13 is a side elevation of the solder-joint finishing and wiping device. Fig. 14 is a plan view of the same. Fig. 15 is an enlarged sectional elevation of solder-pot, showing the solder-disks floating in the molten solder, also the manner in which they are guided. It is shown as being broken to permit of being drawn on a large scale. Fig. 16 is an end view of floating solder-disk and a guide for the shaft on which it is secured. This view also shows how the solder is carried up in a wave against the can. Fig. 17 is an enlarged section across part of the solder-pot, showing the mound or wave above the surface of the solder, as determined at the edge of the bath, which is formed by the rotation of the solder-disk.

The main runway A is provided with an opening or trap *a*, extending across its width and of sufficient size to receive a can. (Shown clearly in Fig. 4.) This trap communicates with and forms the end of a second runway A′, also provided with a similar trap *a′*, which in turn communicates with and forms the end of a third runway A^2. Each successive runway between its opening and the operating device which it feeds is preferably straight in plan and parallel, except where divergence or convergence is necessary to join, with its neighbor, but variously inclined in elevation to permit each successive branch passing from under its parent runway, the series ending on the same level at the operating device to which the end of the combined runway is secured. This combined runway, as shown in Figs. 1 and 2, leads up to and through the device which operates on the cans and is so constructed that the runway A^2 leads into and over the runway A′, as shown in Fig. 2 and in enlarged detail in Fig. 3. At the point of junction of these two runways is a pivoted section a^2, the inner end of which is journaled in the track-frame of A^2. To the pivot of a^2 is secured the counterbalance a^3. Beyond this pivoted section of runway A^2 runway A′ crosses over and into runway A, and at their point of junction is provided a pivoted section a^4, which is similar to that already described and is represented in Fig. 3.

The runway A is straight in plan and of such an incline in elevation that the speed of the can in this runway after being ejected from the soldering-disks is continually accelerated. In the second runway A′ the speed of the can is retarded, owing to the curved

paths of A′ in plan and its less incline. In the third runway A^2 the retarding effect is still more pronounced, owing to its still greater curvature and less incline, so that when the cans all reach the runway A in single file there is a distance of several feet between them.

The fluxing device, which receives its supply of cans from the combined tracks, consists of a box or receptacle B (shown in Figs. 5 and 9) for the fluxing fluid. In this receptacle is a series of rolls or disks B′, secured upon a shaft *b*, which is loosely journaled on suitable bearings *b*′, Fig. 9, in this flux pot or receptacle. These disks are arranged in pairs, suitably spaced to engage the tops and bottoms of cans, and are preferably supplied with tires or laggings of wicking or other absorbing material. (Shown at b^2, Fig. 9.) Above these fluxing-disks and in suitable position to engage cans is a series of rotating driving-rolls B^2, provided with frictional bearing-bands b^4, preferably of an elastic nature, and also provided with flanges b^3. (Shown in Figs. 5 and 9.) These flanges b^3 are suitably spaced to register the cans so that the joint of their tops and bottoms with the body may properly register with the flux-applying disks. These driving-rolls B^2 are secured upon a shaft B^3, journaled in a suitable bearing. Upon one end of this shaft is secured a driving-pulley B^4, which is connected by any suitable power connection with a rotating portion of the machine. I have shown for this purpose the pulley B^4, grooved on its periphery and driven by a round belt b^5 from the main shaft of the soldering device, Fig. 9. This soldering device consists of a solder-pot D, in which a series of solder-applying disks D′ are immersed. (Shown in Figs. 5, 7, and 10.) These solder-applying disks are secured upon a shaft *d*, which is borne loosely upon suitable bearings *d*′ in the solder-pot. These bearings may be of any suitable description. One form I have illustrated in Fig. 10, which represents the shaft *d* as being loosely supported upon centers, but I have found in practice that these bearings may be entirely dispensed with and the shaft with its disks allowed to float freely in the solder, being simply restrained by suitable guards from other than vertical motion, thus providing a soft yielding pressure against the can. This is all clearly shown in Figs. 15 and 16, in which the restraining-guards are shown as slotted guides depending from the cover of the pot. The shaft *d*, as is shown in the various views, is entirely below the surface of the solder, so that the major segments of the disks are consequently below the solder-surface. This arrangement, which is one of the essential features of this invention, conserves important ends, which will hereinafter be described. The solder-applying disks D′ are suitably spaced upon their bearing-shaft *d* to engage with the joints of the tops and bottoms of cans, as illustrated in Fig. 10, wherein cans are shown with dotted lines in position to be operated on. In some cases I have found it advisable to limit the amount of solder applied to the cans and to wipe off any excess of solder which may have been so applied, and for this purpose wipers G are provided, Figs. 7, 8, and 5. These wipers consist of flat strips notched, as shown in Fig. 8, to embrace the edge of each solder-applying disk. They are secured to a frame G′, which is pivoted concentrically with the solder-applying disks. This frame is suitably connected to the driving mechanism to be raised and lowered above and below the surface of the solder. These connections consist, Fig. 7, of the link *g*, the rock-arm *g*′, shaft g^2, and lever g^3, which is suitably engaged with driving-cam H to operate during a portion of the revolution of the said cam.

To feed the cams into operative contact with the solder-applying disks and discharge the cans when soldered, two parallel series of driving-rolls E are provided. These rolls E are provided with flanges *e*, suitably spaced to register the cans with reference to the solder-disks. Each series of rolls E is secured upon shafts *e*′ *e*′, which are loosely journaled in a rocking frame E′. (Shown in Fig. 10 and also in Figs. 5, 6, and 9.) This rocking frame is loosely pivoted or journaled upon the frame C at *c*, the axis of its pivotal motion being the center of the axially-alined cans when in process of being operated upon, Figs. 5 and 6. To rotate these can-driving rolls E, the shafts upon which they are secured are furnished with gears e^2 e^2, which mesh with a driving-gear F′, secured upon the driving-shaft F, which is journaled in the frame C concentrically with the axis of the rocking frame E′. On the outer end of this shaft are provided tight and loose pulleys or other suitable power connections for giving it rotary motion.

The rolls E are provided with soft or elastic coverings e^3. (Shown in Figs. 9 and 10.)

The solder-pot, in which the solder-applying disks are immersed, is provided with covers D^2, each of which has two slits or openings d^2, through which the solder-disks extend, Figs. 11 and 10. Each cover is also provided with tracks a^6 and guides a^5, which together form a continuation and connection of the compound runways to and from the soldering device, Figs. 11, 5, and 10.

To heat the solder-pot and melt the solder, a suitable heating device L is provided, shown herein as gas and air pipes with a perforated burner-pipe, though any other suitable heating device may be employed, Figs. 5 and 10.

To operate the rocking frame, any suitable means may be employed. The one I herein show consists of a pivoted lever H′, which is pivotally connected to the frame C at *c*′. Its other end is engaged with the lower end of a link *h*, Fig. 10, whose upper end is loosely connected to a crank-pin E^2, Figs. 5 and 2.

To give suitable motion to this rock-arm H′, a cam-groove h', suitably curved, is provided, which engages with and drives a cam pin or roller h^2. (Shown in Fig. 10.) The nature of the groove in the cam H is such that a motion is given, through the connections just described, to the rocking frame E′ and rollers E, so that they assume successively the positions illustrated in the diagrams in Fig. 12, with suitable time intervals to properly effect their functions. The cam itself is driven by means of its engagement through the worm-teeth on its periphery with the worm J, secured upon the main driving-shaft.

To regulate the feed of the cans, a stop, Figs. 5 and 6, is provided, which consists of a frame I, pivoted to the frame C at i. A rod i', Fig. 9, which connects the end levers of this frame, is provided with pins or stops i^2, which project upward and normally extend above the surface of the compound runways in the path of the cans. To operate this stop the tappet I′, Fig. 9, is provided, secured to the rocking frame E′.

Guards or fenders K are provided, partly encircling the rolls E, as clearly shown in Figs. 5 and 9 and diagram 12.

The device for finishing the soldered cans and making the soldered joint a clean and workmanlike job consists of two parallel buffing-rolls M M, preferably of soft textile material. These buffing-rolls M M are placed longitudinally in the discharge-runway A, as shown in Figs. 13 and 14, near the discharge end of the compound runway and are driven by any suitable power connections. I have shown for this purpose a rope belt N, passing around the grooved pulleys m m on the shaft of each buffing-roll. This rope may be driven by any suitable source of power.

The operation of my device is as follows: The cans already having the tops and bottoms applied being deposited, either by hand or by the heading-machine, in the upper extension of the runway A, beyond the trap or opening a, Figs. 1 and 2, in continuous succession or single file, roll down the said runway till each in turn reaches the trap or opening a, into which it falls and is deflected by the curved portion of the runway A′ to the trap or opening a', through which it falls into runway A^2. This series of operations proceeds until runway A^2 is filled completely with cans. Then the last which falls into the trap a' serves to close this trap and forms a bridge across the opening a', over which the next and each successive can will pass into the lower portion of runway A′ till this in turn is filled to trap a, when the last can will serve as a bridge, as before, and succeeding cans will roll directly down runway A, as described with reference to runway A′. When the compound runway or marshaling device is filled, the leading transverse row of cans is in axial alinement.

For convenience of description it will be assumed that the soldering and fluxing devices have not been in operation until the compound runway is completely filled, though this is not customary in practice. With this assumption in view, and the main shaft now in motion, the following operation will take place: The rotation of the cam H through the engagement of the worm J and the teeth on the periphery of the cam will transmit motion to the arm H′, which in turn, through its connecting-link h, transmits rocking motion to the pivoted frame E′, causing it to assume the position represented in diagram III, Fig. 12. This motion of the rocking frame E′ brings the tappet I′ into engagement with the frame I, thereby depressing its stop-pins i^2 and so permitting the cans to roll down the compound runway against the fenders K. (Shown in diagram III, Fig. 12.) Continued motion of the cam causes the rocking frame E′ to assume the position of diagram I, Fig. 12, which permits the leading transverse line of cans to roll down and upon the soldering-disks, their engagement with which is facilitated and insured by the rotation of the rolls E in the direction shown by the arrows in the diagrams, which not only facilitates the ingress of the cans, but also their discharge when soldered. Continued motion of the cam H causes the rocking frame E′ to assume the position of diagram II, Fig. 12, in which position the solder is applied by means of the disks d^2, the rotation of these disks being effected by the rolls E through the intervention of the cans. Owing to the fact that the disks project but slightly above the solder-surface and rotate quite rapidly, the surface of the molten solder in proximity with the disks is raised in a mound or wave by the centrifugal action of the rotating disk to some little height above the general surface of the solder and disks, and it is this wave or mound of molten solder much more than the simple contact of the disks with the can which makes this device so efficient in applying the liquid metal. Other objects of immersing the disks so that their shaft axis and major segment are below the surface of the solder are to overcome the several difficulties which are experienced if the disks project more than half their diameter above the solder—namely, that the disk being largely exposed to the air permits oxidation of the solder on the exposed surface, thereby forming a coating of dross, so preventing "wetting" of the disk by the molten solder, thus reducing the efficiency of the disk to carry solder; also, rapid loss of heat takes place from the exposed surface, so that good and smooth work is impossible; and, further, moderately-rapid rotation of a disk projecting above the solder more than half will cause the solder to be thrown off at various tangential angles, so that high speed, which is essential to good and economical work, is impossible. With my invention the axis of the shaft upon which the disks are secured being below the surface and the disks themselves projecting but slightly above the

surface the action in all these particulars is entirely different and all these difficulties, which are serious ones, disappear. The disks in my machine when in operation are, in fact, not exposed at all, being, on the contrary, covered by a thick wave of unbroken solder which rolls against the can, and in effect is the same as though the can were dipped below the surface of the solder, with the advantage of putting any limited part of the can so below the surface of the molten solder. This is clearly shown in Figs. 10, 11, 5, 7, 15, 16, and 17. Further motion of the cam II, and the rocking frame E′ again assumes the position of diagram III, Fig. 12, and the leading row of cans is discharged. During the latter part of the operation of the soldering the bar G′, with its wipers G, is raised above the level of the solder by means of its engagement with cam II. This wipes the solder from the rolls, which in consequence during this portion of their operation simply rotate as hot disks in contact with the soldered joint and operate to sweat the solder into the joint and carry off any excess which may have been applied thereto. The tracks a^6 and guides a^5 on the cover D^2, together with the flanges on the rolls E, assist and facilitate the passage of the cans through the machine and their accurate registering with the solder-disks. While this soldering operation is in process and the lines of cans are held back, the fluxing of the cans preparatory to soldering is accomplished in the manner following: The driving-rolls B^2 of the fluxing device being in rotation by the engagement through the power connection with the main shaft cause the line of cans to rotate by frictional contact with their peripheries and thereby effect the rotation of the fluxing-disks, which, being immersed in the flux, deposit it on the cans. The application of solder to the cans being completed and they discharged from the soldering device and being so discharged in axial alinement it becomes necessary for further convenient and economical manipulation of the cans to remarshal them into single file. For this purpose the device illustrated in Figs. 1, 2, and 3 is provided, which consists of a compound runway comprising the number of component runways equal to the number of cans the machine is adapted to solder simultaneously. This compound discharge-runway is similar in many respects to the compound feed-runway, but having a reverse action. The runway A^2 discharges into runway A′, and runway A′ in turn discharges into runway A. When the cans come from the soldering device, the solder remains molten on the cans for some little time, and it is therefore essential that they receive no jars or shocks or be stopped from continual rotation till the solder is set, as this is apt to cause the tops and bottoms to fall off. To effect this purpose, the pivoted counterbalanced sections a^2 and a^4 are provided, which offer no obstruction to cans rolling on the lower runway, and, further, give an incline for a can to run down from an upper to a lower runway. The end a^2 is normally in the position therein shown, Fig. 3, being held so by the counterbalance-weight a^3. When a can rolls into the end a^2, the end is borne down thereby to the inclined position, as stated above, but immediately returns to its normal position when the can has passed over it. The cans are now in single file and in suitable position to receive the finishing operation on the soldered joints, which consists of wiping, smoothing, and polishing the joints while the solder is still molten, so as to leave the can in a bright, smooth, and finished condition, and incidentally to remove and save any lumps or excess of solder which may remain on the can. This is accomplished by the parallel buffing-rolls M, Figs. 13 and 14, over which the can rolls, thereby receiving a continual wiping and polishing without a stop or delay being made for this purpose in its journey from the solder-applying device. After rolling over this finishing device the can continues on in its runway to be delivered at any suitable discharge-place.

It is of course evident that this device is not limited in capacity to that shown in the drawings, which has simply been shown for convenience of illustration as capable of operating on three cans simultaneously. The machine can be made of practically any width and consequent capacity. It will further be seen that though on account of the character of this soldering-machine a device for marshaling cans to and from single file from and into axial alinement is absolutely necessary to its practical and proper working the mechanism I employ for this purpose is not solely applicable to the can-head-soldering machine, but might be used in any place where it is desirable for any purpose to arrange cans to and from single file from and into axial alinement.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A gravity-runway adapted to marshal cans from single file into multiple series.

2. A gravity-runway adapted to marshal a multiple series of cans into single file.

3. A marshaling device comprising means adapted to utilizing a can whereby the course of a traveling can is changed.

4. In a machine for operating on cans and other cylindrical bodies a device for marshaling cans consisting of a multiplicity of tracks or runways each component track emerging from its next preceding neighbor and a drop or opening which forms the means of supply from each runway to its next succeeding neighbor.

5. In a machine for operating on cans and other cylindrical bodies, a device for marshaling cans consisting of a multiplicity of tracks each component track merging into its succeeding neighbor and at the point of

mergence being provided with a pivoted section.

6. A feeding device adapted to marshal cans from single file into axial alinement.

7. A machine comprising a feeding device adapted to marshal cans from single file in the direction of their diameters into axial alinement, a device for operating upon the cans while so alined, and a discharging device adapted to marshal cans from axial alinement into single file in the direction of their diameters.

8. A machine for operating upon cans, comprising a soldering device and a feeder thereto adapted to marshal cans from single file in the direction of their diameters into axial alinement.

9. In a machine for operating upon cans and other cylindrical bodies a discharging device adapted to marshal cans from axial alinement into single file in the direction of their diameters.

10. A machine comprising a soldering apparatus and a discharging device adapted to marshal cans from axial alinement into single file in the direction of their diameters.

11. In a machine for operating upon cans and other cylindrical bodies the combination of a feeding device adapted to marshal cans from single file in the direction of their diameters into axial alinement, means for rotating the cans and a discharging device adapted to marshal cans from axial alinement into single file in the direction of their diameters.

12. A machine comprising a feeding device adapted to marshal cans from single file in the direction of their diameters into axial alinement a soldering device adapted to operate upon the alined cans and a device adapted to marshal the discharged cans from axial alinement into single file in the direction of their diameters.

13. A machine comprising a device adapted to solder a multiplicity of cans simultaneously and a feeding device adapted to marshal cans from single file in the direction of their diameters into axial alinement and to feed them to the soldering device.

14. A machine comprising a soldering device adapted to solder a multiplicity of cans simultaneously, a feeding device adapted to feed cans to said multiple soldering device and to marshal them from single file into axial alinement, and a discharging device adapted to discharge the cans when soldered and marshal them from axial alinement into single file in the direction of their diameters.

15. A machine comprising a solder-bath and means for applying solder to cans, and a feeding device adapted to marshal cans from single file in the direction of their diameters into axial alinement and position to receive solder.

16. A machine comprising a solder-bath and means for applying solder to cans, a feeding device adapted to marshal cans from single file in the direction of their diameters into axial alinement and a device adapted to discharge said cans when soldered and to marshal them from axial alinement into single file.

17. A machine comprising a series of rotating solder-applying disks upon a shaft, means for applying solder to said disks, a feeding device adapted to feed a multiplicity of cans simultaneously to the soldering-disks and means for discharging the cans simultaneously and marshaling them from axial alinement into single file.

18. A machine comprising a series of rotating solder-applying disks means for supplying solder to the disks, and a feeding device adapted to marshal cans from single file into axial alinement and position to receive solder.

19. A machine comprising a series of rotating solder-applying disks, means for applying solder to said disks, a feeding device adapted to marshal cans from single file into axial alinement and position to receive solder, and a discharging device adapted to marshal cans from axial alinement into single file.

20. A machine comprising a series of rotating disks, a solder-bath in which the disks are partly immersed a device adapted to marshal cans from single file in the direction of their diameters into axial alinement and to feed a multiplicity of cans simultaneously to the solder-disks.

21. A machine comprising a series of rotating solder-applying disks, a feeding device adapted to marshal cans from single file in the direction of their diameters into axial alinement and to feed a multiplicity of cans simultaneously to the solder-disks, a solder-bath in which the disks are partly immersed, and means for discharging the cans simultaneously when soldered.

22. A machine comprising a device adapted to solder a multiplicity of cans simultaneously, means for marshaling cans from single file in the direction of their diameters into axial alinement and feeding said cans to the soldering device and means for discharging the cans simultaneously when soldered.

23. A machine comprising flux and solder applying devices and means for feeding a multiplicity of cans thereto and marshaling them from single file in the direction of their diameters into axial alinement.

24. A machine comprising flux and solder applying devices, means for marshaling cans from single file in the direction of their diameters into axial alinement and feeding said cans to the flux and solder devices, and means adapted to receive the cans when soldered and marshal them into single file.

25. A machine comprising means for marshaling cans from single file in the direction of their diameters into axial alinement, a series of flux-applying rolls and means for rotating cans in contact therewith, a series of solder-applying disks and means for rotating cans in contact therewith and a device adapted to receive the cans and marshal them into single file.

26. A machine comprising flux-applying disks and means for rotating cans in contact therewith solder-applying disks and means for applying rotating cans in contact therewith, means for marshaling cans from axial alinement into single file in the direction of their diameters, and a device adapted to remove excess of solder from the cover-joints of the cans.

27. A machine comprising feeding fluxing and soldering devices adapted to operate upon a multiplicity of cans simultaneously to flux the tops and bottoms, a device adapted to marshal the soldered cans from axial alinement into single file and a device adapted to remove the excess of solder from the top and bottom cover-joint simultaneously of each.

28. A soldering-machine comprising a molten-solder bath and means whereby a portion of the liquid solder is formed into a wave or mound above the surface as determined at the edge of the bath and automatic means for applying objects in contact therewith and discharging them from the raised portion of the solder-surface.

29. A soldering-machine comprising a molten-solder bath and means whereby a portion of the liquid solder is formed into a wave or mound above the surface as determined at the edge of the bath and means for applying objects in contact therewith.

30. A soldering-machine comprising a molten-solder bath, means whereby a portion of the surface is formed into a wave or mound and means for rotating cans in contact therewith.

31. A machine comprising a molten-solder bath and means for forming a series of waves or mounds above the surface of the solder therein and automatic means for feeding to and applying objects in contact therewith and discharging them therefrom.

32. A machine comprising a molten-solder bath and means for forming a series of waves or mounds above the surface of the solder therein, automatic means for feeding cans to and accurately registering their seams with the raised portion of the solder-surface, and discharging them when soldered.

33. A soldering-machine comprising a floating device adapted to convey and apply solder contained in a molten-solder bath.

34. A solder-applying device which presses against the object soldered by floatage.

35. A connected series of soldering devices adapted to convey and apply solder to a multiplicity of cans simultaneously and to derive from floatage pressure necessary to perform its function.

36. A machine comprising a floating solder conveying and applying disk in a bath of solder.

37. A soldering-machine comprising a rotatable solder conveying and applying disk floating in a bath of solder.

38. A machine comprising a series of floating solder-applying disks upon a shaft in a bath of solder.

39. A machine comprising a series of rotatable solder-applying disks floating in a solder-bath and means for applying the joints of cans in contact therewith.

40. A machine comprising a molten-solder bath a solder conveying and applying disk therein the major segment of which is below the surface of the solder.

41. A machine comprising a solder-bath containing a series of solder-applying disks upon a shaft the axis of which is below the surface of the solder.

42. A machine comprising a receptacle for molten solder means adapted to rotate a can horizontally above the solder and means for applying solder in a stream continuous with the solder-bath to the can.

43. A soldering-machine comprising a molten-solder receptacle and a device adapted to apply the solder in a stream or wave continuous with the solder in the receptacle to a horizontally-rotating can above said receptacle.

44. A machine comprising a molten-solder receptacle and a device adapted to support and apply solder in a stream or wave continuous with the solder in the receptacle to a horizontally-rotating can above said receptacle.

45. A soldering-machine comprising a molten-solder receptacle provided with means for heating solder, and tracks or courses adapted to support a can horizontally and means for applying solder in a stream continuous with that in the bath to the can while so horizontally supported.

46. A soldering-machine comprising a molten-solder receptacle provided with means for heating solder and inclined tracks or courses adapted to support a can with its axis horizontal and means for applying solder to said can while so horizontally supported.

47. A soldering-machine comprising a molten-solder receptacle provided with means for heating the solder, a cover and means through the cover of applying solder to a can.

48. A soldering-machine comprising a molten-solder receptacle having means for heating the solder a cover to said receptacle adapted to support horizontally and means for applying solder through said cover to a can.

49. A soldering-machine comprising a solder-receptacle with heating device, a cover to the receptacle provided with tracks or courses adapted to support a can horizontally above said solder and means for applying solder in a stream continuous with that in the bath to the can.

50. A soldering-machine comprising a solder-receptacle with heating device a cover thereto provided with tracks or courses adapted to support and guide a can its axis horizontal, runways to and from said cover forming continuation of said tracks.

51. A rotating disk adapted to apply solder

and to derive its rotation from the object upon which it applies solder and a solder-bath in which it is partly immersed provided with suitable heating device.

52. A rotating disk adapted to apply solder to and derive its rotation from frictional contact with the object to which it applies solder and a solder-bath in which it is partly immersed provided with heating devices for melting solder.

53. A soldering-machine comprising a rotating disk adapted to apply solder to cans and to derive rotary motion therefrom a bath of solder in which it is partly immersed provided with heating devices for melting solder.

54. A soldering-machine comprising a rotatable disk adapted to apply solder to and derive rotary motion from the rotation of a can in contact therewith, a bath of solder in which the disk is partly immersed and heating device for melting solder.

55. A soldering-machine comprising a rotating disk adapted to apply solder to and receive its rotation from a can by frictional contact therewith and a bath in which the disk is partly immersed provided with a heating device to melt solder.

56. A soldering-machine comprising a rotating flux-applying disk a flux-pot in which the disk is partly immersed means for rotating the can in peripheral driving contact with the flux-applying disk, and a solder-applying device connected by a runway with the fluxing device and having means whereby the cans are received and automatically fed to the soldering devices.

57. A machine comprising means for fluxing a multiplicity of cans in axial alinement simultaneously, means for feeding a multiplicity of cans simultaneously to said fluxing device, and a soldering device adapted to solder a multiplicity of cans simultaneously.

58. A machine comprising a series of rotating disks, a flux-pot in which said disks are partly immersed, means for rotating a multiplicity of alined cans in peripheral contact with the flux-disks, a solder-bath and means for applying solder therefrom to the fluxed portion of said cans.

59. A machine comprising a series of rotating disks, a flux-pot in which said disks are partly immersed, means for rotating a multiplicity of axially-alined cans in peripheral contact with the flux-applying disks, a series of solder-applying disks and a solder-bath in which they are partly immersed and spacing and registering devices and means for rotating a multiplicity of cans in peripheral contact with the solder-disks.

60. A machine comprising a fluxing device adapted to flux the top and bottom simultaneously of each of a multiplicity of cans simultaneously, a soldering device adapted to apply solder to the tops and bottoms of a multiplicity of cans simultaneously and means for registering and spacing the cans with the fluxing and soldering devices.

61. A machine comprising means for applying flux to the cover-joints of the tops and bottoms of a multiplicity of cans in axial alinement, and means for registering and soldering the tops and bottoms on cans in axial alinement simultaneously.

62. A machine comprising a soldering device, means adapted to utilize the weight of a can for advancing said can and means for removing excess of solder from the can while being advanced by its own weight.

63. An inclined runway provided with means for removing excess of solder from cans while advancing by gravity.

64. A runway provided with tracks for supporting cans consisting of longitudinal brushes or wipers adapted to advance a can.

65. A gravity-runway for cans formed of inclined longitudinal brushes set parallel to each other.

66. A runway for cans formed of inclined longitudinal rotating brushes set parallel to each other.

67. A runway for cans formed of inclined rotating brushes set parallel to each other and spaced to rotate in contact with the top and bottom of a can.

68. A soldering-machine comprising means for applying solder to a can and means adapted to advance a can by gravity and to remove excess solder therefrom.

69. A machine comprising means for applying molten solder to the head-joint with the body of a can, a discharge-way adapted to receive the soldered can and convey it from the solder-applying devices and means adapted to advance a can by gravity for removing the excess solder while the can is rolling by gravity.

70. A machine comprising a device adapted to solder both top and bottom simultaneously on a can and a device adapted to remove the excess solder and means intermediate of the soldering and excess-removing devices for directing the can from one device to the other and registering the top and bottom in contact with the solder-removing device.

71. A machine comprising means for soldering a top and bottom simultaneously on each of a multiplicity of cans with means for registering the cans with the soldering devices an inclined rotating buff or brush the axis of which lies transverse to the axis of the can and means for rotating the cans in peripheral contact with the rotating brush.

72. A machine comprising means for applying solder to the top and bottom simultaneously of a can and a solder-joint-finishing device consisting of inclined parallel rotating brushes or wipers their axis lying parallel to the path of the cans discharged from the soldering devices and means for rotating cans in peripheral contact with the rotating brushes.

73. A machine comprising means for soldering the top and bottom simultaneously on a can and a discharge-runway provided with a

solder-joint-finishing device consisting of inclined parallel rotating brushes or wipers located beneath the path of the can spaced to come in contact, one with the top and the other with the bottom as the can rolls down the discharge-runway.

74. A machine comprising flux and soldering devices adapted to perform their functions on the top and bottom of a can simultaneously and a solder-joint-finishing device consisting of two parallel inclined rotating brushes or wipers adapted to remove excess solder from the top and bottom joints of a can simultaneously.

75. A machine comprising means for fluxing and soldering the top and bottom simultaneously of a can and a finishing device adapted to remove the excess of solder from the top and bottom of a can simultaneously.

76. A machine comprising means for feeding a multiplicity of cans simultaneously devices adapted to flux the top and bottom of each and all simultaneously and a finishing device adapted to finish and remove excess of solder from both ends of each can simultaneously, and connections intermediate of the soldering and finishing devices for directing cans from one device to the other and register both ends with the soldering devices.

77. A machine comprising flux-applying disks and means for rotating cans in peripheral driving contact therewith, solder-applying disks and means for rotating cans in peripheral contact therewith and a rotating solder-removing device combined.

78. An oscillating frame, in a runway having tracks or courses to guide a rolling can, adapted by its movement to receive said can and to carry it to position to be operated upon.

79. An oscillating frame, in a runway having tracks or courses to guide a rolling can, adapted by its movement to receive said can and to carry it to position to be operated upon and discharge the same.

80. An oscillating frame, in a runway having tracks or courses to guide rolling cans, adapted by its movement to receive said multiplicity of cans and to carry them into position to be operated upon simultaneously.

81. An oscillating frame, in a runway having tracks or courses to guide a rolling can adapted by its movement to receive said can and carry it into position to be soldered, and a soldering device combined.

82. An oscillating frame in a runway having tracks or courses to guide a rolling can, adapted to receive said can and to carry it into position to be soldered, and a solder-applying disk combined.

83. A machine comprising an oscillating frame in runways having tracks or courses to guide rolling cans adapted to receive said cans and to carry them into position to be soldered, and a soldering device adapted to solder a multiplicity of cans simultaneously.

84. A machine comprising an oscillating frame adapted to feed cans into axial alinement near its center of oscillation and discharge them therefrom, and means for rotating said cans while so alined.

85. An oscillating frame provided with a rotating roll adapted to rotate a can near its center of oscillation.

86. An intermittently-oscillating frame provided with a rotating roll adapted to receive a can near its center of oscillation and means for holding said can while being there rotated.

87. An intermittently-oscillating frame provided with a rotating roll adapted to rotate a can near its center of oscillation, means for feeding the can to and retaining it thereat and discharging therefrom.

88. An oscillating frame provided with a rotating roll adapted to rotate a can near its center of oscillation and a second roll placed to impinge in rolling contact upon the periphery of a can so located.

89. An oscillating frame provided with rotating rolls whose axes are parallel, adapted to rotate a can near their center of oscillation and a third roll or disk adapted to impinge in rolling contact upon the periphery of the can.

90. An oscillating frame provided with a series of rotating rolls adapted to rotate a multiplicity of cans near the center of oscillation.

91. An oscillating frame provided with a parallel series of rotating rolls adapted to rotate near its center of oscillation a multiplicity of cans in axial alinement.

92. A machine comprising an oscillating frame provided with parallel series of rotating rolls adapted to rotate a multiplicity of cans in axial alinement and means for feeding said cans to and discharging them from contact with the rotating rolls.

93. A machine comprising an oscillating frame provided with a rotating roll adapted to rotate a can near the center of oscillation and means for applying solder to the can.

94. A machine comprising an oscillating frame provided with a roll having spacing-flanges, adapted to rotate a multiplicity of cans near the center of oscillation and means for applying solder to said cans.

95. A machine comprising an oscillating frame provided with parallel series of rotating rolls adapted to rotate a multiplicity of cans near the center of oscillation and means for applying solder to said cans.

96. A machine comprising an oscillating frame provided with parallel series of rolls adapted to rotate a multiplicity of cans near the center of oscillation and a series of disks adapted to apply solder to the cans.

97. A machine comprising an oscillating frame provided with a roll adapted to rotate cans near the center of oscillation and position, to receive solder and a solder-bath from which solder is applied to the cans.

98. A machine comprising an oscillating frame provided with rolls adapted to rotate

a multiplicity of cans near its center of oscillation, a series of solder-applying disks and a bath of solder in which the disks are partly immersed.

99. A machine comprising an oscillating frame provided with rolls adapted to rotate a can near the center of oscillation solder-applying disks and a solder-bath in which the disks are partly immersed.

100. A machine comprising an oscillating frame provided with rotating rolls adapted to rotate cans near the center of oscillation solder-applying disks, a bath of solder in which the disks are partly immersed and means for feeding the cans to the solder-disks and discharging them when soldered.

101. A machine comprising an oscillating frame provided with rolls adapted to rotate cans near the center of oscillation means for applying solder to said cans and a device adapted to marshal cans from single file into axial alinement and to feed them to the solder-applying devices.

102. A machine comprising an oscillating frame provided with rolls adapted to rotate cans near the center of oscillation means for applying solder to the cans and a device adapted to receive the soldered cans and marshal them from alinement into single file.

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Witnesses:
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