E. J. YOUNG & A. D. WELKER.

MACHINE FOR IMPREGNATING MATCH STICKS.

APPLICATION FILED FEB. 10, 1915.

1,167,324.

Patented Jan. 4, 1916.

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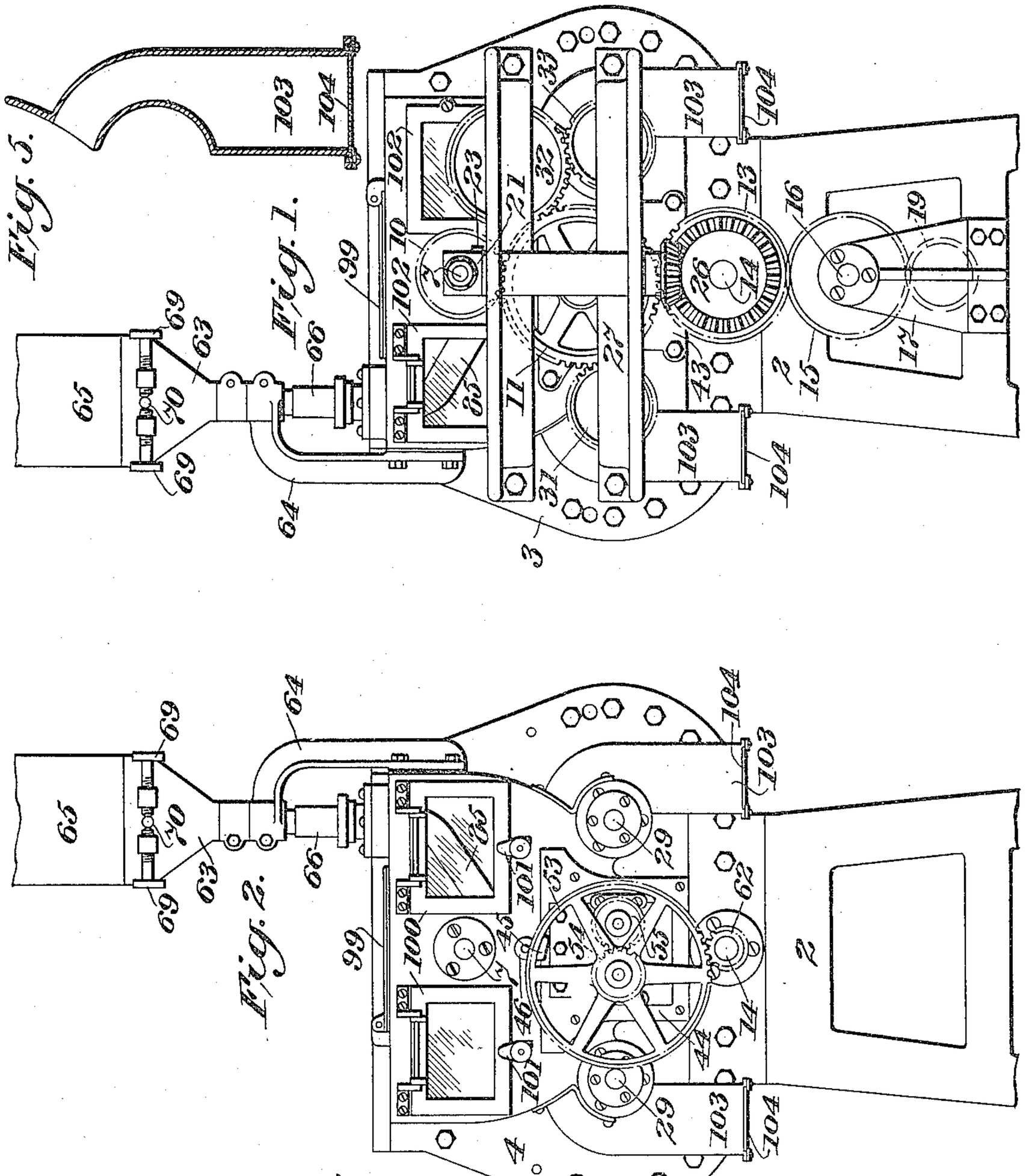

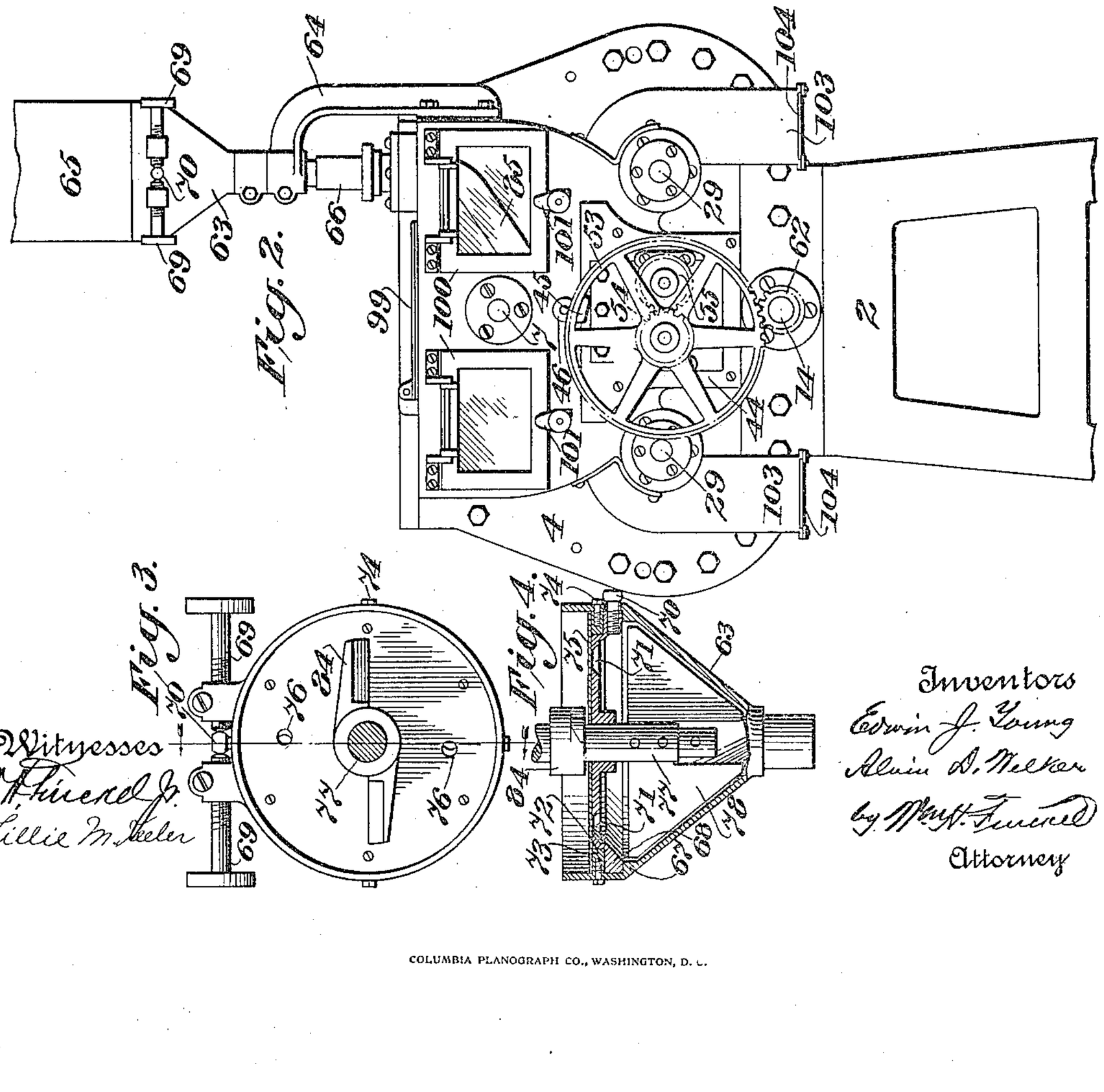

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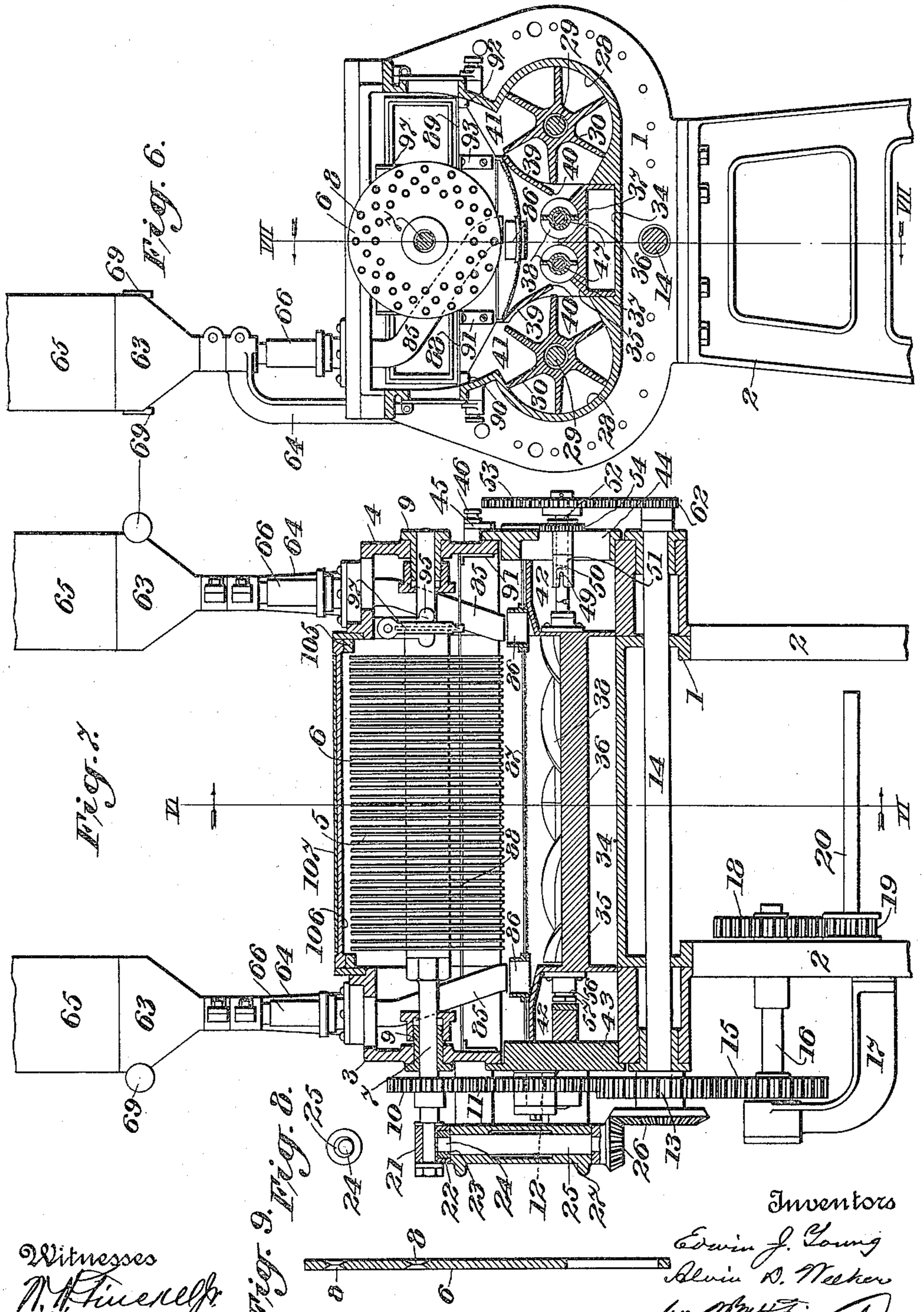

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

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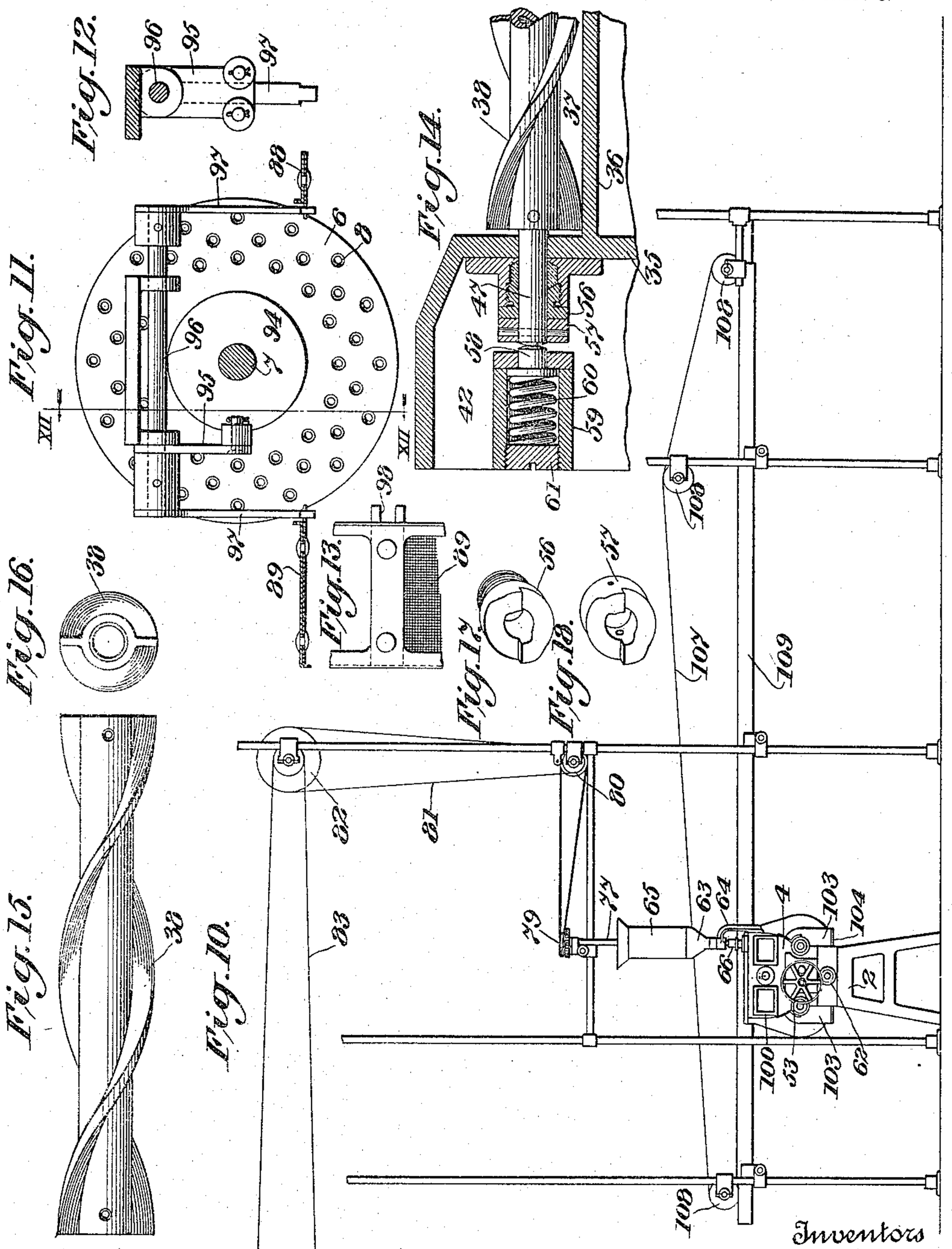

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UNITED STATES PATENT OFFICE.

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MACHINE FOR IMPREGNATING MATCH-STICKS.

1,167,324. Specification of Letters Patent. Patented Jan. 4, 1916.

Application filed February 10. 1915. Serial No. 7,450.

To all whom it may concern:

Be it known that we, EDWIN J. YOUNG and ALVIN D. WELKER, citizens of the United States, residing at Wadsworth, in the county of Medina and State of Ohio, have invented a certain new and useful Improvement in Machines for Impregnating Match-Sticks, of which the following is a full, clear, and exact description.

The object of this invention is to provide an efficient machine for impregnating match sticks with a substance in powdered form which will render matches made from such sticks non-glowing after they have been ignited and extinguished.

The invention is primarily designed as a part of a continuous match machine, to be installed between the cutting head and the paraffining chest, although the machine may be used independently.

The invention is in the nature of an improvement upon the machine of our case Serial No. 829,299, filed April 3, 1914, and it consists in a discous distributing roll flanked by rotary agitators to which the impregnating substance is supplied and which, in turn, force it to and upon the sticks between the disks of the distributing roll; means being provided to deliver the impregnating material to such agitators and to insure the maintenance of the impregnating substance in powdered form, and means being provided for regulating the feed of the impregnating substance to the machine, as we will proceed now to explain and finally claim.

In the accompanying drawings illustrating the invention, in the several figures of which like parts are similarly designated, Figure 1 is an elevation of one end, and Fig. 2 is an elevation of the opposite end of an apparatus involving the invention. Fig. 3 is a horizontal section, and Fig. 4 is a partial vertical section, on a larger scale, illustrating one form of feed-regulating funnel. Fig. 5 is a vertical section of a collecting box. Fig. 6 is a transverse vertical section on line VI of Fig. 7. Fig. 7 is a longitudinal vertical section on line VII, Fig. 6. Fig. 8 is a top plan view of the distributer vibrating shaft. Fig. 9 is a cross-section, on a larger scale, of part of one of the distributer disks, showing in detail the doubly-countersunk holes therein. Fig. 10 is a side elevation showing a portion of a continuous match machine with the impregnating machine of this invention incorporated. Fig. 11 is a sectional end view on a larger scale, illustrating the screen shaking means. Fig. 12 is a sectional elevation in detail taken in the plane of line XII, Fig. 11. Fig. 13 is a detail plan view of a portion of one of the screens. Fig. 14 is a sectional elevation of the vibrating means for the spirals. Fig. 15 is an end elevation of one of the spiral members, and Fig. 16 is an end view thereof. Figs. 17 and 18 are perspective views of the complementary cam-faced vibrators for the spirals.

For purposes of illustration and without thereby limiting the invention, we will describe a machine embodying its principles designed for use in a continuous match machine of known or approved construction, and installed therein between the cutting head, by which the sticks are made and stuck, and the chest in which the melted paraffin is contained.

The machine has a main body portion 1 mounted upon legs 2. The main body portion has open flanged ends, and these ends are provided with complementally flanged housings 3 and 4, bolted or otherwise secured to the flanged ends of the body portion.

The distributing roll 5 is composed of a series of disks or blades 6 mounted upon a shaft 7 and suitably spaced apart thereon so as to freely admit the match sticks between them; and these disks are provided with any suitable means for effecting the circulation of the impregnating powder between them and its deposition upon the match sticks, such means, as here shown, being holes 8 countersunk at both ends, as shown in the enlarged section Fig. 9. The shaft 7 is mounted in stuffing boxes or bearings 9 in the opposite housings in such way as to receive not only a rotary movement, but also a longitudinal movement or vibration. The rotary movement of this shaft is imparted through its gear wheel 10, meshing with a gear wheel 11 mounted upon a stud 12, said gear wheel 11 being engaged by a gear wheel 13 on a shaft 14 mounted in the housing, and said gear wheel 13 meshing with a gear wheel 15 on a countershaft 16, which has bearings in one of the legs 2 and a bracket 17 secured to said leg and the countershaft 16 has a gear wheel 18 in

mesh with a pinion 19 on a shaft 20, which may be the shaft of a motor or other source of power. The longitudinal movement of shaft 7 may be imparted by clamping on one of its ends a block 21 which is provided with a transverse groove 22 in which is a sliding box 23 having a hole engaged by the eccentric end 24 of a vertical shaft 25, which is rotated in any suitable way, as by a bevel gear connection 26 with the shaft 14. This vertical shaft may be supported in a bearing in a bracket 27 fastened to the housing 3. As the shaft 25 rotates, its eccentric end engaging the block 21, as described, will move said block in the direction of the length of the shaft 7, and as said block is fast to the shaft the latter will be moved lengthwise rapidly, or vibrated.

In the bottom of the body 1 are two parallel circular or cylindrical chambers 28, in which horizontal shafts 29 are arranged, and on these shafts are mounted to turn with them, similar fan wheels 30, or cylindrical bodies provided with tangential or radial vanes, and these shafts are turned toward one another by means of a gear wheel 31 meshing with gear wheel 11 meshing with an intermediate gear wheel 32 mounted upon a stud on the housing and in turn engaging the gear wheel 33 on the other fan wheel shaft 29. These fan wheels constitute the agitators herein referred to.

Between the chambers 28 and parallel with them, is a cavity 34 in which is placed a trough 35 having a bottom 36 in which are the parallel longitudinal semi-circular cavities 37 in which are arranged the anti-caking spirals 38, each composed of a right-handed member and a left-handed member, as shown in Fig. 7. The trough has the longitudinal side walls 39 provided with openings 40 communicating with the chambers 28, and extending upwardly to about the level of the tops of the agitators and forming the inner walls of the agitator chambers and ending short of the outside side walls of said chambers so as to leave the discharge openings 41 at the tops of said chambers. The ends 42 of the trough are recessed, as shown in Figs. 7 and 14, and extend from housing to housing of the body and are there closed in by seals 43 and 44, the former not connected with the trough but sealing one end thereof; and upon this seal is fixed the stud 12 which supports the gear wheel 11; and the latter (seal 44) attached to the trough and removable with it from the body and serving as a stop to limit the position of the trough in the body when in operation, and held in place by means of latch 45 and lock-nut 46, Figs. 2 and 7. The shafts 47 on which the spirals are fixed so as to turn with them, have bearings in the ends of the trough and extend through them, and these shafts have flexible connections with the driving medium by which longitudinal motion of the shafts is permitted, each of such connections being herein shown as a transverse pin 49 engaging opposite notches 50 in a sleeve 51 connected to turn with the short shaft 52 of the driving gear wheel 53. The shaft 52 has a gear wheel 54 in mesh with a similar gear wheel 55 on the shaft of the other spiral, so that the spirals will turn in opposite directions. The opposite ends of the shafts 47 are connected with means for imparting the desired longitudinal or vibrating motion which is necessary to prevent the impregnating powder from caking, building up, or solidifying on the spirals, and such connections may consist (see Figs. 14, 17 and 18) of cam-faced pieces 56, fixed to the adjacent end of the trough and complementary cam-faced pieces 57 pinned or otherwise fixed to the ends of the shafts to turn with them, so that their cam surfaces will ride over the fixed cam-faced members. In order to hold the cam-faced pieces in operative relation any suitable yielding or tension members are arranged in the adjacent end of the trough, and as here shown, these tension members may consist of buttons or push-pieces 58 arranged in sockets 59 in the end of the trough and backed up by coiled springs 60 which are held in the recesses by screw-plugs 61. It will be apparent that as the shafts 47 turn, they and their spirals will be given endwise vibratory motion by the riding of the cam-faced pieces over their fixed mates under the tension of the tension members. As shown in Figs. 7 and 14, the parts are in their normal right-hand positions, and the cam-faced members have their cams at low point. The gear wheel 53 meshes with a pinion 62 on the shaft 14. By releasing the latch 45 the trough and its adjuncts may be bodily withdrawn from the machine whenever desired or necessary, and as readily replaced.

It is desirable to regulate with considerable nicety the quantity of impregnating powder introduced into the machine, and for this purpose we may use any suitable regulating feed, one such being here shown and comprising hoppers 63 mounted at opposite ends of the machine on brackets 64 fixed to the machine and having the hopper tops 65. These hoppers are connected with the body by spouts 66 which open into the body through its top. Each hopper is provided with an inside shoulder 67 on which a disk 68 may be turned, the extent of its turning movement being governed or regulated by adjusting screws 69 supported on the hopper engaging opposite sides of a lug or pin 70 fixed to the disk and extending outwardly through a horizontal slot in the hopper. This disk is provided with any number of holes 71, preferably two. The

edge of the disk is recessed at 72 and in this recess is a ring 73, which is made fast to the hopper by screws 74 or otherwise rendered stationary, and to this ring is fixed a disk 75 which is provided with holes 76 corresponding in location, size and number with the holes in the disk 68, so that by turning the latter the extent of coincidence of the holes 71 and 76 may be varied to regulate the volume of powder passing through them. A shaft 77 projects vertically through central holes in the disks, and to its end below the disks is fixed a laterally extending wing 78 which operates as a stirrer to keep the impregnating material in motion. This stirrer shaft may be rotated by any suitable means, such as a band pulley 79 on it belted to a pulley 80 on a horizontal cross-shaft mounted on the match machine framework and driven by a belt or chain 81 connected with a pulley or sprocket wheel 82 on another cross-shaft which may be driven by a belt or chain 83 from any suitable source of power. On this shaft 77 is fixed to turn with it a feed arm 84, located above the upper disk 75, said feed arm having its leading edges beveled by preference.

From the spouts 66 curved pipes or extension spouts 85 enter the body of the machine and discharge through nipples 86 into the trough 35 about midway between the spirals therein and at or near their opposite ends. These nipples are mounted in a screen or foraminous or reticulated diaphragm 87 spanning the top of the trough and mounted stationarily upon it, and this screen serves to catch any displaced match sticks and other foreign matter and exclude it from the trough. Other framed screens 88 and 89 are mounted movably upon brackets 90 and 91 and 92 and 93 over the openings at the tops of the fan-wheel chambers for a similar purpose, and these screens 88 and 89 are given a vibratory or shaking motion, by any suitable means, in order to shake the impregnating powder back to the circulating mediums. A convenient means for effecting the vibration or shaking of these screens consists of a disk 94 fast on the distributer shaft, engaging a roller-arm 95 fast on a rock-shaft 96, the opposite ends of this rock-shaft having depending arms 97 which engage forked lugs 98 on the frames of these screens, so that as the distributer is vibrated or moved longitudinally, the disk 94 will engage the roller-arm and vibrate it, thus rocking the rock-shaft and vibrating its screen-engaging arms 97, and these arms thereby imparting the desired vibration to the two screens. The disk 94 may be a flange on the nut by which the distributing disks are fixed to their shaft and is so shown herein.

The top and ends of the machine may be provided with glazed openings for inspection and repair purposes. As shown, the top openings are located in alinement with the hopper spouts and they may be covered by glazed frames 99 hinged to the body and movably locked in place, and one end, Fig. 2, may have two similarly hinged glazed frames 100 secured by latches 101, and the opposite end, Fig. 1, may have two similarly glazed frames 102, one of which is screwed and the other hinged to the head or housing.

As shown in Figs. 1, 2, 5, and 10, the ends of the machine may have the boxes 103 made fast to them and communicating with the interior of the body for collecting the coarse powder and detritus moving toward the ends of the machine while in operation. This material so collected may be removed from the boxes from time to time, as through sliding gates or movable bottoms 104. By making provision for the collecting and disposing of this coarse powder, its accomulation in the machine is prevented and clogging of the machinery avoided and the machine may be run continuously.

The body of the machine over the distributing roll is open at top, and provided with rails 105 to receive the traveling chain of sticking plates 106. In order to prevent the escape of the impregnating material through this opening, we use an endless flexible impervious traveling belt or apron 107, preferably of canvas, carried along the uppermost sides of the plates over drums or rolls 108 suitably supported in the pipe frame of the match machine. Connected with the impregnating machine is a horizontal box 109, which extends therefrom fore and aft and is provided inside with rails for supporting the endless chain of plates. The belt or apron referred to and the chain of plates pass through this box, and the belt serves to prevent the impregnating powder from passing up between the joints of the plates and settling upon the plates.

We have thus explained our invention by reference to the drawings, but it is to be understood that we do not limit the invention to details, and hence reserve to ourselves the right to such variations and modifications as may fall within the scope and breadth of the subjoined claims.

The operation is as follows: The match plates with their loads of match sticks coming from the cutting head or machine, enter the box 109 from the left, Fig. 10, under cover of the belt or apron 107, and then pass through the impregnating machine and thence through the box at the right, and thence emerge and progress to the next match making operation. The impregnating powder in a dry state is fed into the impregnating machine through the hoppers in regulated quantity, and falling upon the spirals at or near their ends, is advanced to-

ward the center of the machine, at the same time being spilled over through the openings leading from the trough into the circular chambers, where it is picked up by the rotating fan wheels and thrown out toward the center of the distributer between the disks between which the match sticks project. These disks being provided with the holes or equivalent obstructions and the distributer having an endwise vibration, the powder is effectively circulated between and about the depending sticks upon which it adheres. Since the upper screens are in vibration and the spirals likewise, the powder is kept in circulation and the sticks effectively impregnated and rendered non-glowing.

What we claim is:—

1. In a machine for impregnating match sticks, a rotary discous distributer, a body in which it is mounted, rotary agitators flanking said distributer, means interposed between the agitators to insure pulverulence of the impregnating material and its delivery to the agitators, and means to supply powdered impregnating material to the agitators.

2. In a machine for impregnating match sticks, a rotary discous distributer, a body in which it is mounted, means to vibrate said distributer longitudinally, rotary agitators flanking said distributer, means interposed between the agitators to insure pulverulence of the impregnating material and its delivery to the agitators, and means to supply powdered impregnating material to the agitators.

3. In a machine for impregnating match sticks, a rotary discous distributer, a body in which it is mounted, rotary agitators flanking said distributer, means interposed between the agitators to insure pulverulence of the impregnating material and its delivery to the agitators, means to vibrate said means for insuring pulverulence, and means to supply powdered impregnating material to the agitators.

4. In a machine for impregnating match sticks, a rotary discous distributer, a body in which it is mounted, rotary agitators flanking said distributer, means interposed between the agitators to insure pulverulence of the impregnating material and its delivery to the agitators, and means to supply powdered impregnating material in regulated quantity to the agitators.

5. In a machine for impregnating match sticks, a rotary discous distributer, a body in which it is mounted, rotary agitators flanking said distributer, spirals interposed between the agitators to insure pulverulence of the impregnating material and its delivery to the agitators, and means to supply powdered impregnating material to the agitators.

6. In a machine for impregnating match sticks, a rotary discous distributer, a body in which it is mounted, rotary fan wheels flanking said distributer, means interposed between the fan wheels to insure pulverulence of the impregnating material and its delivery to the fan wheels, and means to supply powdered impregnating material to the fan wheels.

7. In a machine for impregnating match sticks, a rotary discous distributer, a body in which it is mounted, rotary agitators flanking said distributer, means interposed between the agitators to insure pulverulence of the impregnating material and its delivery to the agitators, and hoppers having adjustable outlets to regulate the quantity of impregnating material fed to the machine.

8. In a machine for impregnating match sticks, a rotary discous distributer, a body in which it is mounted, rotary agitators flanking said distributer, spirals interposed between the agitators to insure pulverulence of the impregnating material and its delivery to the agitators, and feed hoppers for supplying the impregnating material having discharge pipes whose delivery ends open at opposite ends of the spirals.

9. In a machine for impregnating match sticks, a rotary discous distributer, a body in which it is mounted, rotary agitators flanking said distributer, a pair of separated rotary spirals interposed between the agitators to insure pulverulence of the impregnating material and its delivery to the agitators, and feed hoppers for supplying the impregnating material having discharge pipes whose delivery ends open at opposite ends of the spirals and between said spirals.

10. In a machine for impregnating match sticks, a rotary discous distributer, a body in which it is mounted, a pair of agitators arranged parallel with and below said distributer, means to rotate said agitators in opposite directions and toward the distributer, means interposed between the agitators to insure pulverulence of the impregnating material and its delivery to the agitators, and means to supply powdered impregnating material to the agitators.

11. In a machine for impregnating match sticks with a powdered anti-glowing material, a distributer having a shaft, disks mounted to turn with said shaft, means to rotate said shaft, means applied to said shaft to give to the distributer endwise vibration, rotary agitators flanking said distributer, means interposed between the agitators to insure pulverulence of the impregnating material and its delivery to the agitators, and means to supply powdered impregnating material to the agitators.

12. In a machine for impregnating match sticks, a rotary discous distributer, the disks of which are provided with transverse holes

to insure circulation of the impregnating material, a body in which it is mounted, rotary agitators flanking said distributer, means interposed between the agitators to insure pulverulence of the impregnating material and its delivery to the agitators, and means to supply powdered impregnating material to the agitators.

13. In a machine for impregnating match sticks, a rotary discous distributer, a body in which it is mounted, rotary agitators flanking said distributer, means interposed between the agitators to insure pulverulence of the impregnating material and its delivery to the agitators, and means interposed between the distributer and the agitators and the means for insuring the pulverulence of the impregnating material to exclude foreign matter while permitting the circulation of the impregnating material.

14. In a machine for impregnating match sticks, a rotary discous distributer, a body in which it is mounted, rotary agitators flanking said distributer, shaking screens interposed between the distributer and the agitators, means interposed between the agitators to insure pulverulence of the impregnating material and its delivery to the agitators, and means to supply powdered impregnating material to the agitators.

15. In a machine for impregnating match sticks, a rotary discous distributer, a body in which it is mounted, rotary agitators flanking said distributer, shaking screens interposed between the distributer and the agitators, means interposed between the agitators to insure pulverulence of the impregnating material and its delivery to the agitators, a stationary screen interposed between the distributer and the means for insuring pulverulence of the impregnating material, and means to supply powdered impregnating material to the agitators.

16. In a machine for impregnating match sticks with a powdery material to render the matches non-glowing, a discous distributer, means to rotate said distributer, and means to effect a lengthwise vibration of said distributer, combined with screens and means actuated by said vibrating distributer to shake said screens.

17. In a machine for impregnating match sticks with a powdery material to render the matches non-glowing, a discous distributer, a body in which said distributer is mounted, means to feed the impregnating material into said body, and means to deliver such material to the distributer including a pair of spirals, means to rotate them, flexible connections between said spirals and their rotating means, and cam-faced pieces yieldingly juxtaposed relatively to the spirals and to one another to effect an endwise vibration of the rotating spirals and thereby prevent the cohesion of the impregnating material.

18. In a machine for impregnating match sticks with a powdery material to render the matches non-glowing, a rotary distributer, agitators, means to deliver the impregnating material to the agitators whence it is supplied to the distributer, means to maintain the material in powder form, a body in which these several parts are mounted, and boxes applied to the ends of the body and communicating with its interior to collect detritus and the coarse powder piling up at the ends of the machine while in operation.

19. In a machine for impregnating match sticks, a rotary discous distributer, a body in which it is mounted, rotary agitators flanking said distributer, a pair of rotary spirals, each of said pair having a right hand and a left hand member, said spirals interposed between the agitators to insure pulverulence of the impregnating material and its delivery to the agitators, and means to supply powdered impregnating material to the agitators.

In testimony whereof we have hereunto set our hands this 8 day of February, A. D. 1915.

EDWIN J. YOUNG.
ALVIN D. WELKER.

Witnesses:
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