Nov. 26, 1935. A. BODOR 2,022,309

MACHINE FOR MAKING PAPER BOTTLES

Filed Feb. 9, 1933 20 Sheets-Sheet 1

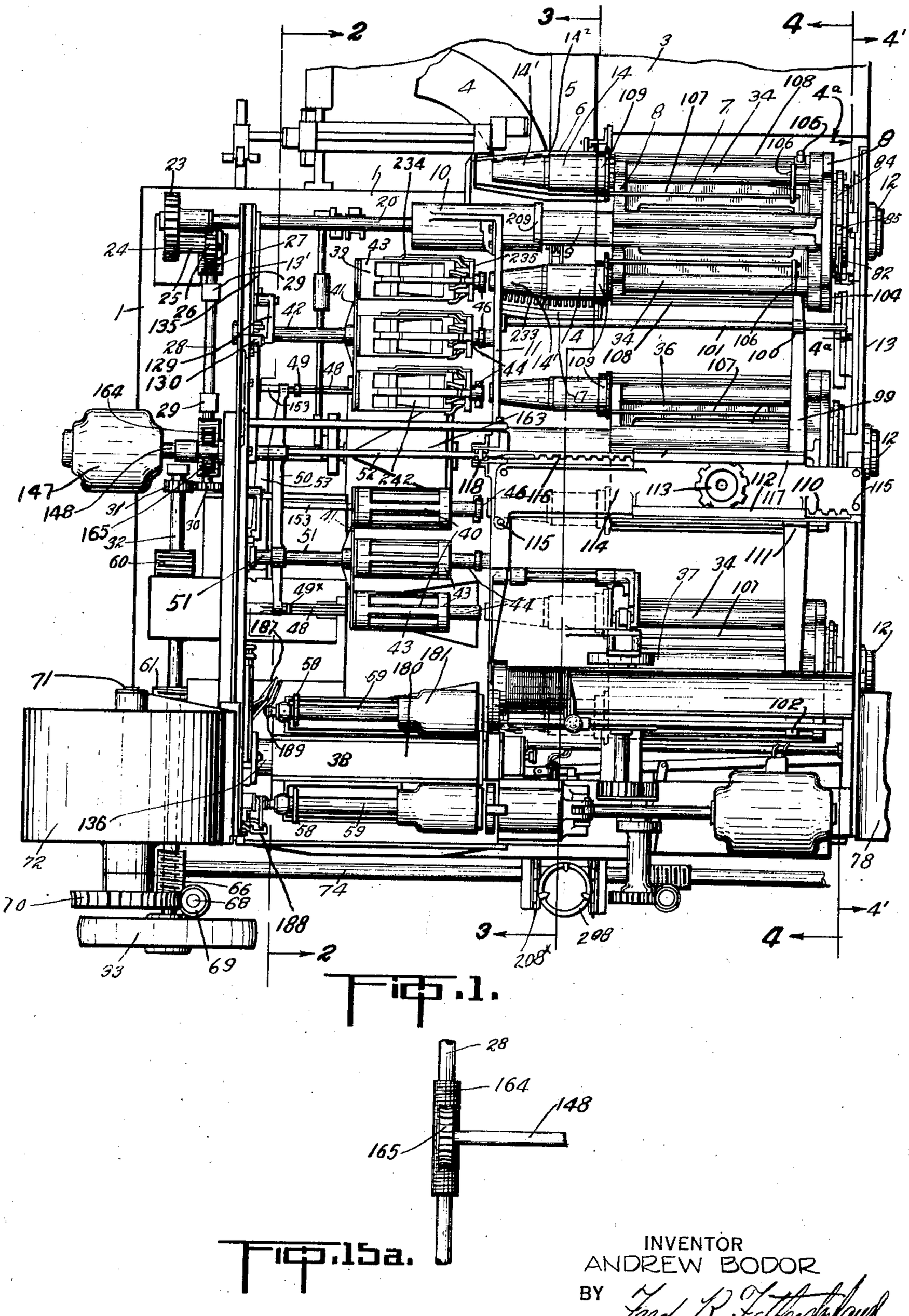

FIG. 1.

FIG. 15a.

INVENTOR
ANDREW BODOR
BY Fred. B. Fetherstaugh
ATTORNEY

Nov. 26, 1935. A. BODOR 2,022,309

MACHINE FOR MAKING PAPER BOTTLES

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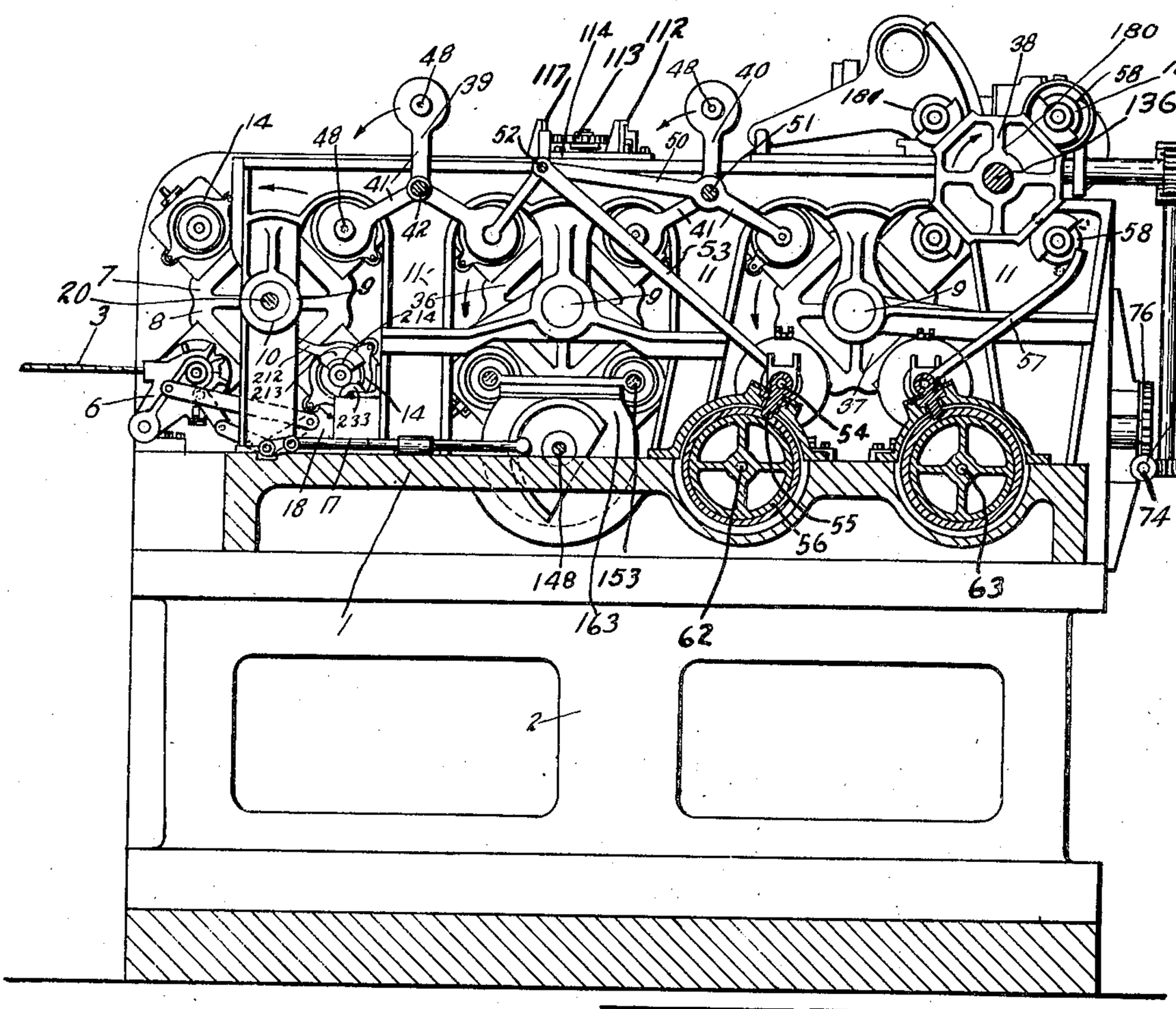

FIG. 2.

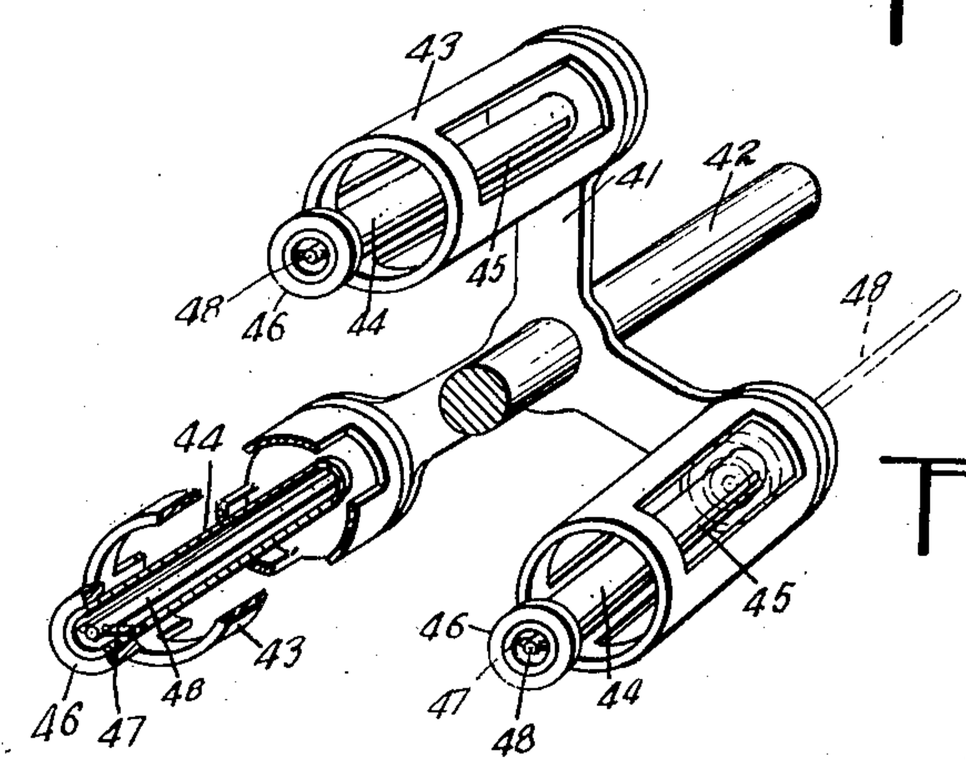

FIG. 2a.

INVENTOR.
ANDREW BODOR

BY Fred. B. Fetherston Haugh

ATTORNEY.

Nov. 26, 1935. A. BODOR 2,022,309

MACHINE FOR MAKING PAPER BOTTLES

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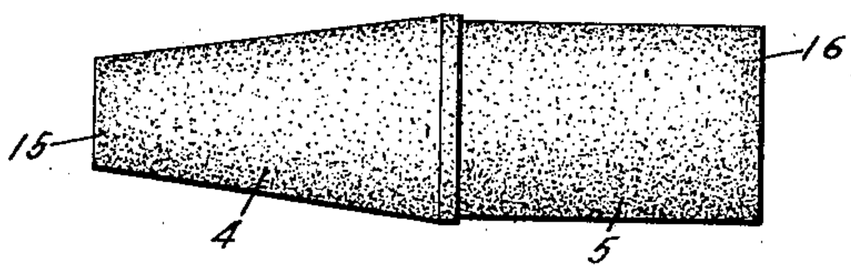

FIG. 2 b.

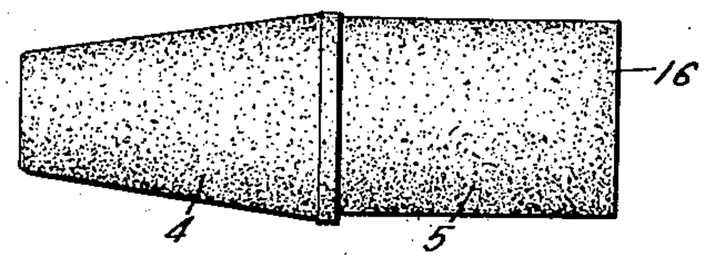

FIG. 2 c.

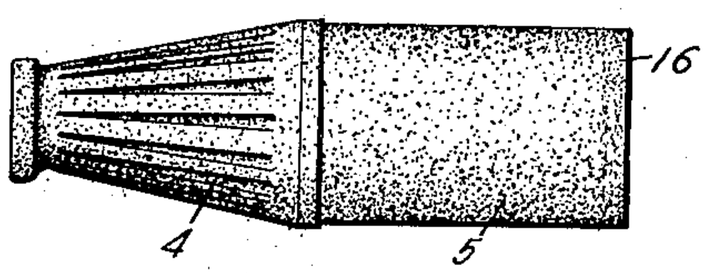

FIG. 2 d.

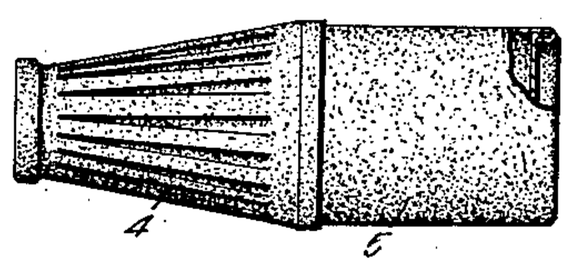

FIG. 2 e.

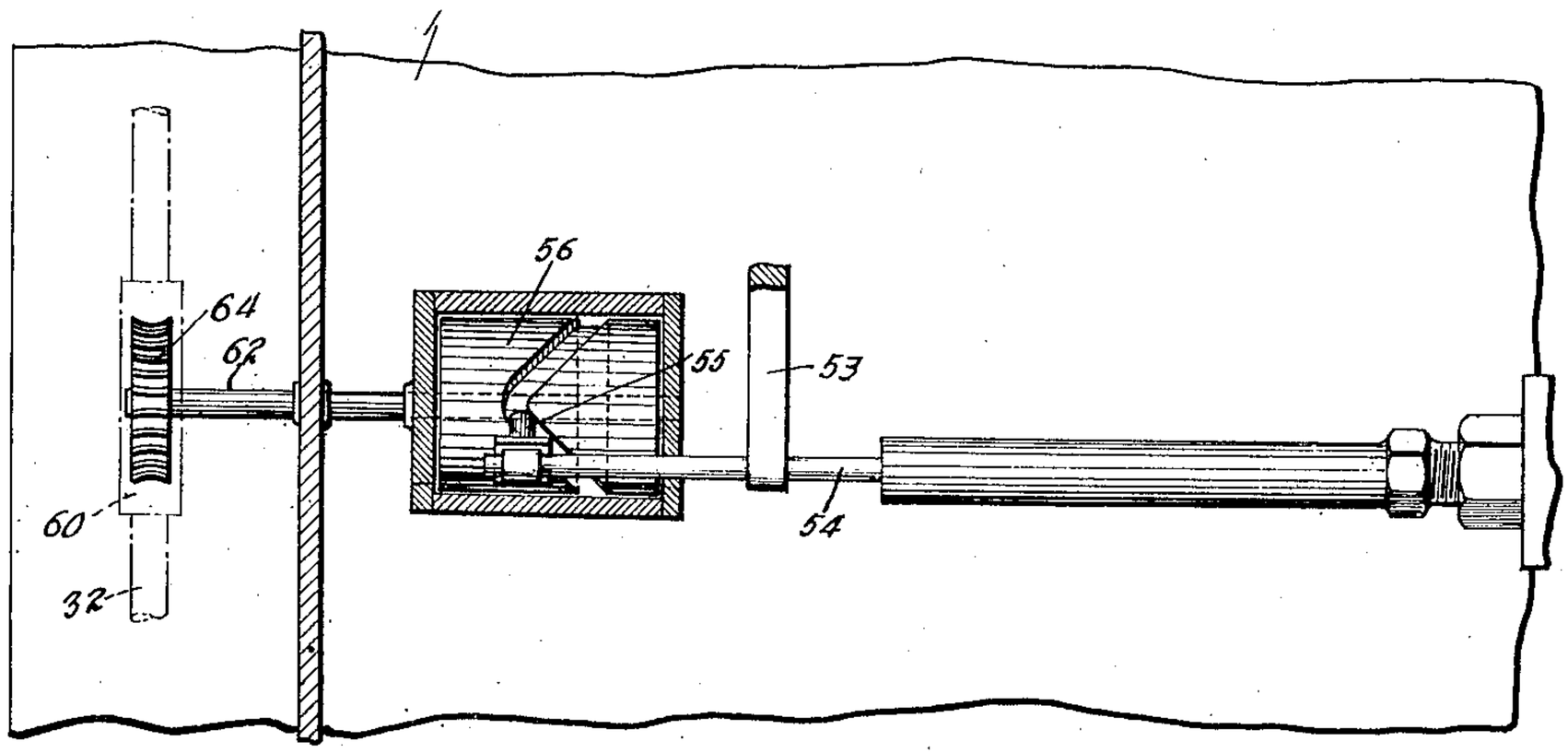

FIG. 2 f.

INVENTOR.
ANDREW BODOR
BY Fred B. Tettenstorf
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MACHINE FOR MAKING PAPER BOTTLES

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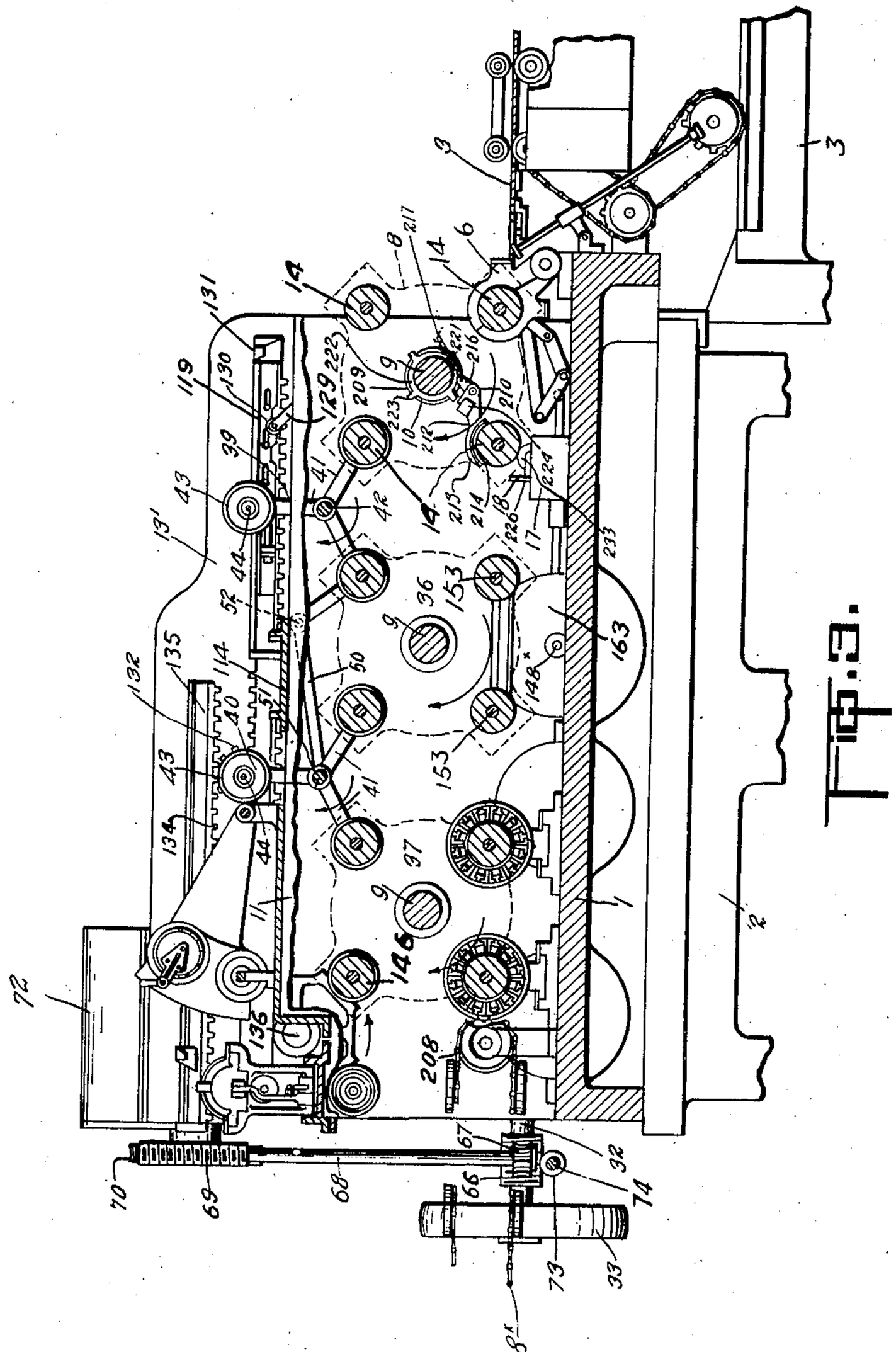

FIG. 4.

INVENTOR
ANDREW BODOR
BY Fred. B. Fethersonhaugh
ATTORNEY

Nov. 26, 1935. A. BODOR 2,022,309

MACHINE FOR MAKING PAPER BOTTLES

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FIG. 4.

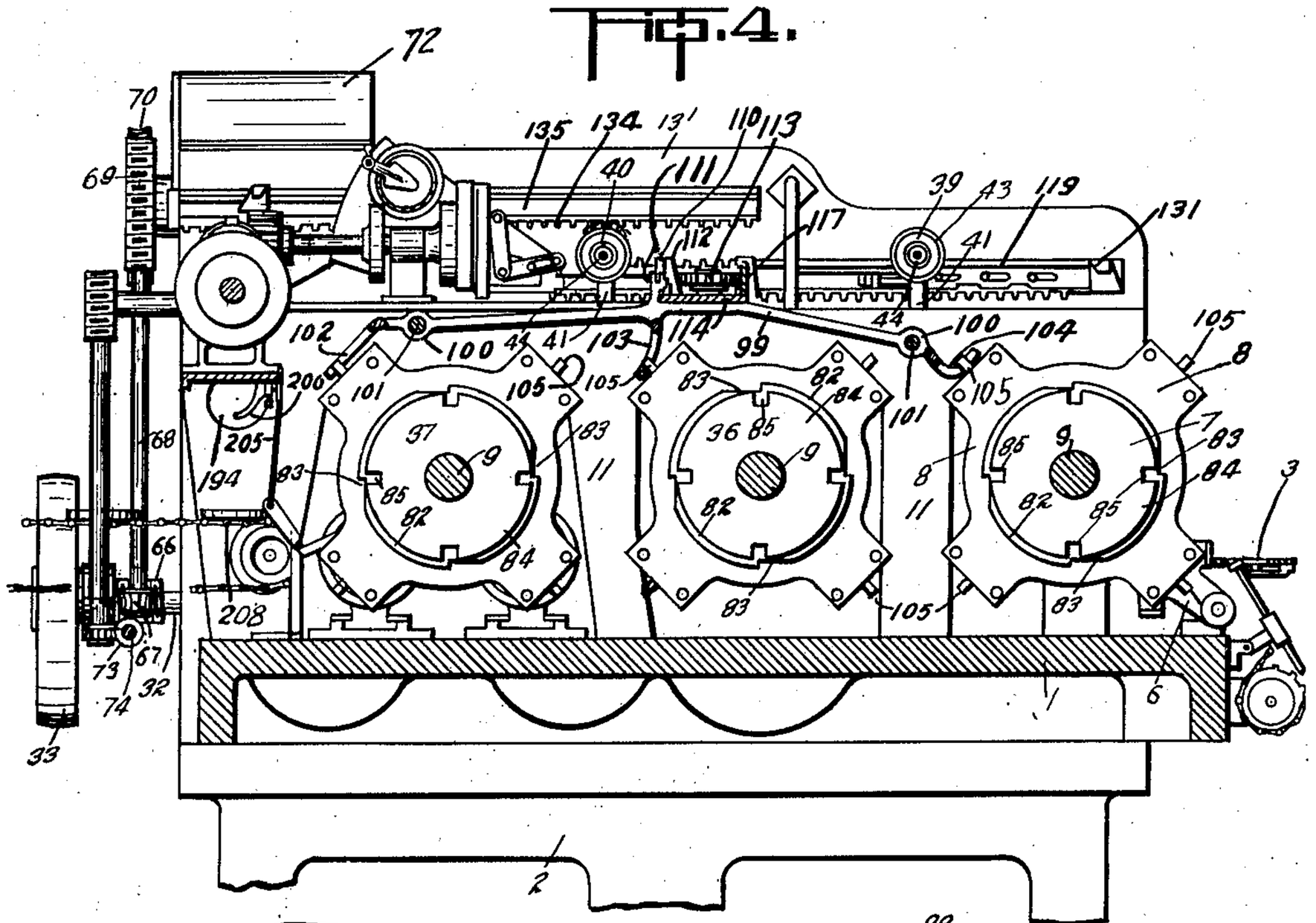


FIG. 4c.

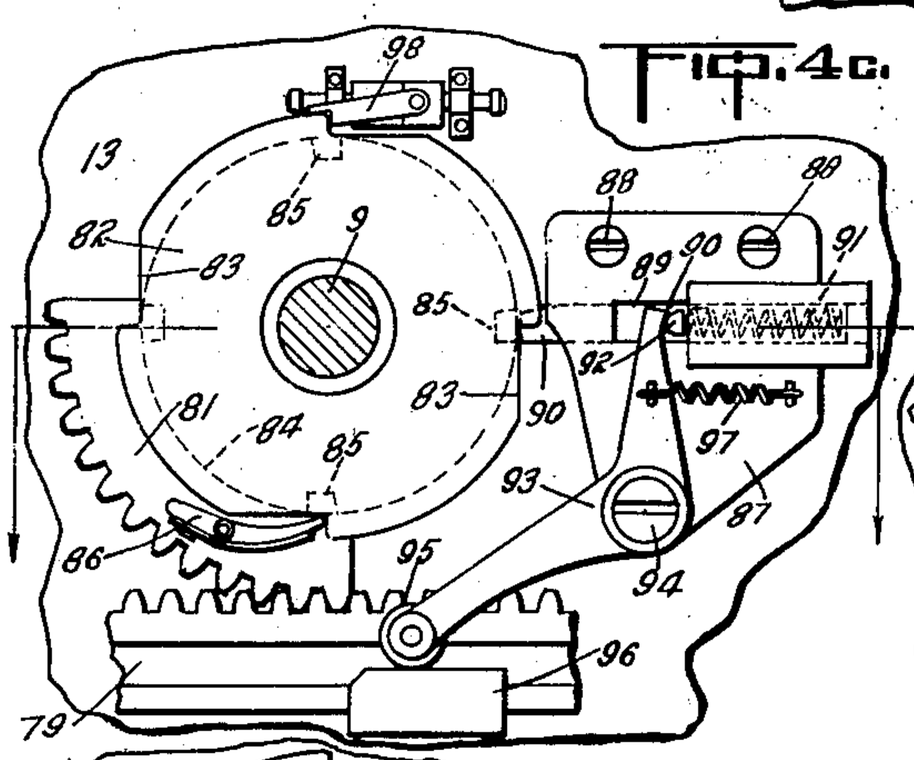
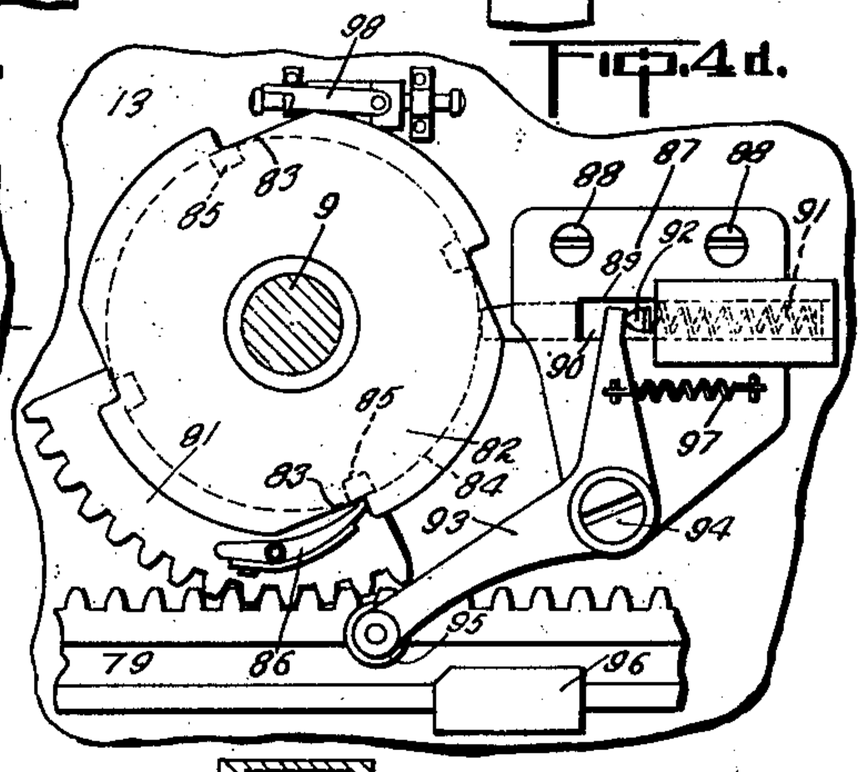


FIG. 4d.



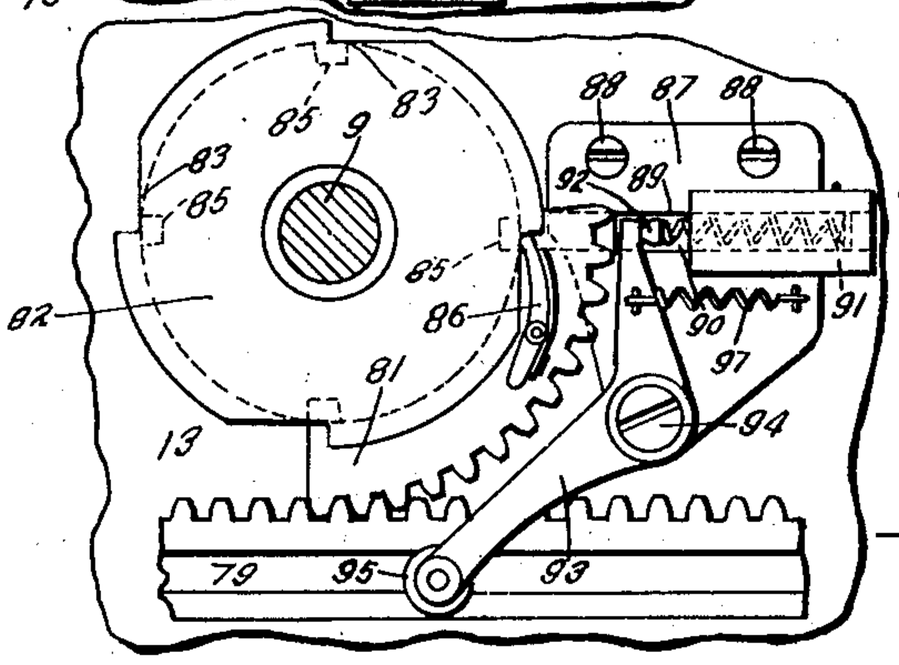


FIG. 4e.

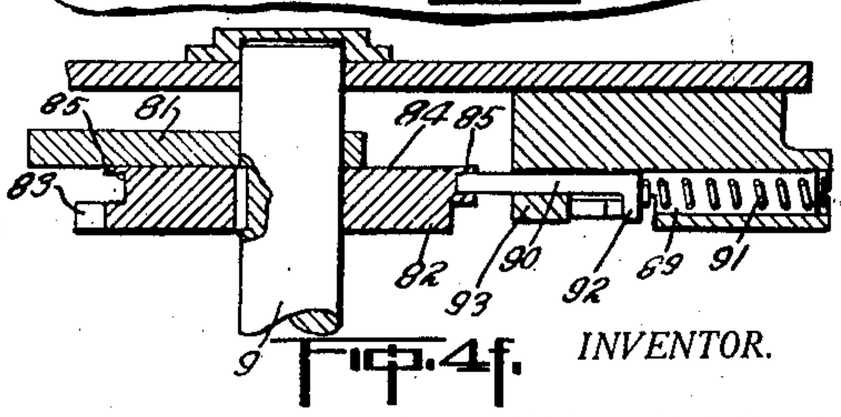


FIG. 4f.

INVENTOR.

ANDREW BODOR

BY

Fred B. Stevenson

ATTORNEY.

Nov. 26, 1935. A. BODOR 2,022,309

MACHINE FOR MAKING PAPER BOTTLES

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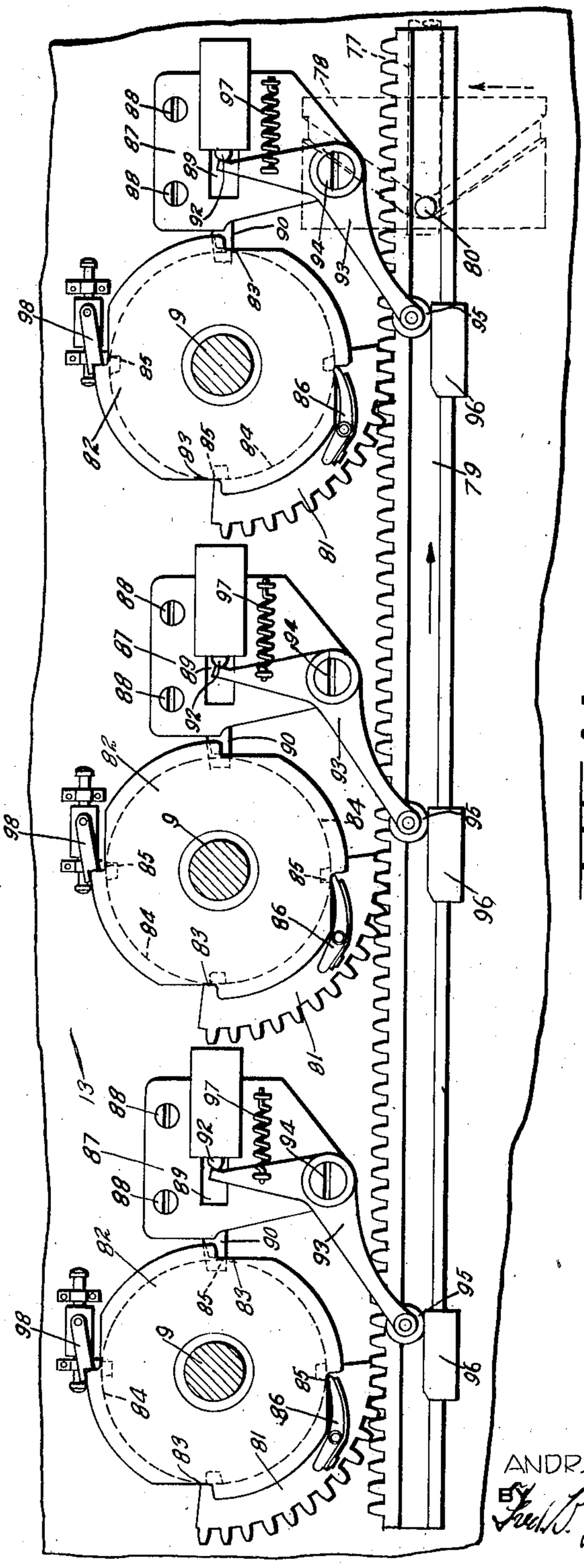

Fig. 4 b.

INVENTOR-
ANDREW BODOR
BY Fred B. Fetherstonhaugh
ATTORNEY-

Nov. 26, 1935. A. BODOR 2,022,309

MACHINE FOR MAKING PAPER BOTTLES

Filed Feb. 9, 1933 20 Sheets-Sheet 7

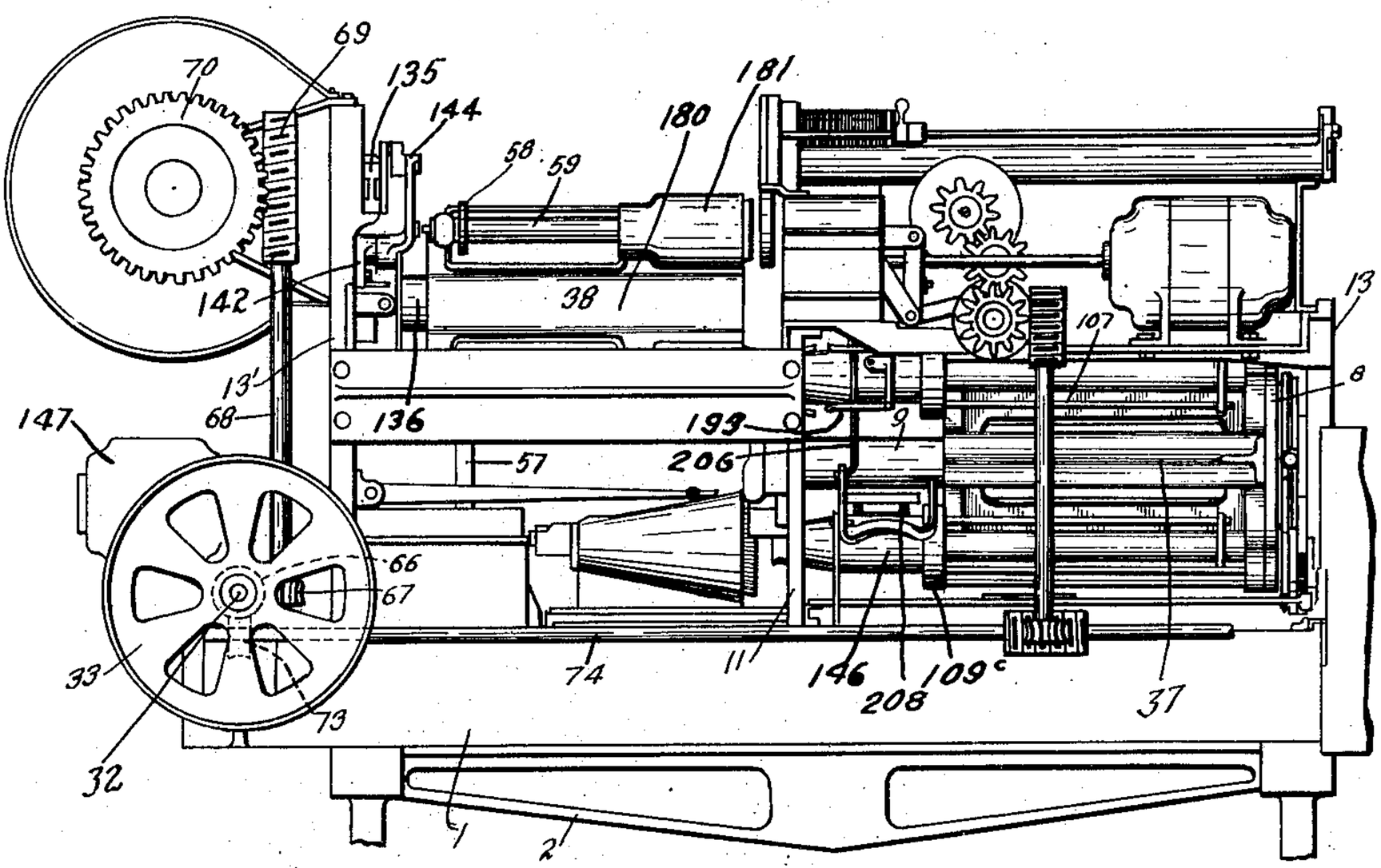

FIG. 5.

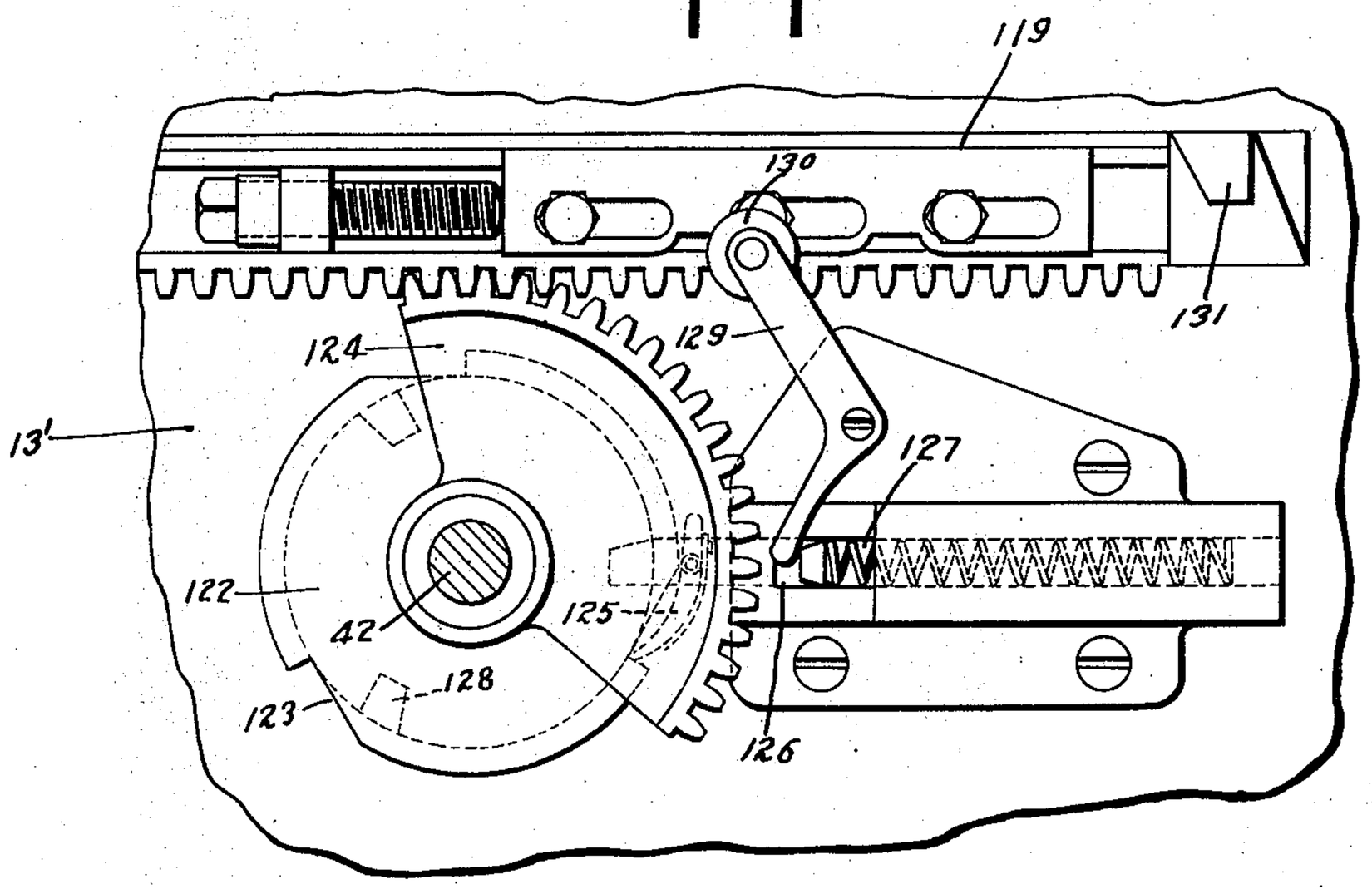

FIG. 6.

INVENTOR
ANDREW BODOR
BY Fred. B. Fetherstonhaugh
ATTORNEY

Nov. 26, 1935. A. BODOR 2,022,309

MACHINE FOR MAKING PAPER BOTTLES

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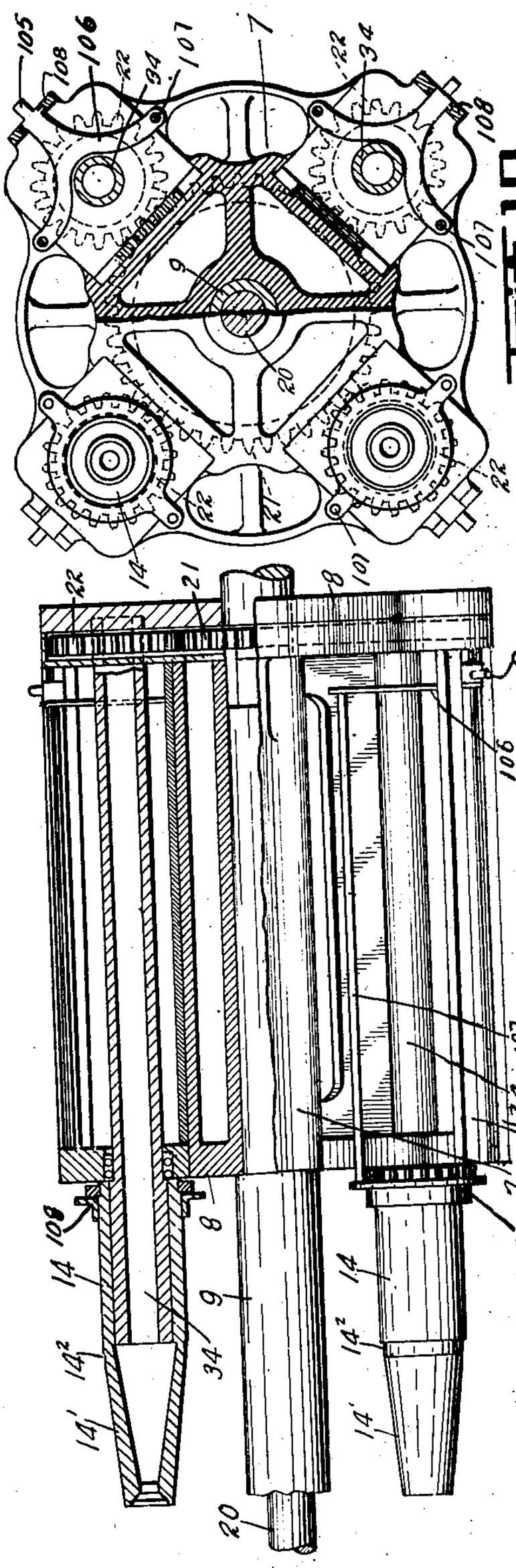

Fig. 10.

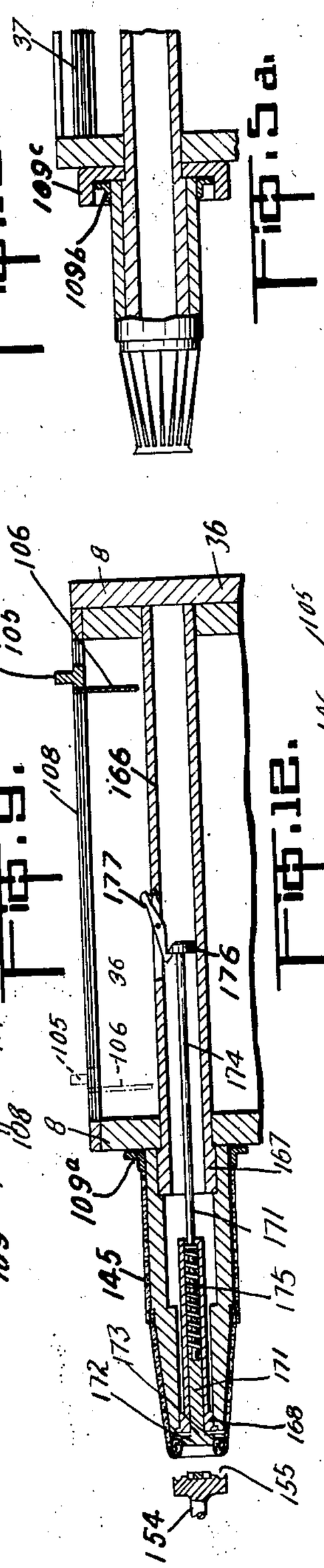

Fig. 5a.

Fig. 9.

Fig. 12.

Fig. 11.

INVENTOR.
ANDREW BODOR
BY Fred P. Fetherston Haugh
ATTORNEY.

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MACHINE FOR MAKING PAPER BOTTLES

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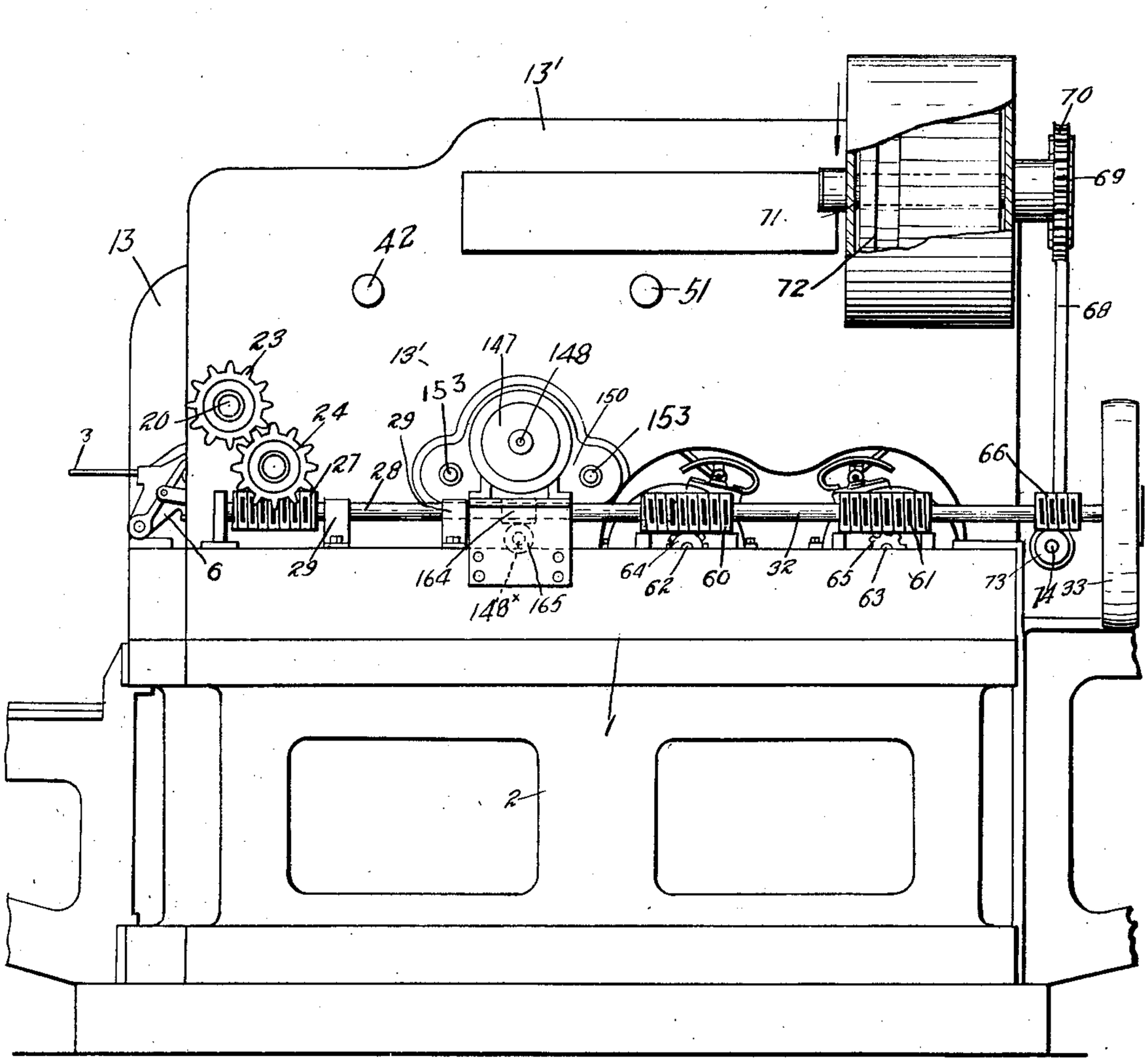

FIG. 6.

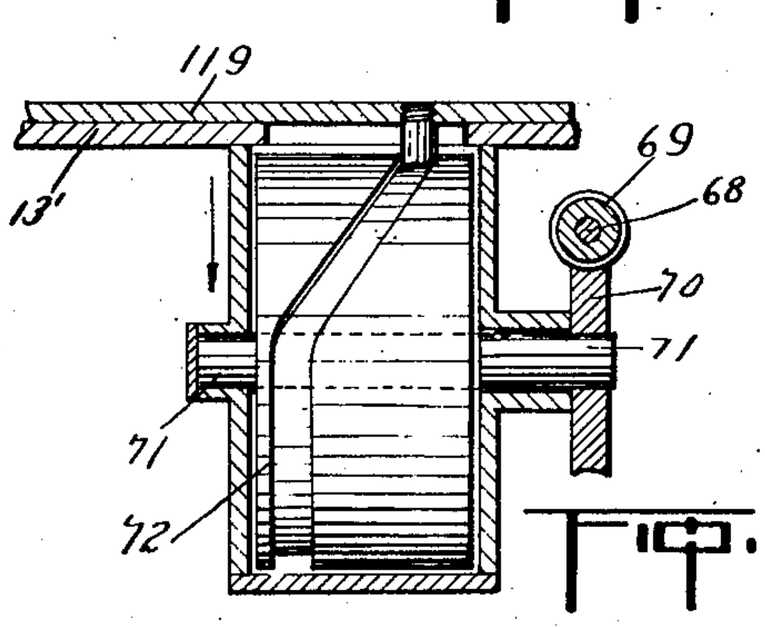

FIG. 6a.

INVENTOR
ANDREW BODOR
BY Fred. B. Whitehouse
ATTORNEY

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MACHINE FOR MAKING PAPER BOTTLES

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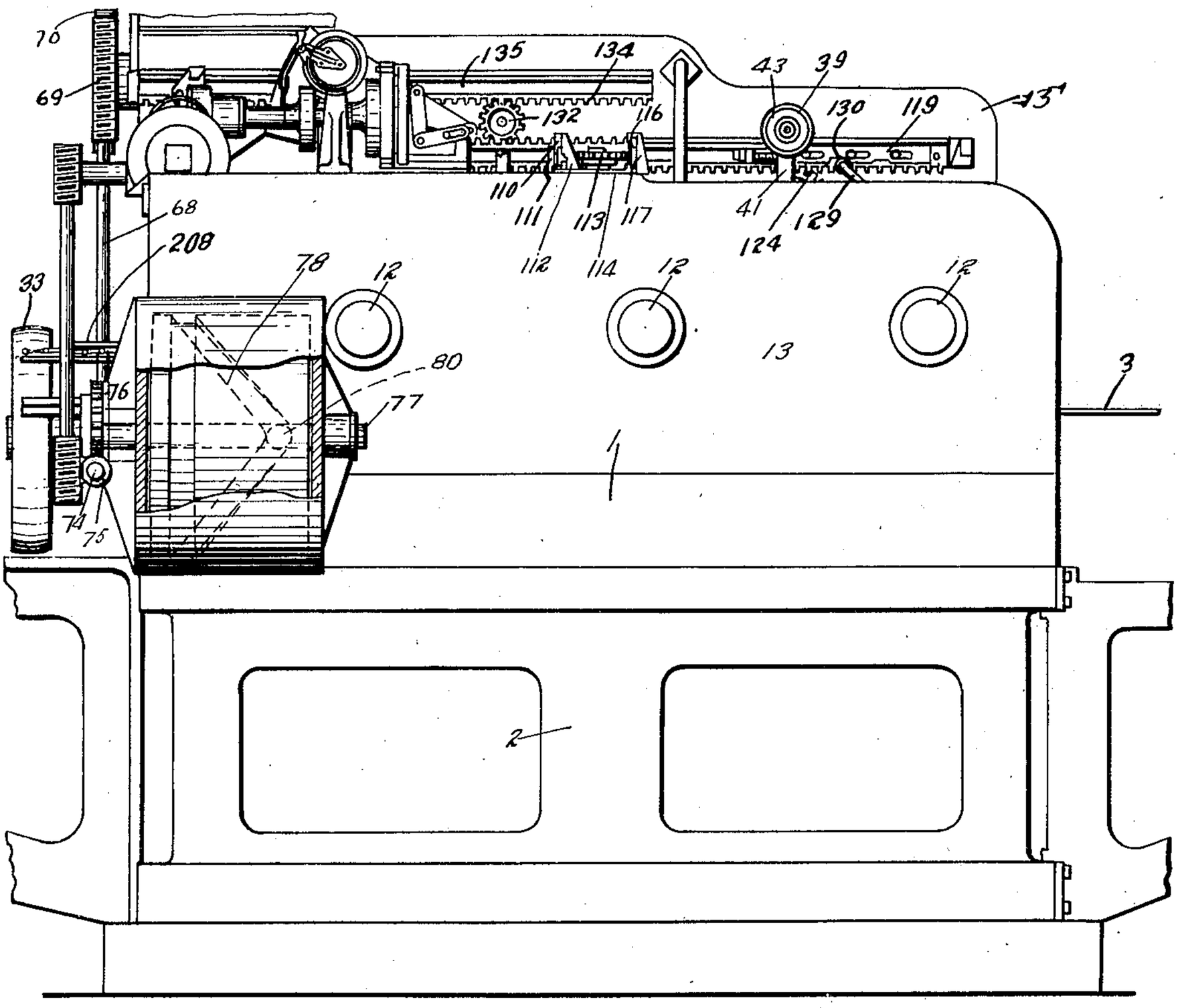

FIG. 2.

INVENTOR
ANDREW BODOR
BY Fred. B. Fetherston Haugh
ATTORNEY

Nov. 26, 1935. A. BODOR 2,022,309

MACHINE FOR MAKING PAPER BOTTLES

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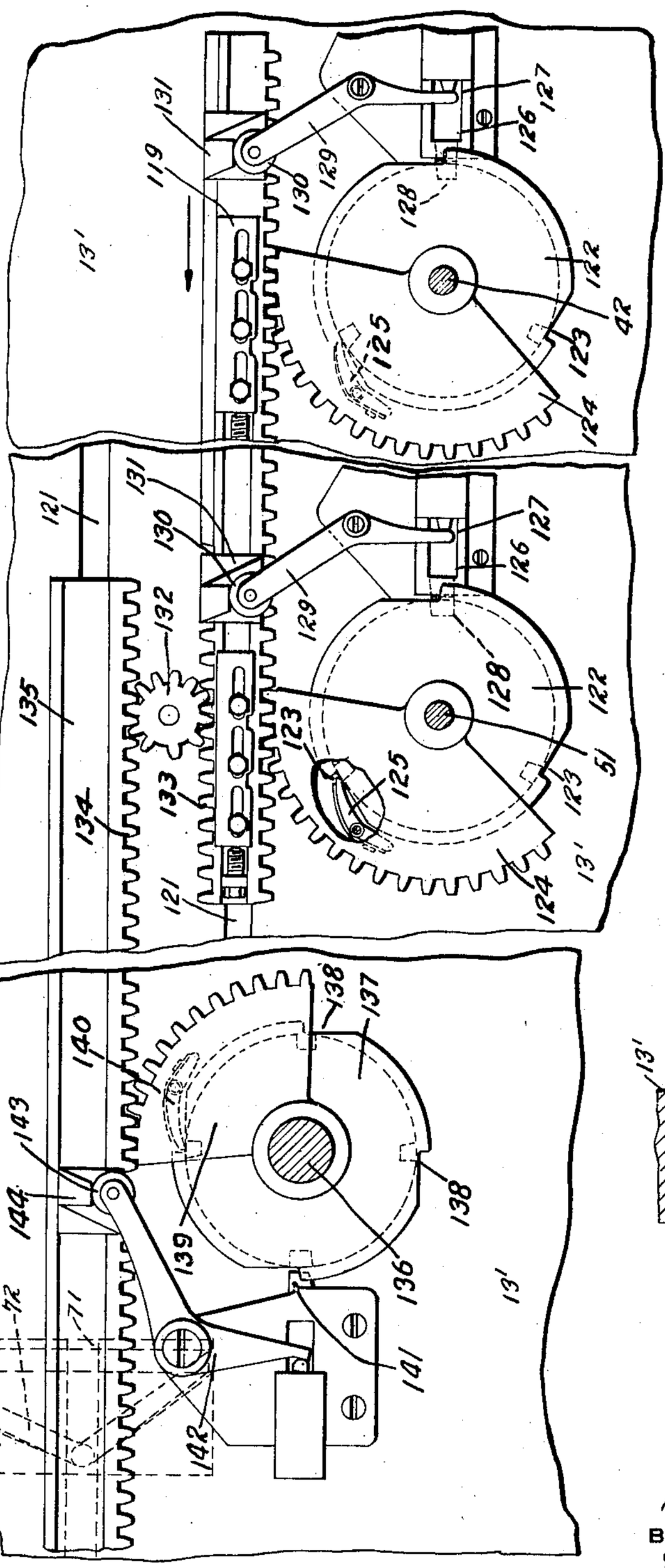

Fig. 8a.

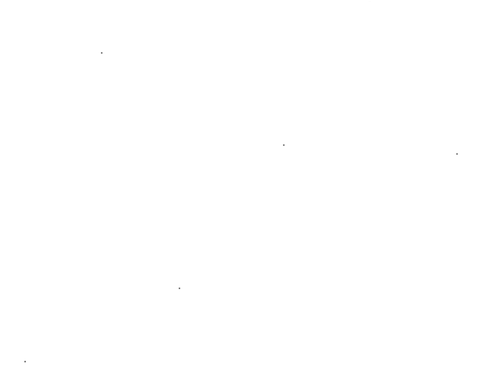

Fig. 8b.

INVENTOR-
ANDREW BODOR
BY Fred B. Fetherstonhaugh
ATTORNEY-

Nov. 26, 1935. A. BODOR 2,022,309

MACHINE FOR MAKING PAPER BOTTLES

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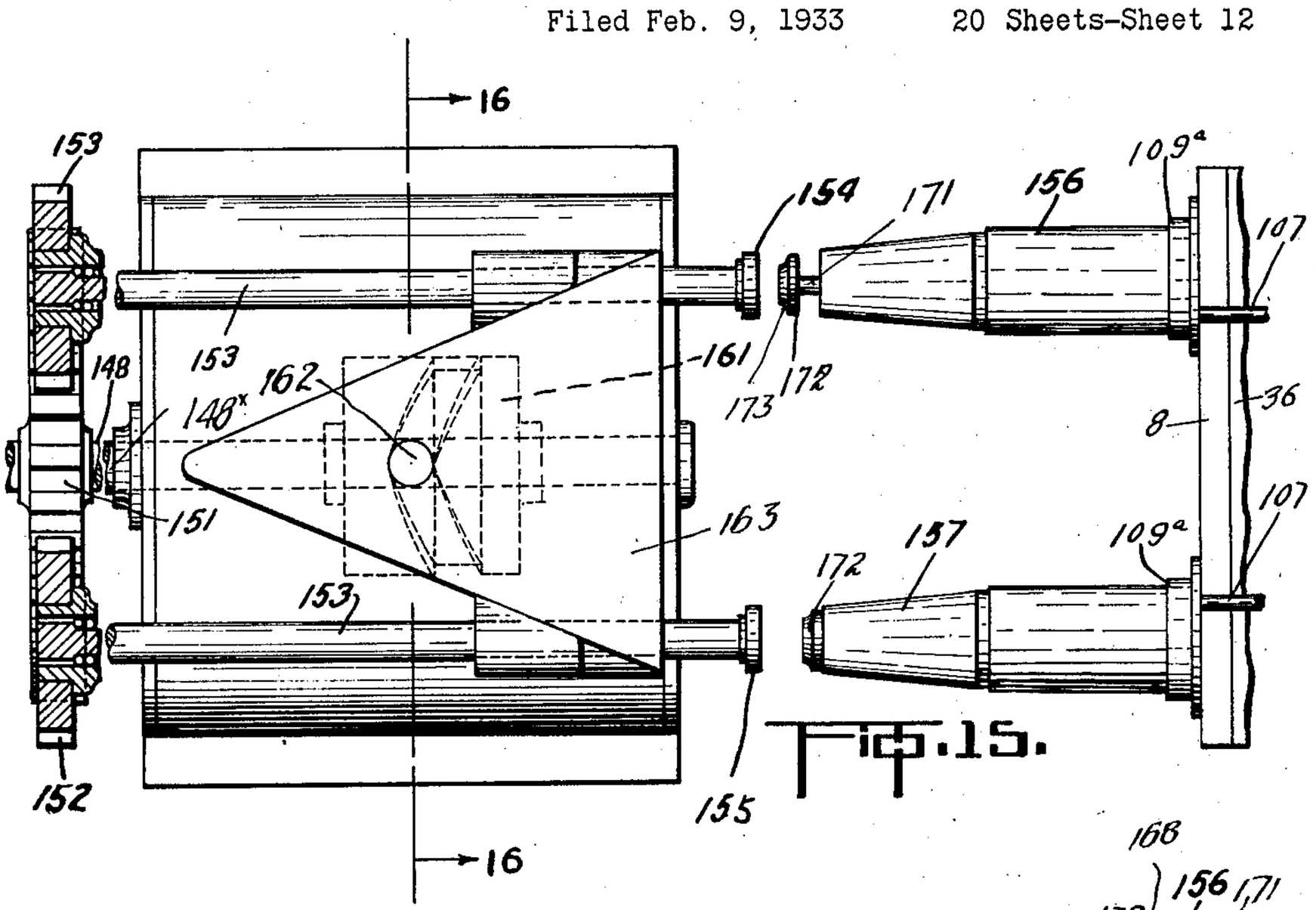

FIG. 15.

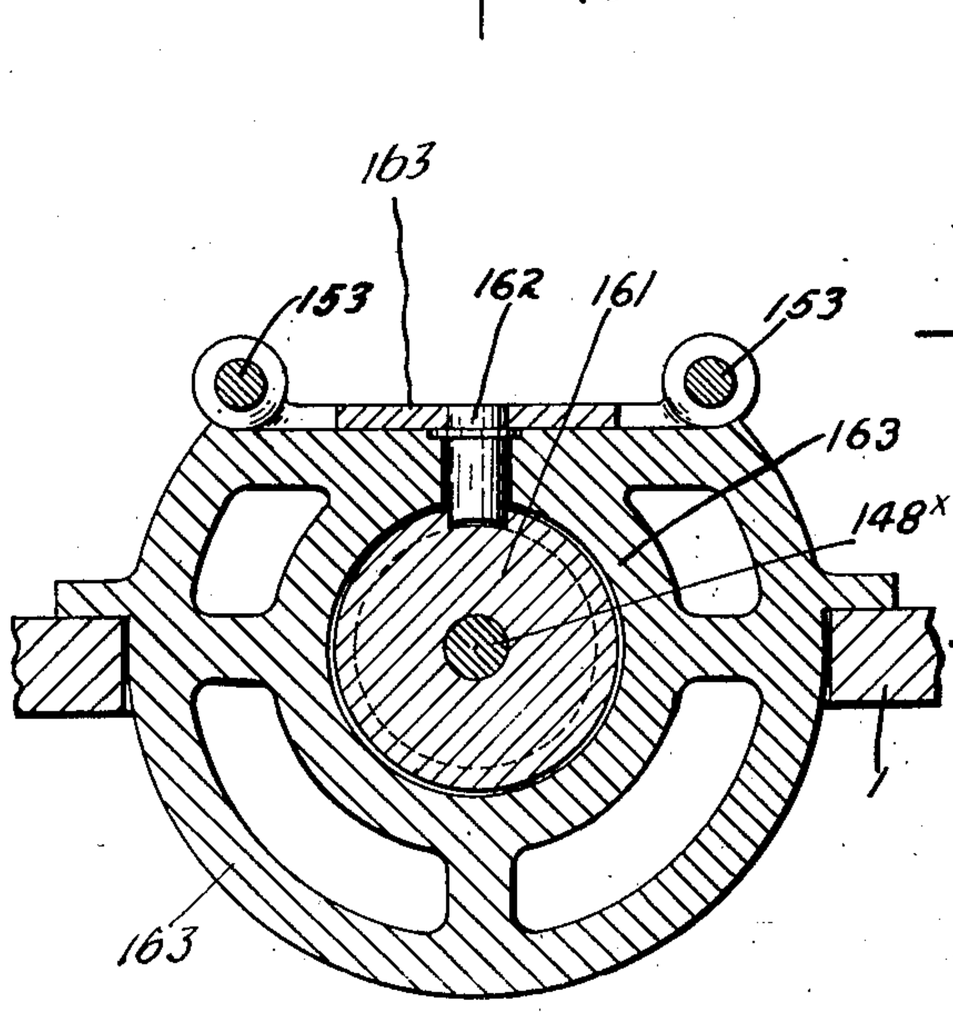

FIG. 16.

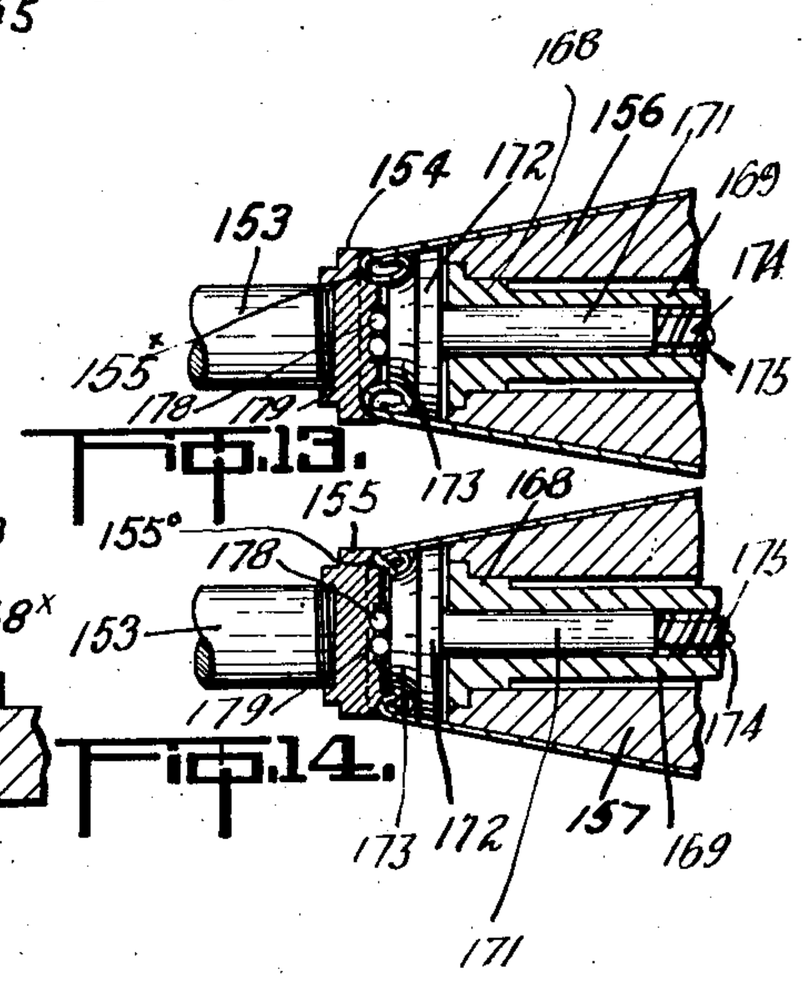

FIG. 13.

FIG. 14.

INVENTOR
ANDREW BODOR
BY Fred. B. Fetherstonhaugh
ATTORNEY

Nov. 26, 1935. A. BODOR 2,022,309

MACHINE FOR MAKING PAPER BOTTLES

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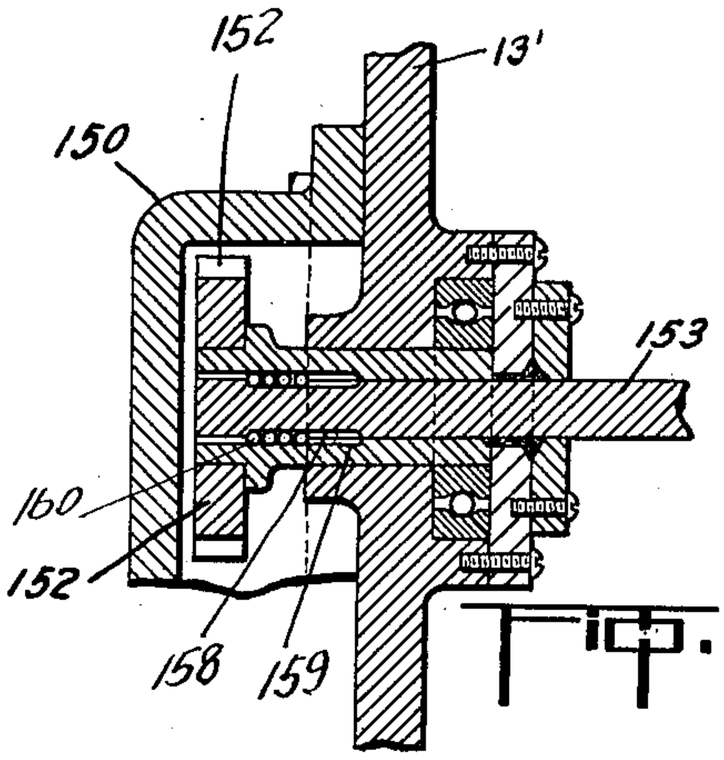

FIG. 17A.

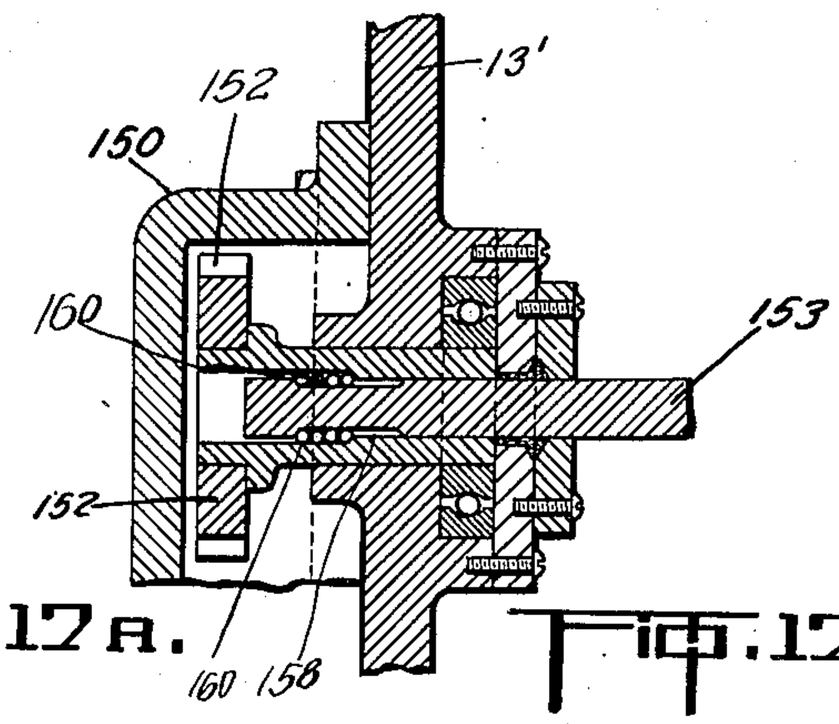

FIG. 17B.

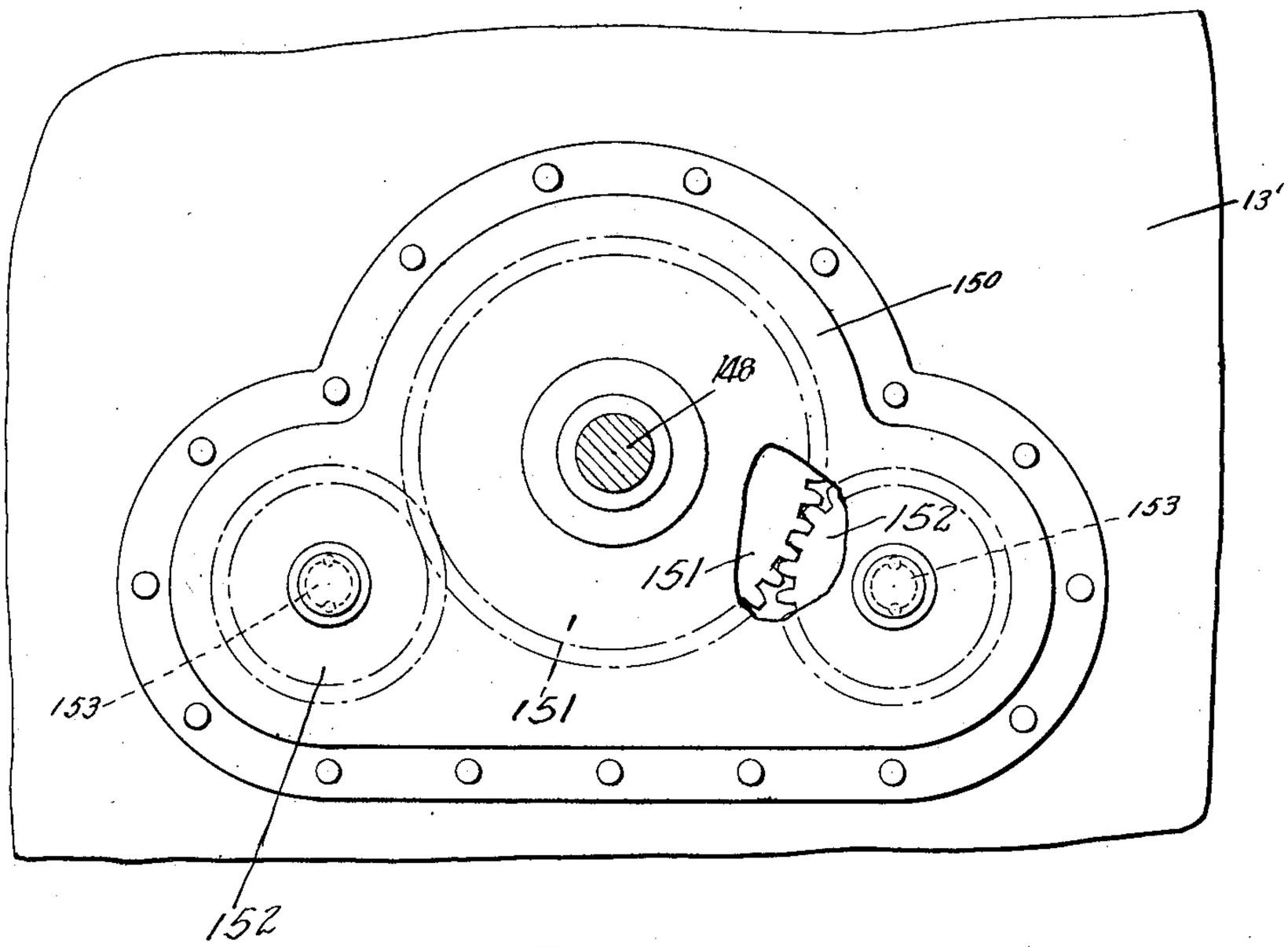

FIG. 17

INVENTOR.
ANDREW BODOR

BY Fred. B. Fetherstonhaugh

ATTORNEY.

Nov. 26, 1935. A. BODOR 2,022,309

MACHINE FOR MAKING PAPER BOTTLES

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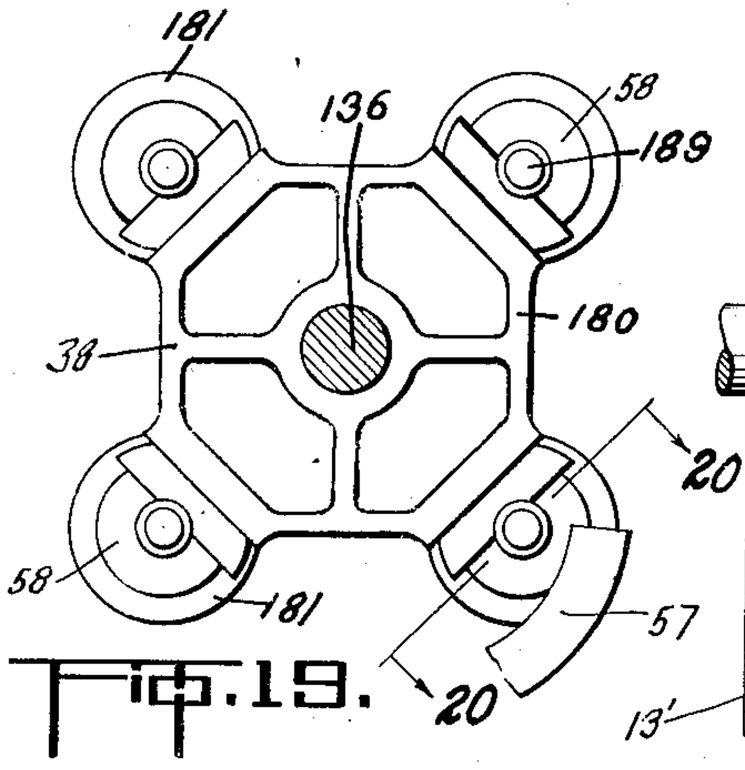

FIG. 19.

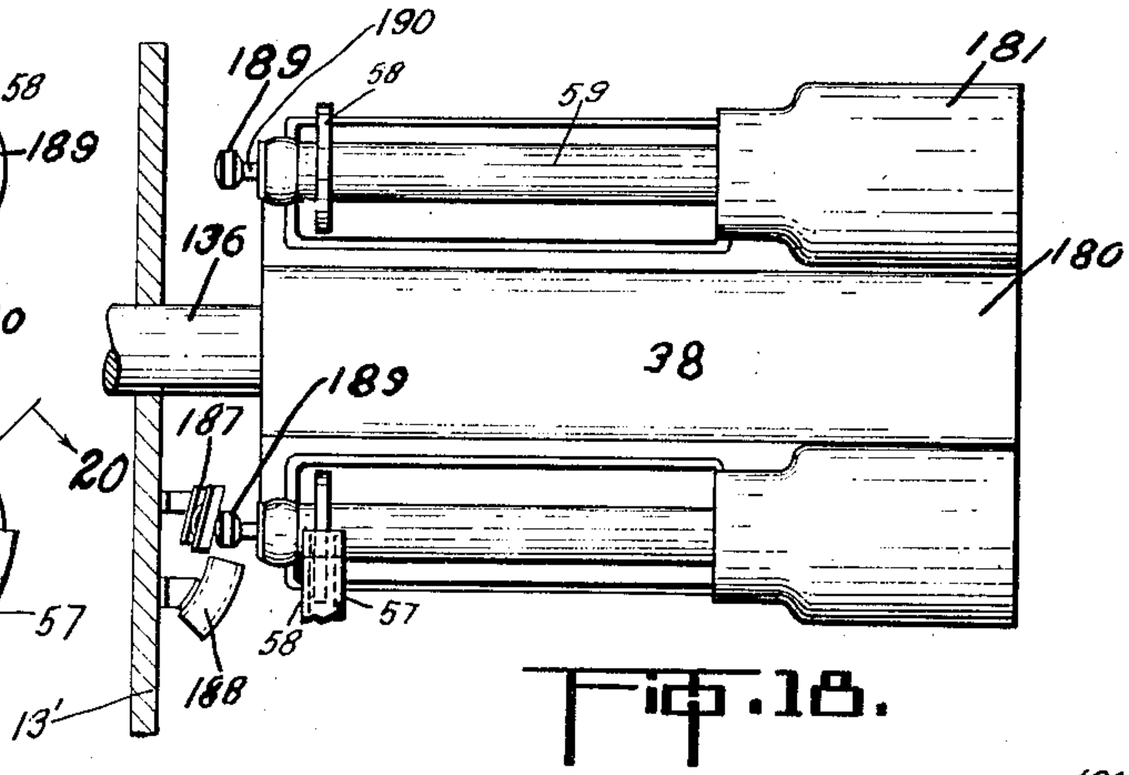

FIG. 18.

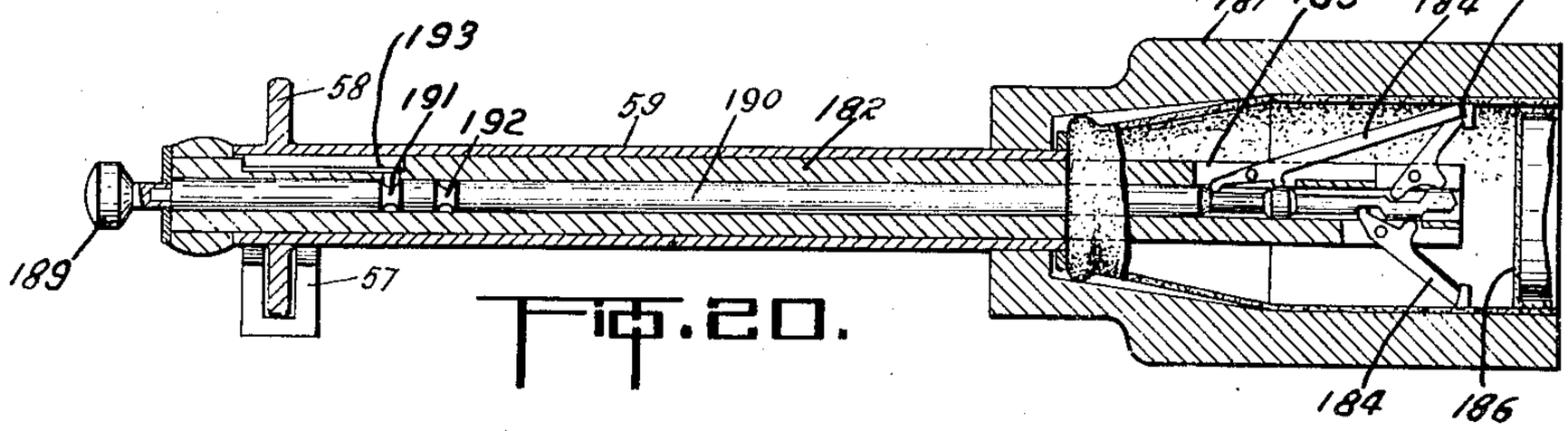

FIG. 20.

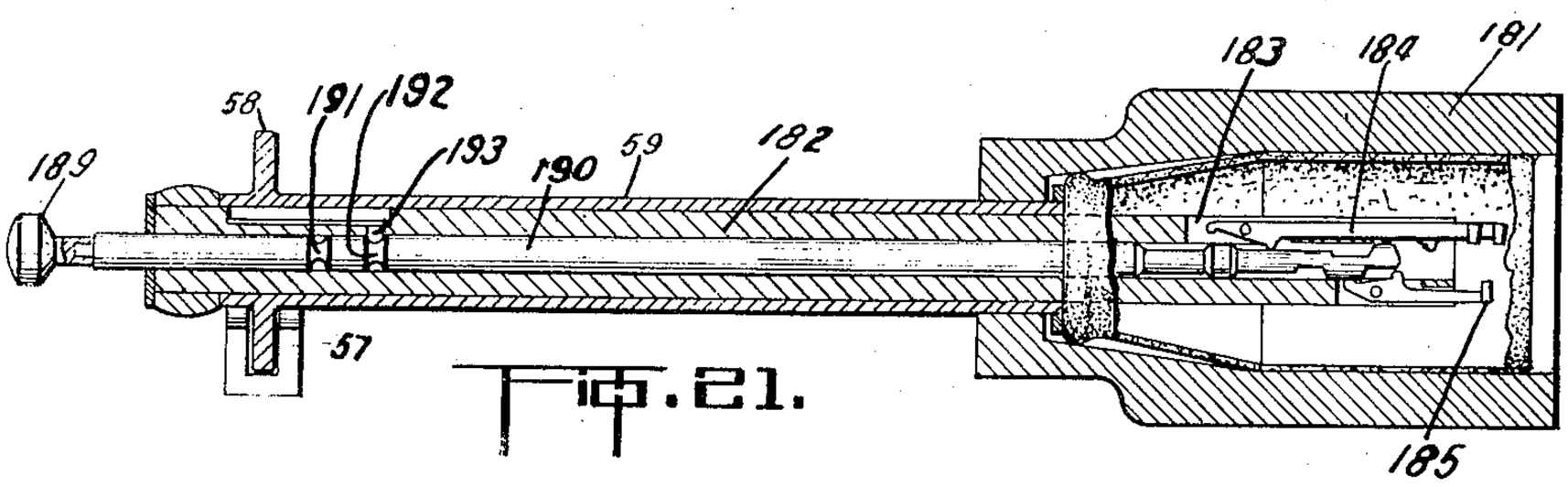

FIG. 21.

INVENTOR.
ANDREW BODOR

BY Fred. B. Fetherstonhaugh

ATTORNEY.

Nov. 26, 1935. A. BODOR 2,022,309

MACHINE FOR MAKING PAPER BOTTLES

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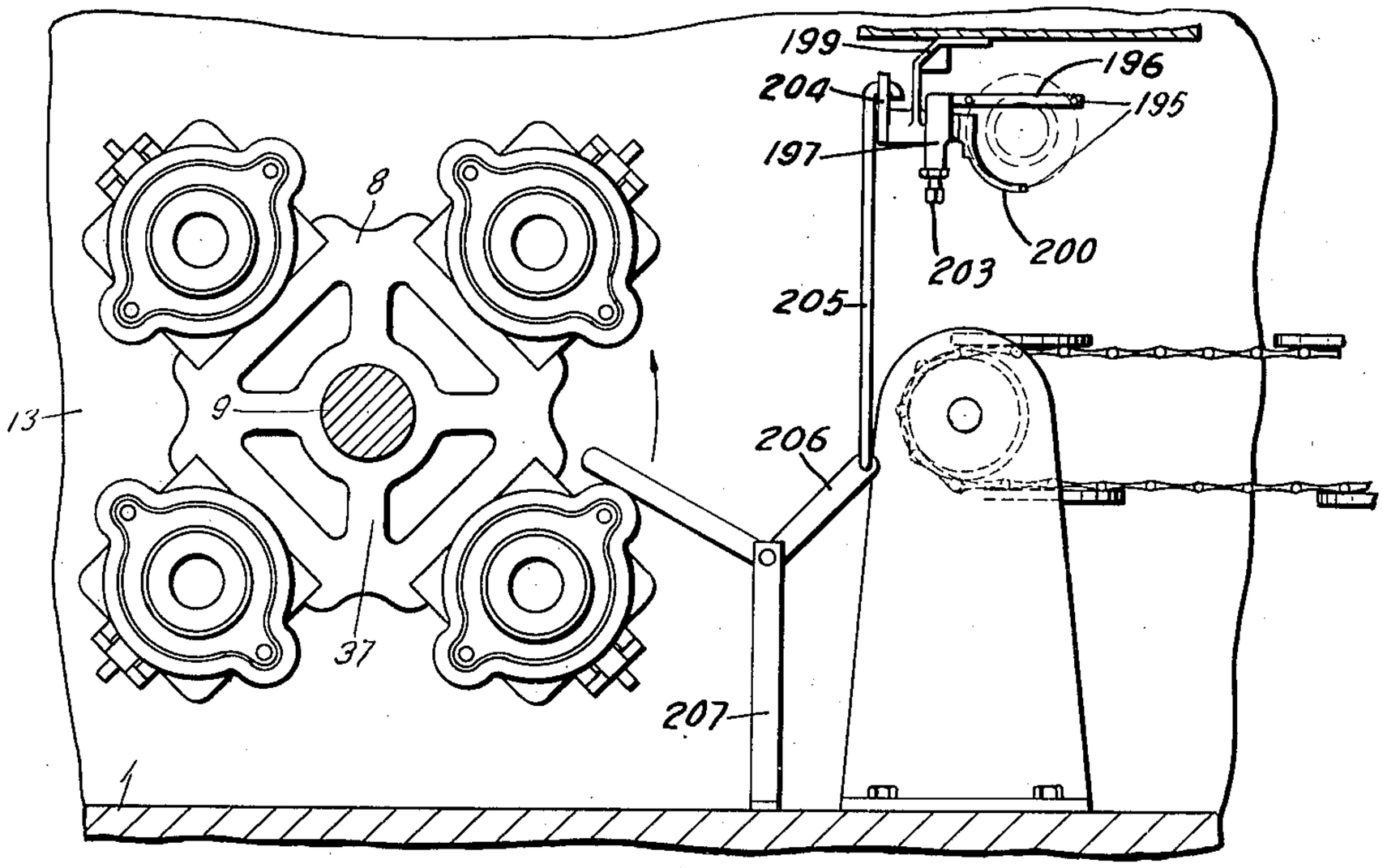

Fig. 22.

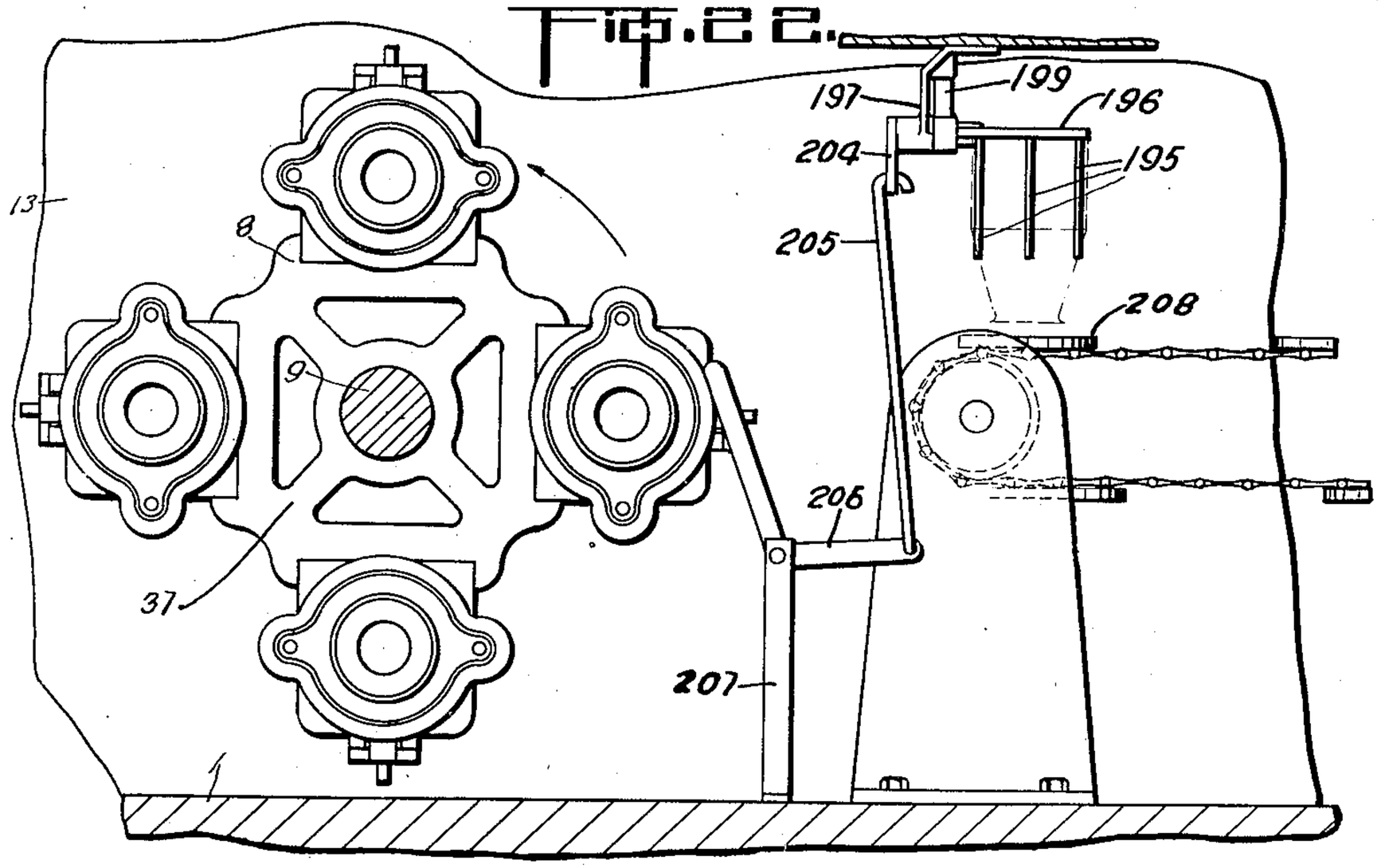

Fig. 23.

INVENTOR.
ANDREW BODOR

BY Fred B. Fetherstonhaugh

ATTORNEY.

Nov. 26, 1935. A. BODOR 2,022,309

MACHINE FOR MAKING PAPER BOTTLES

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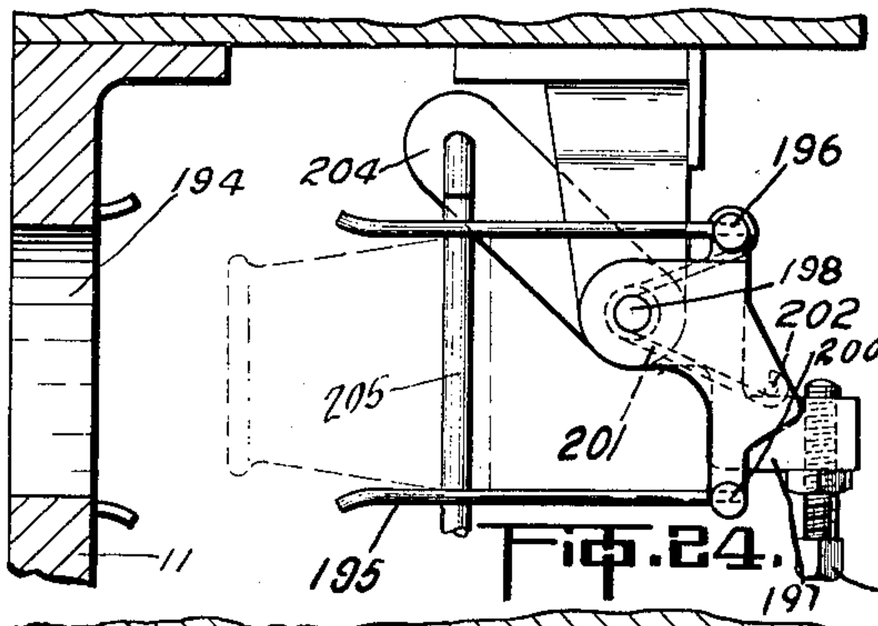

FIG. 24.

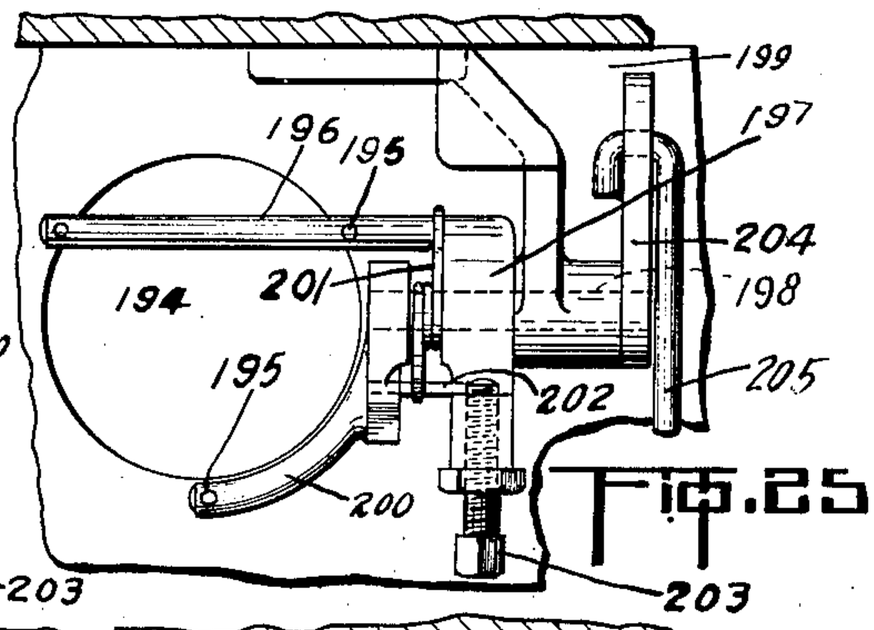

FIG. 25

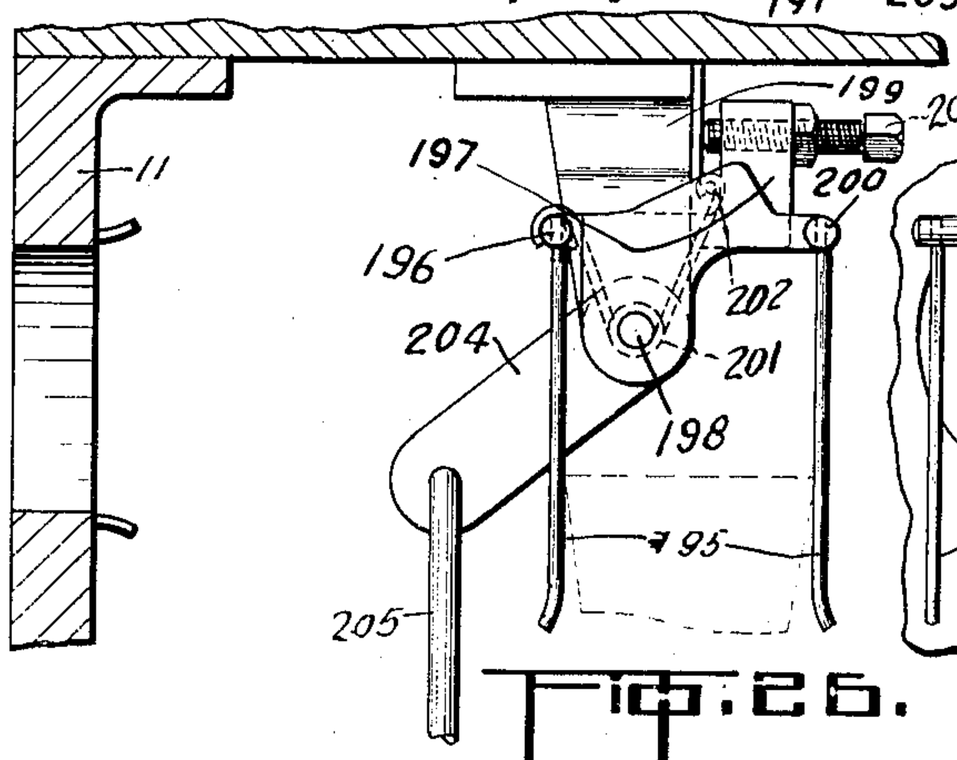

FIG. 26.

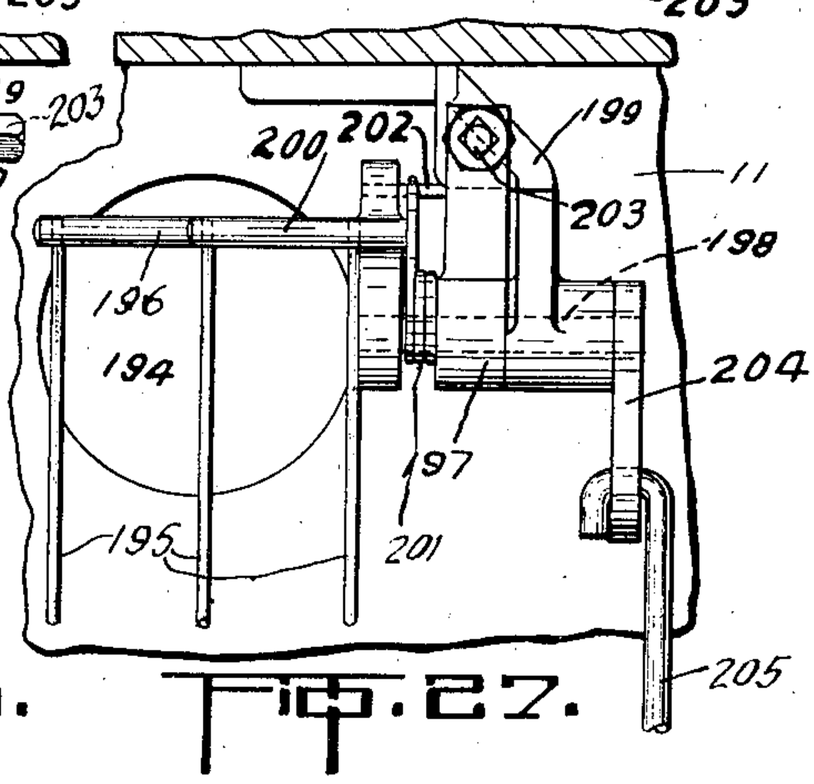

FIG. 27.

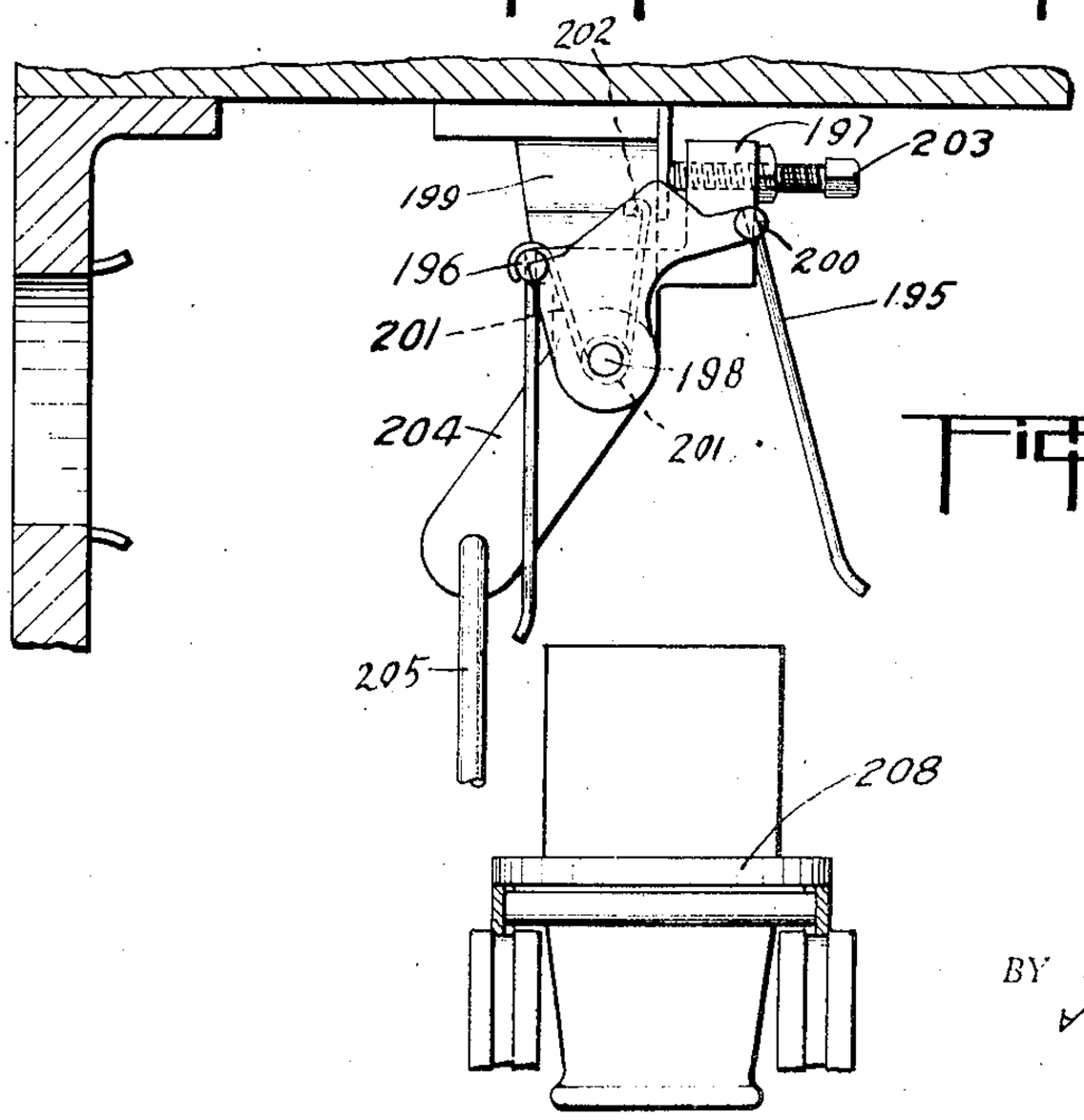

FIG. 28.

INVENTOR.
ANDREW BODOR

BY Fred. B. Fitzsimmons Gallagh

ATTORNEY.

Nov. 26, 1935. A. BODOR 2,022,309

MACHINE FOR MAKING PAPER BOTTLES

Filed Feb. 9, 1933 20 Sheets-Sheet 17

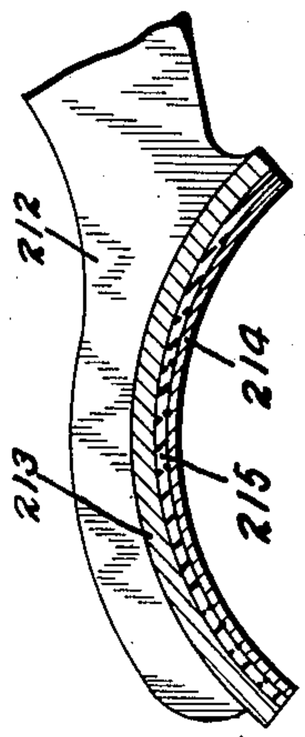

Fig. 31a.

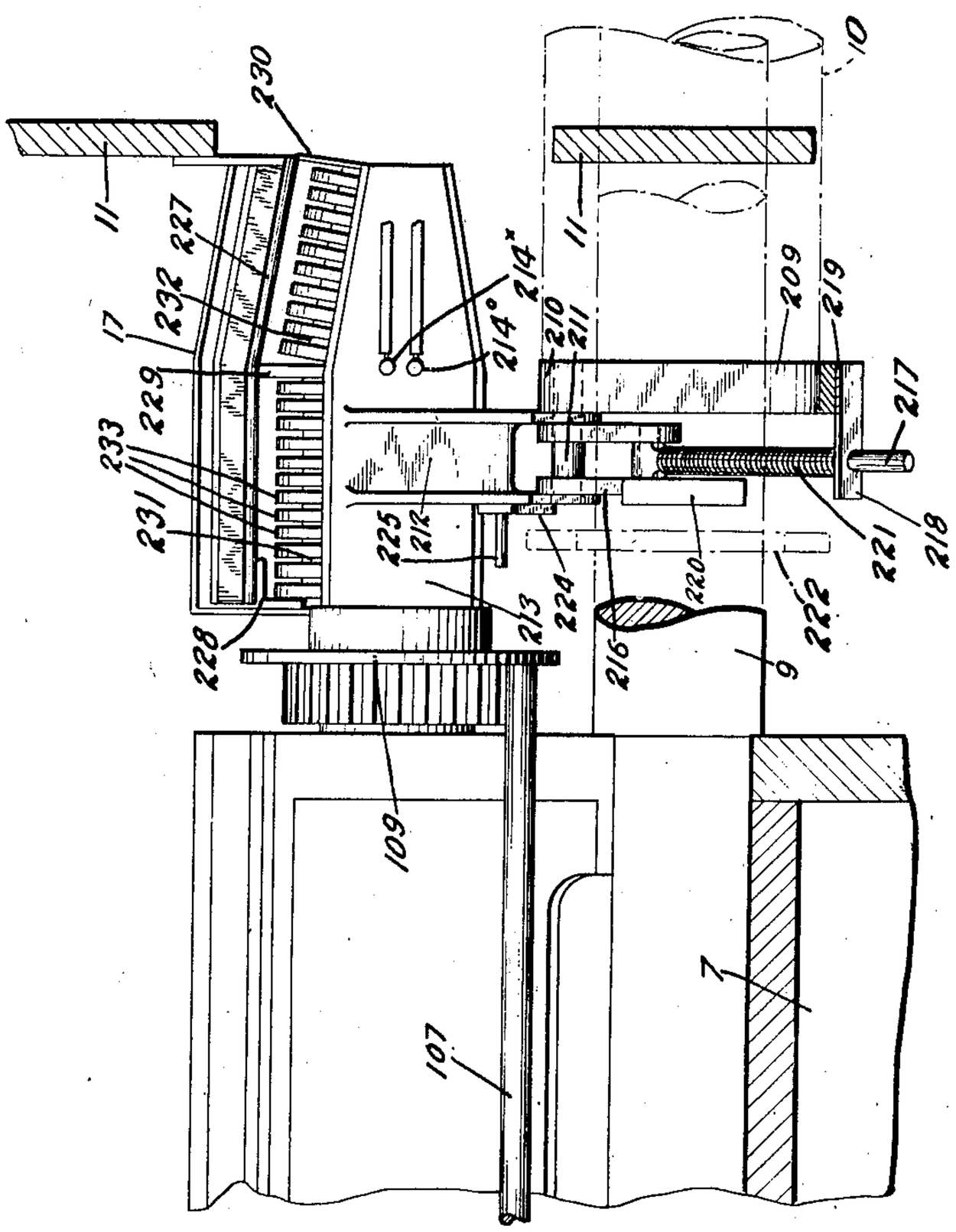

Fig. 29.

INVENTOR-
ANDREW BODOR
BY Fred. B. Fetherstonhaugh
ATTORNEY-

Nov. 26, 1935. A. BODOR 2,022,309

MACHINE FOR MAKING PAPER BOTTLES

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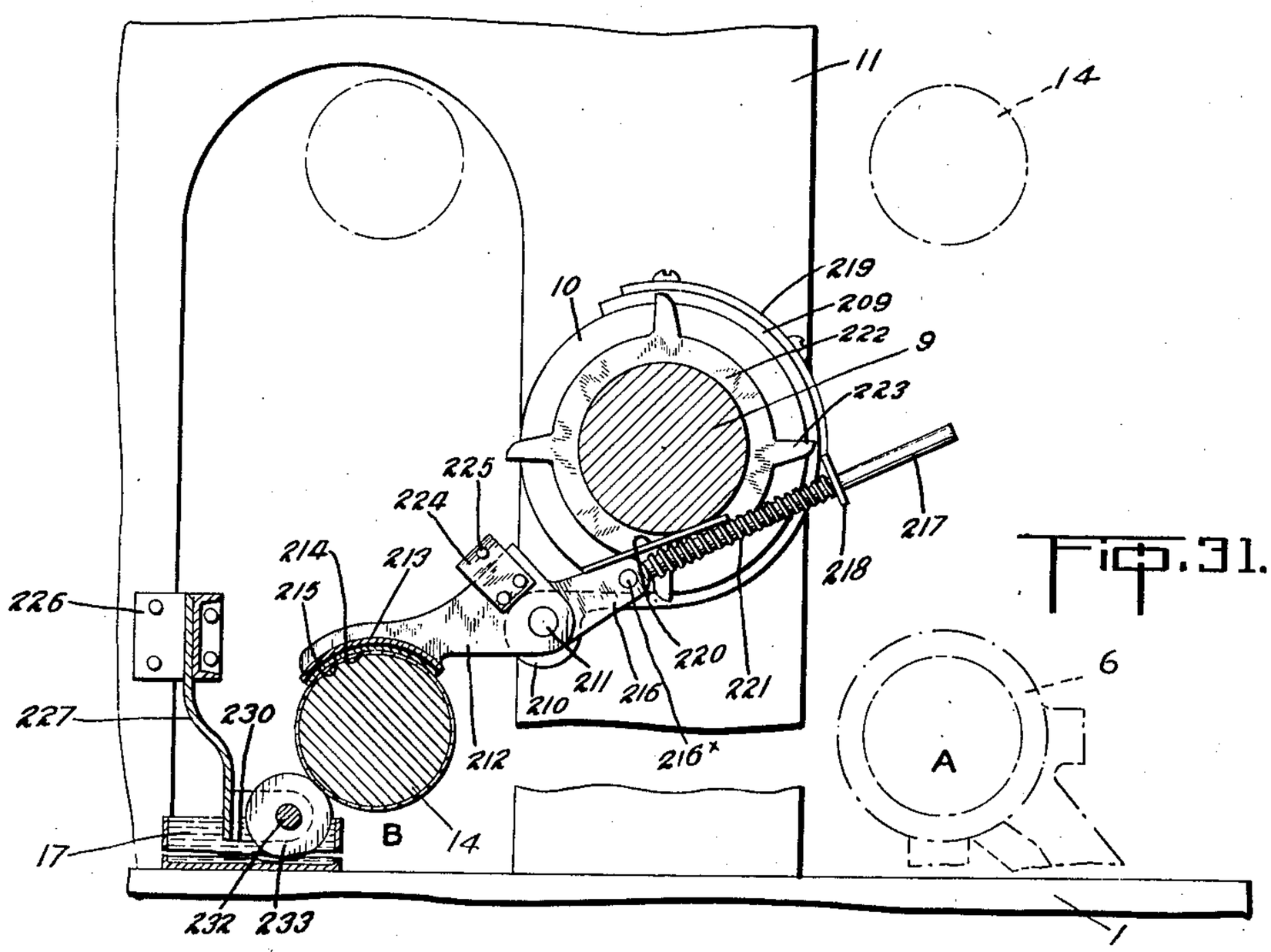

Fig. 31.

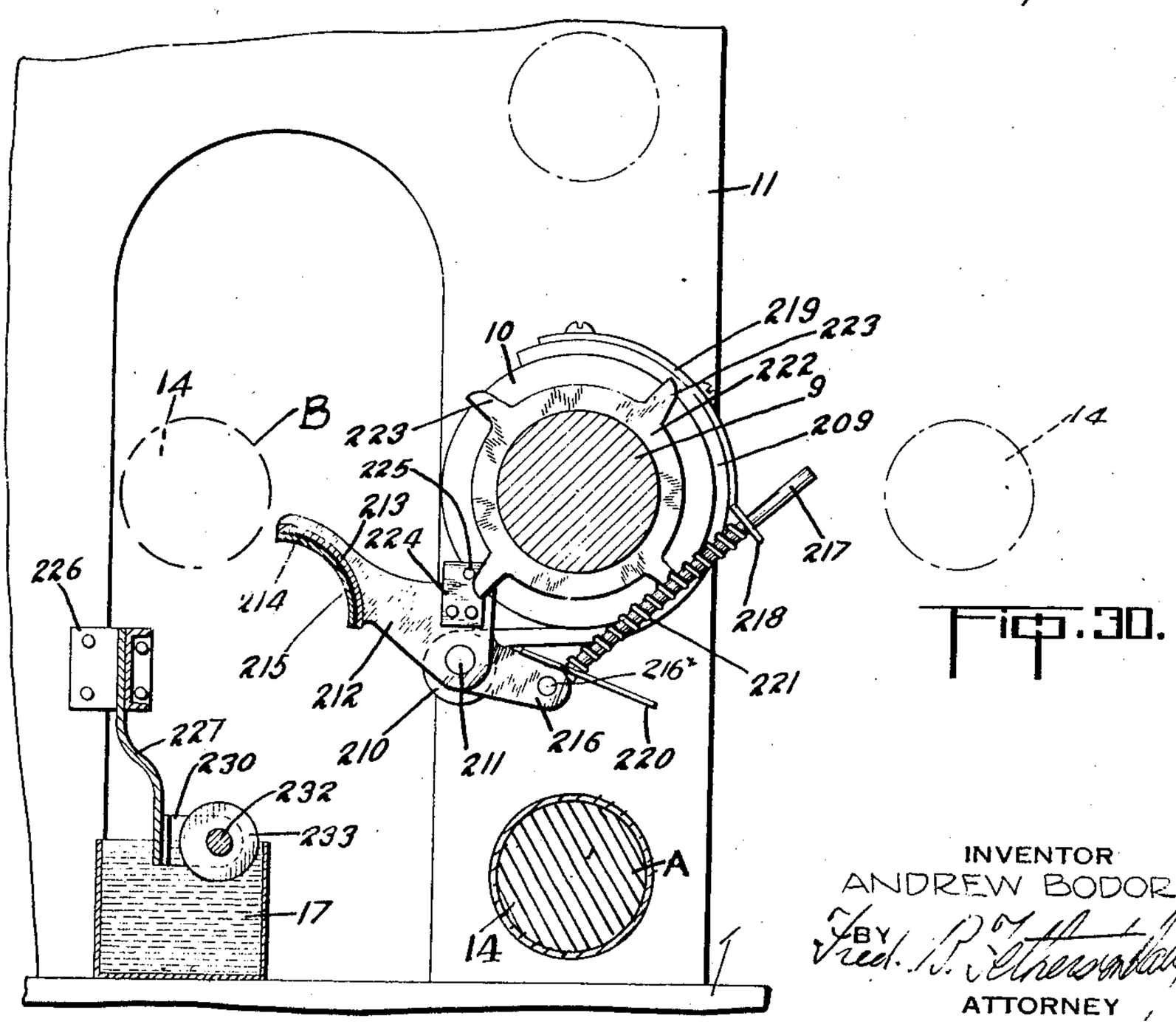

Fig. 30.

INVENTOR
ANDREW BODOR
BY Fred. P. Thresher
ATTORNEY

Nov. 26, 1935. A. BODOR 2,022,309

MACHINE FOR MAKING PAPER BOTTLES

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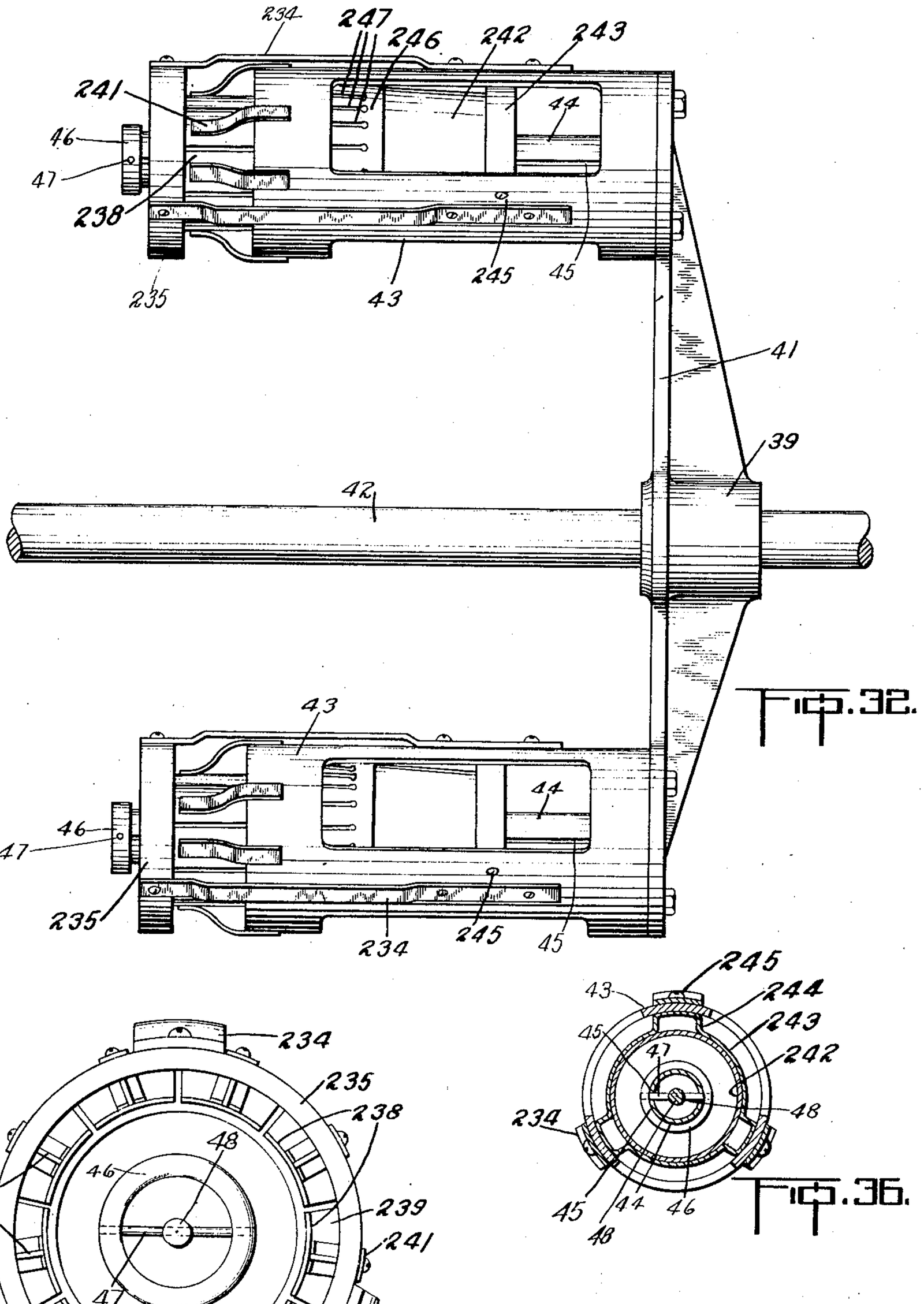

FIG. 32.

FIG. 33.

FIG. 36.

INVENTOR
ANDREW BODOR
BY Fred B. Felkenstaugh
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Nov. 26, 1935. A. BODOR 2,022,309

MACHINE FOR MAKING PAPER BOTTLES

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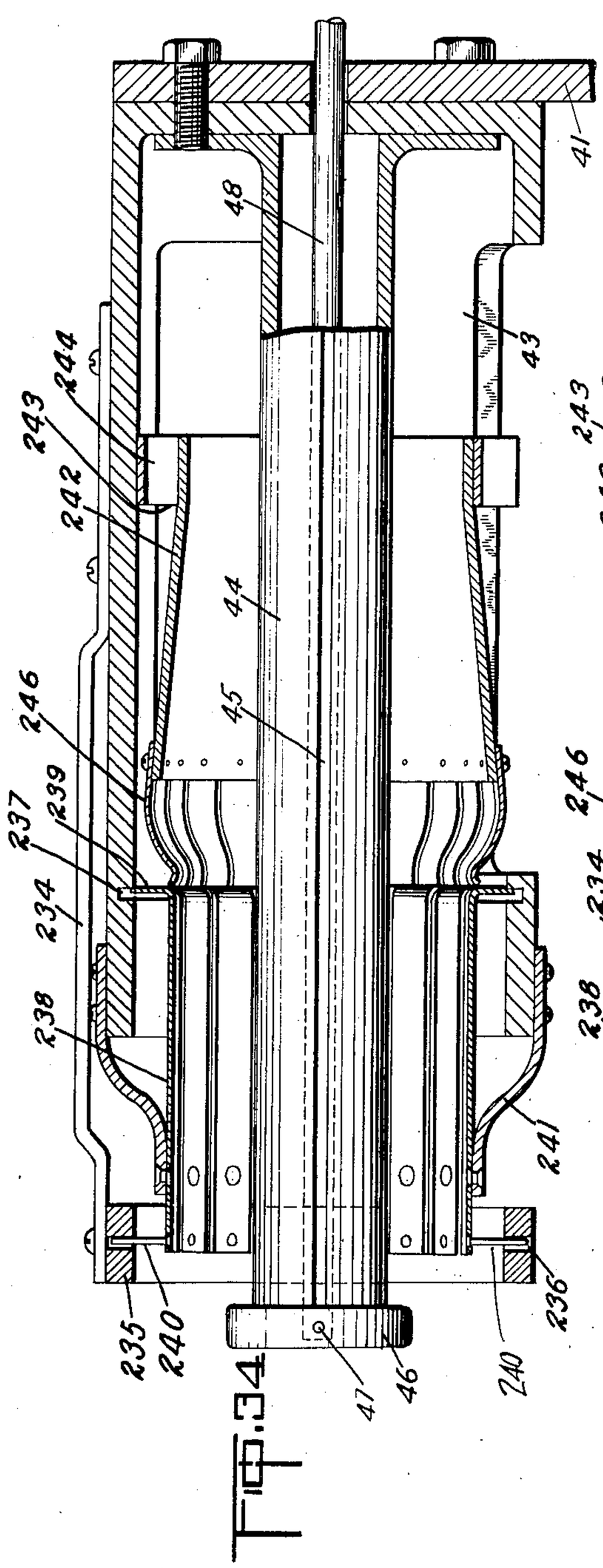

FIG. 34

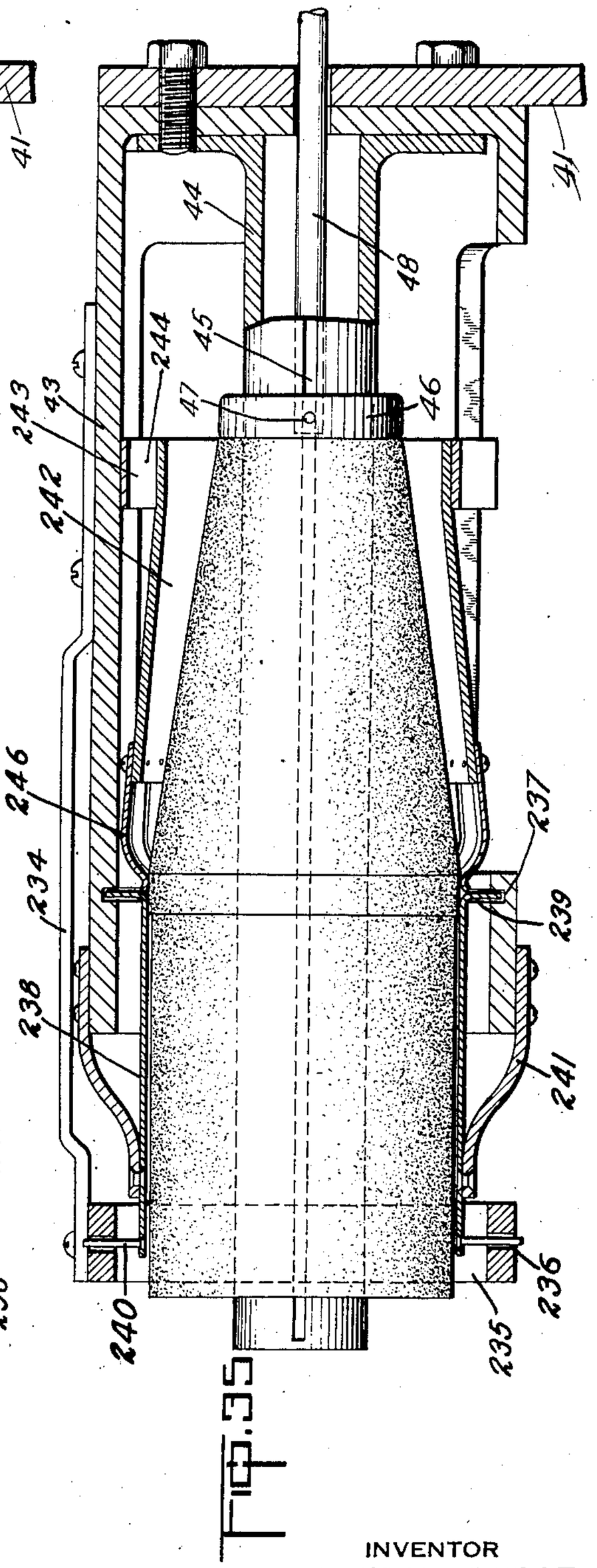

FIG. 35

INVENTOR
ANDREW BODOR
BY Fred B. Fetherstonhaugh
ATTORNEY

Patented Nov. 26, 1935 2,022,309

UNITED STATES PATENT OFFICE

2,022,309

MACHINE FOR MAKING PAPER BOTTLES

Andrew Bodor, Newark, N. J., assignor to Reinforced Paper Bottle Corporation, New York, N. Y., a corporation of Delaware

Application February 9, 1933, Serial No. 656,014

66 Claims. (Cl. 93—39)

My invention relates to improvements in paper bottle making machines, and the object of the invention is to produce an assembly of the various operating parts whereby the bottle may be wound, the neck formed, the bottom inserted in position and spun and the bottle delivered consecutively.

It is not the intention to describe in this application, in detail, the mechanism whereby the body of the bottle is wound, the swedging of the neck is performed in order to produce the corrugated upper portion of the bottle, nor the means whereby the bottom is inserted in the bottle as these form the subject matters of separate applications filed concurrently herewith, but it is the intention to describe the various mechanisms of the machine whereby the bottle is brought to and through the various stages above set forth and the means whereby it is finally delivered from the machine.

My invention consists of a machine having a main frame and bed plate and an arrangement of step by step rotating turrets and step by step rotating transfer cages coacting therewith and arranged to perform the various functions consecutively to produce a bottle, and further mechanism to deliver the bottle from the machine when completely formed as will hereinafter be more particularly explained.

Fig. 1 is a plan view of the machine showing a portion of the feed table and a portion of the paraffining machine at the opposite end.

Fig. 2 is a longitudinal section on **2—2** Fig. 1, looking in the direction indicated by arrows.

Fig. 2*a* is a perspective detail of one of the transfer units.

Fig. 2*b* is a detail view of the bottle partially formed showing the paraffin coating.

Fig. 2*c* is a detail view of the bottle with the neck formed up.

Fig. 2*d* is a detail view of the bottle swedged to finally form the corrugations and neck, previous to the bottom being put in.

Fig. 2*e* is a detail view of the bottle as completely formed and ready for delivery to the paraffiner.

Fig. 2*f* is a detail view of the cam whereby the swaging mechanism is operated.

Fig. 3 is a longitudinal section taken on the line **3—3** Fig. 1 showing the central frame broken away from the top to the bed plate looking in the direction indicated by arrows.

Fig. 4 is a longitudinal section taken on the line **4—4** Fig. 1, looking in the direction indicated by arrows.

Fig. 4*b* is a fragmentary sectional view on the line **4¹**, Fig. 1, showing the rack bar and mechanism whereby the turrets are operated step by step.

Figs. 4*c*, 4*d* and 4*e* are vertical sections through the line **4***a* Fig. 1, looking in the direction indicated by arrow.

Fig. 4*f* is a sectional plan of the mechanism shown in Figs. 4*c*, 4*d* and 4*e*.

Fig. 5 is an end elevation looking at the discharge end of the machine.

Fig. 5*a* is a detailed view mostly in section of the forming end of the mandrel of the third turret.

Fig. 6 is a side elevation of the machine at the transfer side.

Fig. 6*a* is a sectional detail view of the cam and its connection to the rack bar which operates transfer units co-operating with the first and second, and second and third turrets and also the fourth turret on the mandrels of which the body of bottle is held as the bottom is being spun in.

Fig. 7 is a side elevation of the machine at the turret side.

Figs. 8 and 8*a* are fragmentary views showing the mechanism for operating the transfer cages.

Fig. 8*b* is a cross section showing the rack bar and guideway shown in Figs. 8 and 8*a*.

Fig. 9 is a plan view partially in section of the turret carrying the winding mandrels.

Fig. 10 is an end view of Fig. 9 partially in section showing the construction of the turret.

Figs. 11, 12, 13 and 14 are longitudinal sections of the mandrel and turret and spinning mechanism coacting therewith whereby the neck is formed.

Fig. 15 is a plan view of the mandrels and a portion of the turret and the mechanism for imparting a longitudinal movement to the spinning tools.

Fig. 15*a* is a detail of the worm drive operating the spinning mechanism.

Fig. 16 is a transverse section taken on the line **16—16** Fig. 15.

Fig. 17 is a side elevation showing the gearing of the spinners mostly in dotted lines, the frame of the machine being broken away.

Figs. 17*a* and 17*b* are longitudinal sections of the spinner shafts showing the bearings and gears and the two positions of the spinner shafts.

Fig. 18 is an elevation of the turret wherein the bottle is held during the bottom forming operations.

Fig. 19 is a side elevation of Fig. 18.

Fig. 20 is a longitudinal section taken on the line **20—20** Fig. 19, of one of the collapsible man-

drels contained in turret wherein the bottle is held during the bottom forming operations in the operative position.

Fig. 21 is a similar view to Fig. 20 showing the mandrel in the inoperative position.

Fig. 22 is a section and elevation showing the swaging turret and the delivery mechanism which is operated therefrom in the position to receive the completed bottle.

Fig. 23 is a similar view to Fig. 22 showing the bottle in the dotted position about to be delivered.

Fig. 24 is a fragmentary view looking towards the delivery end of the machine partially in section showing the delivery mechanism ready to receive the bottle.

Fig. 25 is a view at right angles to Fig. 24.

Fig. 26 is a similar view to Fig. 24 showing the delivery mechanism in the delivery position.

Fig. 27 is a view at right angles to Fig. 26.

Fig. 28 is a view showing the bottle delivery mechanism when the bottle is released and finally delivered to the endless chain of the paraffiner.

Fig. 29 is a detail plan view of the mechanism for performing the initial paraffining operation.

Fig. 30 is a sectional detail of the parts shown in Fig. 29 prior to applying the paraffin.

Fig. 31 is a similar view to Fig. 30 shown in the paraffin applying position.

Fig. 31*a* is a sectional detail of the heating element and the carrier of the same.

Fig. 32 is an enlarged plan detail of the transfer unit **39**.

Fig. 33 is an end elevation of one of the cages **43** as illustrated in Fig. 32.

Fig. 34 is a further enlarged longitudinal sectional view through a cage **43**.

Fig. 35 is a similar view to Fig. 34 with the bottle body inserted.

Fig. 36 is a cross sectional view on line **36—36** Fig. 32.

In the drawings like characters of reference indicate corresponding parts in the different views.

1 is the bed plate of the machine which is supported on a suitable base **2** and **3** is the feeding table. **4** is the arc-shaped paper blank and **5** is an elongated rectangular blank which together form the major portion of the bottle when they have passed around the winder **6** (see Figs. 1 and 2).

I do not describe the winder for the reason that it forms the subject matter of a separate application.

The mandrel co-operating with the winder shown in Fig. 2 is hidden but is carried by the mandrel turret **7** and is located in the lowermost position in proximity to the feed table as indicated in Figs. 2 and 3. The turret **7** which is the winding turret comprises the end web plates **8**, **8** which are carried on the arbour **9** journalled at one end in the bearing **10** forming a part of the central frame **11** and at the opposite end in the bearing **12** on the outside frame **13** on the far side of the machine. (See detail Fig. 4*c*).

The arbour **9** is divided in proximity to the bearing **12**, the portion journalled in the bearing **12** being keyed to the plate **8**, the portion journalled in the bearing **10** rotating independently of the aforesaid arbour portion.

There are four mandrels **14**, one of which is hidden by the winder **6** hereinbefore referred to and they are located at equal distances apart circularly and are rotated in the direction indicated by arrow. (See Fig. 3.)

It will be understood that after the mandrel **14** passes from the winder to the position at the right, shown in Fig. 2, it carries with it the wound body of the bottle.

17 is a paraffin bath which, in plan, is roughly in the shape of the bottle body. On the bearing **10** of the central frame member **11** is secured a strap bracket **209** which curves downward beneath the bearing to form a small bearing portion **210**, (see Figs. 30 and 31). **211** is a pin secured in the portion **210** upon which is swung an arm **212** carrying a plate portion **213** which is shaped to conform to the shape of the bottle body and concaved to fit therearound. **214** is a heating element having terminals **214**× and **214**⁰. The heating element **214** is supported from the plate portion **213** by insulation **215** (see Fig. 31*a*).

216 is an arm or tail piece extending from the pivot point of the arm **212** between the outer ends of which is pivoted a rod **217** extending at its upper end freely through a lateral extension **218** of a strap **219** secured upon the top of the strap bracket **209**. **220** is a leaf spring which is secured to one member of the tail piece **216**. **221** is a compression spring extending between the enlarged pivotal end of the rod **217** and the lateral extension **218**. The tendency of the spring **221** is to hold the arm **212** carrying the element **214** into its raised position.

222 is an annular member secured to the shaft **9** and provided with a plurality of cam projections **223** corresponding in number to the number of mandrels in the turret. **224** is a plate secured to the arm **212** and provided with a lateral projecting pin **225**.

226 is a channel bar support carried by the frame member **11** from which depends a bracket plate **227** carrying bracket supports **228**, **229** and **230** in which is journalled shafts **231** and **232** on which are carried a series of closely adjacent disc rollers **233**, the lower peripheral portion of which revolves within the liquid paraffin contained in the bath **17**. As the mandrel travels from the position A to the position B the bottle blank carried thereon is carried into contact with the periphery of the rollers **233** and as the blank is revolved by the mandrel the paraffin wax is transferred to the surface thereon.

Prior to the bottle contacting with the rollers **233**, the arm **212** is tripped by one of the cam projections **223** engaging the pin **225** thereby forcing the arm **212** down on its pivot exerting the pressure of the leaf spring **220** against the shaft **9**, so that the pivot point **216**× is carried above the dead centre position thereby forcing the element **214** down into position to engage the bottle blank when it is carried into engagement with the rollers **233** the heat of the element serving to spread the wax evenly over the surface of the bottle blank.

As the mandrel travels upward during the next step by step movement from the position B in Fig. 3, the arm **212** is forced upward carrying the pivot **216**× downward against the pressure of the spring **221** to break the joint and allow the parts to return to their normal position illustrated in Fig. 30.

In order that the blanks may be wound on the mandrel of the winding turret as soon as they enter the machine, it is necessary that each of the mandrels be continuously driven and in order to effect this, I provide a shaft **20** which extends through the arbour **9** and carries on it a gear wheel **21** which meshes with the gear pinions **22**

on each of the mandrels of the turret 7 (see Figs. 9 and 10).

The gear wheel 21 is situated on the shaft 20 at the point where the arbour 9 is divided in proximity to the frame at the far side of the machine. The shaft 20 at the opposite end extends through a bearing in the frame 13^1 at the near side of the machine and is provided with a gear pinion 23 which meshes with a gear pinion 24 supported on a spindle extending through the bearing 25, secured to the bed plate 1. The opposite end of the spindle carries a worm wheel 26 which meshes with the worm 27 on the driving shaft 28. The driving shaft 28 is carried in suitable bearings 29 and the opposite end of it is provided with a pinion 30 which meshes with a pinion 31 on the shaft 32 which is carried in suitable bearings and is provided at the outer end with the main driving pulley 33.

It will thus be seen that the mandrels of the turret 7 are continuously driven from the main driving shaft of the machine.

The mandrels 14, it will be seen on reference to Fig. 9 are hollow and tapered at the outer end at 14^1 and have a slight shoulder 14^2 to provide for the extra ply where the two blanks are connected together. 34 is a hollow spindle on which the mandrel 14 is secured. The spindle 34 has secured to it at one end the gear pinion 22. There are four mandrels in each turret and the mandrels of the winding turret are rotated as hereinbefore described by the gear wheel 21 meshing with the gear pinions 22 on the end of the hollow spindles 34.

The turret 7 is, as hereinbefore described, the winding turret, there are, however, three further turrets which I designate 36, 37 and 38 and are respectively the neck spinning, swaging and bottom spinning turrets. The body of the bottle is carried from the turret 7 to the turret 36 and from the turret 36 to the turret 37 by means which I will presently describe. The body of the bottle when on the mandrel of the turret 36 has the neck spun on the body, and when on the mandrel of the turret 37 the swaging operation and final formation of the neck is accomplished to produce the form shown in Fig. 2*d*.

From the swaging turret 37 the bottle is carried by means, which I shall presently describe, to the final turret 38, on which turret the bottom is put in by means described in a copending application.

When the bottom is put in I provide means for final delivery as hereinafter described.

In order to transfer the body of the bottle from one turret to another it is necessary to provide a stripping mechanism for each turret so as to carry the bottle body to the transfer unit. There are two transfer units 39 and 40. The transfer unit 39 is designed to transfer the bottle body from the winding turret 7 to the next spinning turret 36 and the transfer unit 40 is designed to carry the bottle body from the neck spinning turret 36 to the swaging turret 37.

The transfer units 39 and 40 act simultaneously and each transfer unit comprises three arms located peripherally at equal distances apart which I designate 41. The arms 41 of each unit are secured to the shafts 42 and 51 which are driven as will presently appear. On the end of the arms 41 which are circular is carried the cage 43 in the form of an open cylinder. 44 is a sleeve extending through the cage 43 and provided with a slot 45 extending longitudinally thereof. 46 is a collar located on the sleeve 44 and having a pin 47 extending into the same and through the slot 45 in the sleeve 44.

The pin 47 is not only connected to the collar 46 but also to a rod 48 and as such pin extends through the slot 45 the collar 46 and the rod 48 move together. The rod 48 of the transfer mechanism 39 at the opposite end from the collar 46 abuts the boss 49, or nearly so, secured on one end of the bar 50 and the rod 48 of the transfer mechanism 40 abuts the boss $49^\times$ at the opposite end of the bar 50. The bar 50 is mounted on the shaft 51 upon which it is adapted to slide. The bar 50 is connected by a rod 52 to a rod 53 which is connected at the opposite end to a rod 54 carrying a pin 55 which extends into the groove of the cam 56 (see detail Fig. 2*f*).

57 is a bar which is connected and operated by a cam in connection with the final swaging mechanism by the same device referred to in Fig. 2*f*, except that necessarily the bar 57 would be on the opposite side of the rod 54. The upper end of the bar 57 is channelled and such channel extends on both sides of the collar 58 on the hollow spindle 59 of the collapsible mandrel of the turret 38 (see Figs. 2, 19, 20 and 21). The cam operating connection with the bar 57 is the mechanism whereby the bottle when finished is transferred from the final turret to the delivery apparatus hereinafter described.

It will be noticed that the transfer unit comprises three arms carrying the corresponding number of cages and that the turrets have each four mandrels and, consequently, in order that they work together the transfer unit must rotate a third revolution to each quarter revolution of the turrets, in order that the bottle body may be delivered continuously from the turrets to the transfer unit as such body is passing from the turrets to the transfer units and from the transfer units to the turrets.

On reference to Figs. 1, 6 and 2*f*, it will be seen the shaft 32 has two worms 60 and 61 which serve to drive the cams or rotate them through the medium of the shafts 62 and 63 and the worm gears 64 and 65 respectively.

The shaft 32 has a worm 66 which meshes with a worm wheel 67 on the vertical shaft 68. At the upper end of the shaft 68 is a worm 69 which meshes with the worm wheel 70 on the end of the shaft 71 carrying the cam 72 (see Figs. 6 and 6*a*).

There is a similar cam and mechanism co-operating with the rack bar on the opposite side of the machine by which the turrets are operated which I shall now describe.

In order to impart motion to the rack bar whereby the turrets are given a step by step movement, I provide the shaft 32 with a worm 66, as hereinbefore described, which not only meshes with the worm wheel 67 but also with a worm wheel 73 located on the shaft 74 which is supported in suitable bearings. On the opposite end of the shaft 74, I provide a worm 75 which meshes with a worm wheel 76 on the shaft 77 carrying the cam 78 (see Figs. 1, 7 and 4*b*).

The rack bar 79 has imparted to it a reciprocating movement by means of the follower pin 80 working in the groove of the cam 78. By this reciprocating movement of the bar 79 the turrets 7, 36 and 37 are operated through the medium of the segmental gears 81 which are swung freely on the shafts 9 and mesh with the bar 79.

On the arbour 9 of each turret is secured a disc 82 having ratchet notches 83. Each disc 82 is provided with a portion 84 of reduced diam-

eter and with a recess 85 centrally opposite the base or radial end of each notch 83. The notches 83 having a radial end and tangential bottom. The recesses 85 are, however, provided with one straight rear and inclined front wall.

On each segmental gear 81, I provide a pawl 86 which is spring-held so as to engage the ratchet notches 83 and rotate the discs step by step as the bar 79 reciprocates. There are four notches 83 in each disc 82 corresponding to the number of mandrels in each turret.

The notches are set at equal distances apart and, consequently, the turrets are moved equal distances as they are turned carrying the mandrels a corresponding distance.

87 is a bracket secured to the frame of the machine by screws 88 and provided with a socket 89 through which a plunger 90 extends. At one end of the plunger is located a spiral spring 91 which is designed to hold the plunger normally in the recess 85 of the disc 82. The plunger 90 is provided with a laterally extending projection 92. 93 is a bell crank pivoted at 94 on the bracket 87 and having the upper end engaging with the projection 92.

The lower end of the bell crank is provided with a roller 95 which is designed to co-operate with a block 96 on the rack bar 79. The operation in its different stages is exhibited in Figs. 4*c*, 4*d* and 4*e*. In 4*c* the bell crank 93 has its roller 95 engaging with the block 96 thereby withdrawing the plunger 90 from the recess 85 and allowing the pawl 86 to give the disc a quarter turn as such pawl is being moved through the medium of the rack bar 79 and segmental gear 81.

In Fig. 4*d* it shows the plunger 90 resting against the periphery of the disc, that is the portion 84 thereof of reduced diameter, as indicated in Fig. 4*f*. The bell crank 93, therefore, necessarily is held up by the tension spring 97 as indicated in Fig. 4*d*.

In Fig. 4*e*, however, the pawl 86 is carried round by the segmental gear 81 moved by the rack bar 79 until it has given the full quarter turn whereupon the plunger 90 will drop into the recess 85 and temporarily hold each disc 82 and the corresponding turret while the bottle is being wound, the neck spun, the neck swaged and the lower edge of the body spun after the bottom has been inserted, respectively and simultaneously, such bottom being inserted by mechanism forming part of a copending application and not herein described.

In order to provide against any retrograde movement of the disc, I provide a gravity pawl 98 which is designed to engage with the short side of the notch 83, as indicated clearly.

In order to strip or carry the bottle body from the mandrels of the turrets to the cages of the transfer unit, I provide the following mechanism:

99 is a bar which is provided with bosses 100 having holes through which extend the guiding rods 101 supported on the side and intermediate frames 13 and 11 of the machine. The bar 99 is provided with projections 102, 103 and 104 which are forked to engage the pins 105 forming part of the forks 106, such forks being long enough to allow of the free circumferential travel of the pins 105 as the turrets rotate (see Fig. 10). The ends of the forks 106 are secured to the rods 107, (see Figs. 9 and 10). The apex of the fork 106 in each case is designed to slide longitudinally in the guide bars 108. The rods 107 are connected at the opposite end to a collar 109 which surrounds the mandrel 14 at the inner end as indicated in Figs. 9 and 10 previous to the operation of pushing off the body bottle when it is located on the mandrel 14.

In order to provide for the longitudinal movement of the collar 109 to eject the bottle from the mandrel, it is necessary to move the bar 99 laterally and this is effected by means of the rack 110 which is connected to the bar 99 by the lug 111. This rack bar 110 moves in a slide 112. 113 is a pinion, the spindle of which is connected to the plate 114 secured by bolts 115 to the side frame 13 and intermediate frame 11. The pinion 113 meshes with the rack bar 110 at one side and with a rack bar 116 at the opposite side movable in a suitable guideway 117 attached to the plate 114. The rack bar 116 is connected by a suitable connection 118 to the rod 52 which is secured to the bar 53 (see Figs. 1 and 2) and to which the bar 50 is secured.

Each transfer device 43 of the transfer unit 39 is provided with forwardly extending bracket arms 234 which extend forwardly of the mouth of the transfer device 43 and carries an annular member 235 provided with orifices 236. 237 is an internal annular groove formed in the body of the transfer device. 238 are a series of segmental cylindrical spring members which are arranged annularly, the inner ends of the members being out-turned as indicated at 239 so as to extend into the groove 237, such portion bearing upon the joint formed between the conical portion of the bottle and the cylindrical portion of the bottle. The outer end of the segment is provided with a pin 240 which extends freely through each of the orifices 236. The segments 238 are individually supported adjacent said pins by a bracket 241 secured to that end of the transfer member 43 which is adjacent to the turret.

242 is a conical support provided at its inner end with a supporting ring 243 provided with radially extending portions 244 which fit the interior of the transfer member 43 and is secured thereto by means of screws 245. The opposite end of the conical support carries an annular spring member 246 which is split as indicated at 247 to form spring fingers which curve downwardly and bear against that portion of the bottle body forming the joint between the upper conical portion and the cylindrical portion.

The transfer units and the turrets are so arranged as will be seen so that when a bottle body is being transferred from the mandrel of a turret to the cage of a transfer unit the next bottle body ahead is being transferred from the cage of the transfer unit to the mandrel of the turret ahead and this will be understood on reference to the movement of the bar 50 and its coaction with the bar 99 through the medium of the rod 52, racks 110 and 116 and pinion 113, in which it will be seen that when the bar 50 moves in one direction operated by the cam operated bar 53 it carries the bar 52 longitudinally with it and thereby moves the rack bar 116 to which the bar 52 is connected in the same direction, a bottle body having been previously fed by the stripping mechanism from the lowermost mandrel of turret 7 in Fig. 1 into the uppermost cage 43 of the transfer mechanism 39 carrying the rod 48 to the dotted position. The transfer mechanism is revolved to carry said cage to the lowermost position in Fig. 1 in a line with the uppermost mandrel of the turret 36 and the rod 48 into a line with the boss 49 of the bar 50.

Simultaneously the same operation takes place

in connection with the transfer mechanism 40 and the mandrels of the turrets 36 and 37 so that the rod 48 of the lowermost cage 43 of the transfer mechanism 40 is brought into a line with the boss 49×. As the bar 50 is moved forward the bosses 49 and 49× engage the rear ends of the projecting rods 48 forcing them to the right so as to move the bottle bodies in the lowermost cages of the mechanism 39 and 40 longitudinally on to the mandrels of the turrets 36 and 37 which are in a line therewith.

The forward movement of the bar 50 and the rack bar 116 connected thereto turns the gear pinion 113 so as to move the rack bar 110 to the left carrying the bar 99 in the same direction so as to simultaneously operate the stripping mechanism of the turrets to feed another bottle body into the next cage 43 from the turrets 7 and 36 and also from the turret 37 onto the collapsible mandrel of the turret 38.

I shall now describe the means whereby the transfer units are given their step by step movement.

This mechanism is shown in Figs. 3, 7, 8, 8*a* and 8*b*. The transfer units are all located for the most part above the turret units except, of course, where the cages of the transfer units come directly opposite the top mandrels of the turrets as indicated in Fig. 3. There are two transfer units as indicated in Fig. 3 and they are arranged in the machine on the same level as the fourth turret.

There are also three arms to the transfer unit and consequently it is necessary that they be given a third of a revolution simultaneously with a quarter of a revolution given to the turret so that the transfer units will operate in unison with the turrets. In order to effect this, I provide rack bar 119 which is connected to a guide bar 120 slidable in a suitable guiding groove 121, and operated to reciprocate by the cam 72 driven from the shaft 32. 122 are the two discs which are secured on the arbours 42 and 51 of the transfer cages. The discs 122 in this case, however, are provided with only three notches 123 ratchet shaped for the reason that there are only three cages included in each transfer unit.

For the same reason I provide segmental gears 124 which are of a circumferential length of approximately one hundred and twenty degrees. These segmental gears mesh with the rack bar 119 but are loose on the shafts 42 and 51. 125 are spring pressed pawls pivotally connected to the segmental gears 124 and designed to coact with the ratchet notches 123, as indicated. 126 are spring pressed plungers held in suitable sockets 127 and designed to be brought into the recesses 128 at each one-third revolution of the disc 122.

129 are bell cranks coacting with the plungers and having pivoted at their upper ends rollers 130 which are designed to coact with the blocks 131 secured to the rack bar 119. The blocks 131 when the rack bar 119 is moved in the direction indicated by arrow press upon the rollers 130 and tilt the bell crank so that the lower arm of the bell crank 129 will withdraw the plungers from the recesses 128 opposite the same. Upon the rack bar operating in the reverse direction to arrow the segmental gear and consequently the disc is turned by means of the pawl 125, the plunger 126 riding on the periphery of the reduced portion of the disc 122.

The rack bar 119 is provided with teeth on each side thereof, the teeth on the bottom side extending the whole length of the bar and the teeth on the top side extending only a portion of its length, as indicated clearly in Fig. 8*a*. 132 is a pinion which meshes with the teeth 133 on the top side of the bar 119 and also with teeth 134 on the rack bar 135 which is supported upon and moves in suitable guideways corresponding to the guideways of the rack bar 119.

136 is the arbour of the fourth turret. The arbour 136 has secured on it the disc 137 and four ratchet notches 138, segmental gear 139 loose on the arbour, coacting pawl 140, plunger 141, bell crank 142 having a roller 143 coacting with the block 144, all practically operating in connection with the rack bar 135 in precisely the same manner as the corresponding parts in connection with the turrets 7, 36 and 37.

It will thus be understood that all the movement of the turrets and transfer units are synchronized throughout the machine.

In Figs. 11 and 12, I show sectional details of the mandrel of the second turret showing the collar 109*a* corresponding to collar 109 shown in Fig. 9 for removing the bottle body 145. This collar 109*a* is a part of the stripping device which has been heretofore described.

In Fig. 5*a*, I show a detail of the swaging mandrel mostly in section. A collar 109*b* is provided surrounding the mandrel which is part of the stripping mechanism and is protected by a shield 109*c* from the end of the swaging segments which form the corrugated neck of the bottle as it is moved longitudinally over the mandrel 145. (See also Fig. 5.)

I shall next refer to the neck turning mechanism for the mouth of the bottle and describe the same in reference to Figs. 13, 14, 15, 16, 17, 17*a* and 17*b*.

In Figs. 1 and 6 I show the motor 147 whereby the power is produced to drive the mechanism for spinning the neck of the bottle. The motor 147 is located upon the shaft 148 and this shaft extends through the side frame 12 and is journalled therein. 149 is the bracket by which the motor 147 is supported. 150 is a housing secured on the frame 13[1] and 151 is a gear wheel secured on the shaft 148 and located in the housing. 152, 152 are gear pinions meshing with the gear wheel 151. The gear pinions 152, 152 are located on the spindles 153, 153 as indicated in full lines in Figs. 17*a* and 17*b* and dotted lines in Fig. 17, and are journalled in suitable bearings as indicated.

It is necessary that the spindles 153, 153 move longitudinally in order to bring the spinning heads 154 and 155 into the proper position in relation to the mandrels 156 with which they coact.

In order to provide for the longitudinal movement of the spindles 153, 153, I provide grooves 158 (see Figs. 17*a* and 17*b*) in the spindle 153 diametrically opposite to each other and corresponding grooves 159 in the hub of the pinion 152 so as to form with the balls 160 located therein a keyway for connecting the pinion 152 to the spindle 153 as well as to permit of the longitudinal movement of the spindle 153. The longitudinal movement of the spindles 153, 153 is effected by means of the cam 161 and cam following pin 162 located in the bracket 163 attached to the bed plate 1 of the machine (see Fig. 16). The cam 161 is attached to the shaft 148× journalled in suitable bearings in the bed plate (see Fig. 2 and the fragmentary view Fig. 15). The shaft 148× derives its movement from the shaft 28

through the medium of the worm and worm wheel 164 and 165 respectively (see Fig. 6).

The mandrels 156 are four in number and are supported on the end of a sleeve 166 (see Figs. 11 and 12) which extends through the ends of the turret 36 as indicated. The sleeve 166 is provided with a shoulder 167. The mandrel 156 is hollow as indicated and is provided with an internal end cap 168, having an extension sleeve 169, having an end shoulder 170. 171 is a spindle having at the outer end a head 172 with an end peripheral groove 173. The inner end of the spindle 171 has an extension spindle 174 which extends through the end of the sleeve 169. 175 is a spiral spring extending between the end of the spindle 171 and the end of the extension sleeve 169.

The extension spindle 174 is provided with an end pawl 176 which is designed to coact with the pivoted pawl catch 177. The heads 154 and 155 of the spinner are provided with a peripheral faced groove $155^{\times}$ and 155^{0} which are designed to coact successively with the peripheral grooves 173 of the mandrels 156. In order to reduce friction, I provide balls 178 secured in a ball race 179 in the spinning head 154. It will now be seen that when the body bottle is supported on the mandrel 156 and the heads 154 are brought against the heads 172 by the action of the cam 161 the spinning is accomplished.

In order to understand the means whereby the neck end of the bottle is spun or turned inwardly as indicated in Figs. 11, 12, 13 and 14, I shall now describe the operation in detail.

The stripping fork 106 is in the dotted position shown in Fig. 12 when the cam 161 has drawn back the spinning tools 154 and 155. The stripping fork is then moved inwardly by the mechanism hereinbefore described and in so moving inwardly comes in contact with the catch 177, tilting it on its pivot and releasing the end pawl 176 thereby causing the spindle 174 to move forward and carry with it the head 172 so as to bring the head 172 against the spinning head 154. This movement results in forming an encompassing groove into which the end of the neck of the bottle fits as indicated in Fig. 11 and at this point the cam 161 causes the spinner head to operate on the end of the bottle and impart to the neck thereof an inward curl as indicated clearly in Fig. 13.

At the same time the spindle 174 is brought rearwardly so that the end pawl 176 is engaged by the pawl catch 177. The effect of this is to prevent the curl formed at the neck end from unrolling itself during the travel of the turret to the point where the bottle body is stripped. After the neck is spun as above described the turret rotates to the next position so that the above mandrel is brought into a line with the head 155, the annular groove 155^{0} of which is smaller than the groove $155^{\times}$ so that when it engages the spun end of the neck it forms an annular cap receiving recess as indicated in Fig. 14. After the recess is formed the turret again rotates to the next position where this stripping operation is performed, the pawl 177 being unlocked thereby as above described.

In Figs. 18, 19, 20 and 21, I show the turret 38 in detail and in Figs. 1 and 2, I show the position of the turret in the machine.

180 is the main casting of the turret which is secured on the shaft 136 and carries the sleeves 59, four in number, and operates in connection with the housing 181 through which the sleeve is free to slide. 182 is an inner sleeve which extends through the outer sleeve 59 to a point within the housing where it is provided with a series of slits 183 having pivoted arms 184 located within them and terminating in lugs 185 forming the collapsible mandrel.

This mandrel is covered by United States Patent 1,719,421, dated July 2nd, 1929, and it is therefore not necessary to refer to it further except to say that it holds the bottle body securely in shape during the period that the bottom 186 is being spun into position.

The means whereby this mandrel is operated, however, is by means of the stationary cams 187 and 188. The push cam 187 is designed to operate against a knob 189 to extend the collapsible mandrel and the pull or groove cam 188 is designed to operate on the knob 189 of the spindle 190 to collapse the mandrel.

The spindle 190 extends through the sleeve 182 and is provided with two grooves 191 and 192 designed to be engaged alternately by the spring-pressed dog 193 to hold the mandrel either in the extended or collapsed position, after being moved by either the cam 187 or 188.

The mechanism by which the bottom of the bottle is spun into the bottom of the body of the bottle forms the subject matter of a separate application and I do not here describe it.

After the bottle has been completed it is stripped from the housing 181 of the final mandrel and passed through an opening 194 by the operation of the cam operated bar 57 indicated in Figs. 3 and 4. This opening 194 is in the central frame 11 and the bottle when carried through the opening is placed within the triangularly arranged fingers 195 in the position shown in Fig. 24. The fingers 195 are so arranged that two of them at the top extend outwardly from the bar 196 towards the edge of the opening 194. The bar 196 is carried by a bracket member 197 swung on a spindle 198 extending out from the bracket 199. The lowermost finger 195, however, extends towards the opening 194 from the arm 200 which is carried by a bracket member $200^{\times}$ secured rigidly to the pin 198. The bracket member 197 is resiliently connected to the bracket member $200^{\times}$ by the spring 201 which extends over the finger 195 and the pin 202 extending from the bracket member $200^{\times}$ tending to force the arms 196 and 200 in opposite directions.

It will thus be seen that the lowermost finger 195 extends out from the lower edge of the opening 194 and normally extends rigidly towards the same while the upper fingers are resiliently held so as to coact with the lower fingers. The movement of the bracket 197 is regulated to a nicety by the set screw 203. 204 is an arm secured on the spindle 198 and connected by a rod 205 to a bell crank 206 (see Fig. 22) pivoted to the upper end of the standard 207. As each mandrel of the swaging turret passes the bell crank 206 it will tilt the bell crank so as to draw down upon the arm 204 of the bracket $200^{\times}$ and through the fingers 195 in the position shown in Figs. 26 and 27, the stop screw 203 engaging the bracket 199 to stop the further movement of the bracket member 197. As the bell crank 206 continues to pull the bracket $200^{\times}$ downwardly, such bracket will be tilted further on its pivot against the resistance of the spring 201 and cause the lowermost finger 195 to swing outwardly.

It will, therefore, be understood that the bottle

shown in Fig. 24 is received between the fingers 195 in a horizontal position and in Fig. 26 it is tilted by the fingers into a vertical position and in Fig. 28 it is released by one of the fingers 195 being thrown outwardly as hereinbefore described. The bottle is shown in dotted lines in Figs. 24 and 26.

When delivered as shown in Fig. 28 it passes into a carrying ring 208 of the endless chain 208×.

What I claim as my invention is:

1. In a paper bottle making machine, the combination with a pair of revolving turrets, mandrels carried by each of said turrets carrying a bottle body, mechanism for performing a bottle body forming operation successively as each mandrel of one turret assumes a position for coaction therewith, means for successively stripping each bottle body from its mandrel after such operation is complete, and means for simultaneously mounting a previously stripped bottle body on a mandrel of the other turret.

2. In a paper bottle making machine for forming cylindrical bottle bodies and tapered necks, the combination with a bottle body carrying mandrel having a tapered end beyond which the tapered portion of the bottle neck projects, a head carried by the end of the mandrel within the end of the bottle neck and having an annular face groove, a spinning head provided with an annular face groove opposing the aforesaid annular groove, means for rotating the spinning head, and means for moving the spinning head longitudinally on its axis to engage the edge of the bottle neck in its groove to curl the same inward into the annular groove of the mandrel head.

3. In a paper bottle making machine for forming cylindrical bottle bodies and tapered necks, the combination with a bottle body carrying mandrel having a tapered end beyond which the end of the tapered neck of the bottle body extends, an outwardly spring pressed head spaced from the end of the mandrel within the tapered end of the bottle neck and having an annular face groove, a spinning head provided with an annular face groove opposing the aforesaid groove, means for rotating the spinning head and moving it longitudinally on its axis to engage the mandrel head and force it inward as the edge of the bottle neck enters the groove of the spinning head to curl the same inward into the annular groove of the mandrel head.

4. In a paper bottle making machine for forming cylindrical bottle bodies and tapered necks, the combination with a rotatably mounted turret, and a mandrel mounted thereon to be carried by the rotation of the turret from a bottle body receiving position to a bottle body ejecting or stripping position said mandrel having a tapered end beyond which the end of the tapered neck extends, of an outwardly spring pressed head located at the end of the mandrel within the tapered end of the bottle neck and having an annular face groove, a spinning head provided with an annular face groove opposing the aforesaid groove, means for rotating the spinning head and moving it longitudinally on its axis to engage the mandrel head and force it inward as the edge of the bottle neck enters the groove of the spinning head to curl the same inward into the annular groove of the mandrel head, and means for locking the mandrel head in its inward position during the travel of the mandrel towards the stripping position.

5. In a paper bottle making machine for forming cylindrical bottle bodies and tapered necks, the combination with a rotatably mounted turret, a mandrel mounted thereon to be carried by the rotation of the turret from a bottle body receiving position to a bottle body ejecting or stripping position said mandrel having a tapered end beyond which the end of the tapered neck extends, and stripping mechanism for removing the bottle body from the mandrel, of an outwardly spring pressed head located at the end of the mandrel within the tapered end of the bottle neck and having an annular face groove, a spinning head provided with an annular face groove opposing the aforesaid groove, means for rotating the spinning head and moving it longitudinally on its axis to engage the mandrel head and force it inward as the edge of the bottle neck enters the groove of the spinning head to curl the same inward into the annular groove of the mandrel head, means for locking the mandrel head in its inward position during the travel of the mandrel towards the stripping position, and means actuated by the stripping mechanism for releasing the locking means.

6. In a paper bottle making machine for forming cylindrical bottle bodies and tapered necks, the combination with a rotatably mounted turret, a mandrel mounted thereon to be carried by the rotation of the turret from a bottle body receiving position to a bottle body ejecting or stripping position, said mandrel having a tapered end beyond which the end of the tapered neck extends, and stripping mechanism for removing the bottle body from the mandrel, of an outwardly spring pressed head located at the end of the mandrel within the tapered end of the bottle neck and having an annular face groove, a spinning head provided with an annular face groove opposing the aforesaid groove, means for rotating the spinning head and moving longitudinally on its axis to engage the mandrel head and force it inward as the edge of the bottle neck enters the groove of the spinning head to curl the same inward into the annular grove of the mandrel head, means for locking the mandrel head in its inward position during the travel of the mandrel towards the stripping position, means actuated by the stripping mechanism for releasing the locking means, and means for forming an annular recess in the interior of the spun portion of the neck.

7. In a paper bottle making machine, the combination with a plurality of rotatable turrets, means for rotating the turrets, and bottle body carrying mandrels extending from each turret, of means for automatically and simultaneously stripping a bottle body from a mandrel of each turret as the mandrels assume the stripping position.

8. In a paper bottle making machine, the combination with a plurality of rotatable turrets, means for rotating the turrets in unison, and a plurality of bottle body carrying mandrels mounted on each turret, of a stripper mounted adjacent each mandrel, and means with which the strippers of each turret successively engage for simultaneously actuating a stripper of each turret.

9. In a paper bottle making machine, the combination with a rotatable turret and a mandrel mounted thereon, of a stripping device comprising a stripping collar freely surrounding the mandrel and against which the end of the bottle body bears, a guided pusher connected to the collar and movable longitudinally in respect to

the mandrel, and cam operated means engageable with the pusher at a predetermined point in the rotation of the turret.

10. In a paper bottle making machine, the combination with a rotatable turret, and a mandrel mounted thereon, of a stripping device comprising a stripper collar freely surrounding the mandrel and against which the end of the bottle bears, a guided pusher carried by the turret and connected to the collar and movable longitudinally in respect to the mandrel, a pin extending radially from the pusher, a guided bar member extending transversely of the turret and provided with a slotted portion with which the aforesaid pin engages at a predetermined point in the rotation of the turret, and cam means for reciprocating the transverse bar member.

11. In a paper bottle making machine, the combination with a rotatable turret, and a mandrel mounted thereon, of a bar extending transversely of the turret, cam means for reciprocating the bar axially of the turret, a stripping collar mounted freely on the mandrel, and means for engaging the stripping collar and bar at the stripping point in the rotation of the turret.

12. In a paper bottle making machine, the combination with the main frame, a plurality of turrets rotatably mounted in the main frame, and mandrels carried by each turret, of a stripping mechanism coacting with each mandrel and movable longitudinally thereof, a bar extending transversely of the turrets and having a slot corresponding to each turret, guides mounted in the main frame parallel with the axes of the turrets and on which the transverse bar is mounted, cam means for reciprocating the transverse bar on its guides, and a projection extending radially from each stripping mechanism to carry the projections of each turret successively to the stripping point and a projection of each turret simultaneously into engagement with the corresponding slot of the transverse bar.

13. In a paper bottle making machine, a plurality of rotatably mounted turrets and mandrels mounted thereon to revolve in the same plane, and a transfer mechanism revolving in another and parallel plane for transferring the bottle bodies from the mandrels of one turret to the mandrels of the next adjacent turret.

14. A paper bottle making machine comprising a plurality of turrets rotatable around parallel axes, bottle body supporting mandrels carried by the turrets and having their longitudinal centres parallel with said axes, and means coacting with a mandrel of each turret as they are carried by the turrets in pairs to closely adjacent positions for transferring a bottle body from one mandrel of the pair to the other mandrel of the pair.

15. In a paper bottle making machine, the combination with a plurality of turrets rotatable around parallel axes, bottle supporting mandrels carried by each turret and having their longitudinal centres parallel with said axes, of a rotatable transfer mechanism located laterally opposite and centred centrally between each pair of adjacent turrets, a plurality of bottle body holders forming part of each transfer mechanism and so arranged thereon as the transfer mechanism rotates that the holders thereof on one side of the transfer mechanism are carried successively into longitudinal alignment with each successive mandrel on one turret as it rotates and the holders on the other side of the transfer mechanism into longitudinal alignment simultaneously with the mandrels of the other or adjacent turret.

16. In a paper bottle making machine, the combination with a pair of revolving turrets, a plurality of mandrels carried by each turret and on which bottle bodies are mounted, and means for revolving the turrets to carry one mandrel of each turret in pairs successively to an adjacent position, of a rotatable transfer device provided with a plurality of bottle body receivers, such receivers being carried in pairs into axial alignment with the aforesaid pairs of mandrels, a stripper for stripping the bottle body from one mandrel of each pair into one of the aforesaid receivers when in a line therewith, and an ejector for simultaneously ejecting the previously received bottle body from the other of the aforesaid receivers onto the other mandrel of each pair when aligned therewith, and a single means for operating the strippers successively and the ejectors successively.

17. In a paper bottle making machine, the combination with a pair of revolving turrets, a plurality of mandrels carried by each turret and on which bottle bodies are mounted, and means for revolving the turrets to carry one mandrel of each turret in pairs successively to an adjacent position, of a rotatable transfer device provided with a plurality of bottle body receivers, such receivers being carried in pairs into axial alignment with the aforesaid pairs of mandrels, a stripper for stripping the bottle body of one mandrel into one of the aforesaid receivers when in a line therewith, an ejector in each receiver set in the ejecting position by the insertion of a stripped bottle body for ejecting the bottle body onto the other mandrel of the pair, and means for operating the strippers successively and the ejectors successively and simultaneously with the strippers.

18. In a paper bottle making machine, a transfer unit comprising a rotatably mounted member, bottle body receivers carried thereby each comprising an open ended cylinder into which the bottle body is passed longitudinally, a plunger device slidably mounted in the cylinder to move axially when engaged by the end of the bottle neck when at the bottle receiving position, and means engaging the opposite end of the plunger to force it in the opposite direction when carried to the bottle ejecting position.

19. In a paper bottle making machine, a transfer unit comprising a rotatably mounted member, bottle body receivers carried thereby each comprising an open ended cylinder into which the bottle body is passed longitudinally, a stem carried by the rotatable member longitudinally of the cylinder, an abutment slidably mounted thereon and a plunger rod connected to the abutment at one end and extending through the rotatable member to be moved longitudinally by the engagement of the bottle neck end with the abutment when in the bottle receiving position, and means engaging the opposite end of the rod to move it in the opposite direction when in the bottle ejecting position.

20. In a paper bottle making machine, a transfer unit comprising a rotatably mounted member, bottle body receivers carried thereby each comprising an open ended cylinder into which the bottle body is passed longitudinally, a longitudinally slotted tubular stem carried by the rotatable member centrally of the cylinder, a collar slidably carried on the stem, a pin extending diametrically through the collar and the slots of the stem, and a rod connected at one end to

the diametric pin and extending through the stem and the rotatably mounted member, and means engaging the opposite end of the rod to move it in the opposite direction when in the bottle ejecting position.

21. In a paper bottle making machine, a pair of transfer units each comprising a rotatably mounted member, cylindrical bottle body receivers carried by the member, ejecting mechanism in each cylinder each provided with a longitudinally movable operating rod moved outward from the receiver by an inserted bottle, a laterally movable bar, guides supporting the bar, and means for moving the bar laterally to engage the ends of the ejector rods of both units when in the ejecting position.

22. In a paper bottle making machine, the combination with the turrets rotated by a step by step movement and provided with mandrels, stripper mechanism mounted thereon each having a radial pin projection, and transfer units provided with cylindrical receivers and ejecting mechanism therein including a longitudinally movable ejecting rod in each ejecting mechanism, of a laterally movable bar mounted in suitable guideways and having open ended slots with which the radial pin projections engage as the turrets rotate, a laterally movable bar mounted in suitable guideway to engage the rods of the ejecting mechanism, and mechanism for moving the laterally movable bars inward in opposite directions to simultaneously operate the stripper and ejecting mechanism when in the stripping and ejecting positions.

23. In a paper bottle making machine, the combination with the turrets rotated by a step by step movement and provided with mandrels, stripper mechanisms mounted thereon each having a radial pin projection, and transfer units provided with cylindrical receivers, and ejecting mechanism therein including a longitudinally movable ejecting rod in each ejecting mechanism, of a laterally movable bar mounted in suitable guideways and having open ended slots with which the radial pin projections engage as the turrets rotate, a laterally movable bar mounted in suitable guideways to engage the rods of the ejecting mechanism, a pinion mounted on a stationary stud, a rack bar engaging each side of the pinion and connected respectively to the laterally movable bars, guideways in which the rack bars are mounted, and means for reciprocating the rack bars at each step by step movement of the turrets.

24. In a paper bottle making machine, the combination with rotatable turrets, means for rotating the turrets by step by step movement, bottle body supporting mandrels carried by each of the turrets, and stripper mechanism coacting with each mandrel of each turret, of rotatable transfer units, means for rotating the transfer units by a step by step movement synchronizing with the step by step movement of the turrets, bottle body receivers carried by the transfer units, an ejecting mechanism in each receiver and a single driving means for simultaneously operating the stripping mechanism and ejecting mechanism, and a cam for timing the operation of the stripping and ejecting mechanism betwen each step by step movement of the turrets.

25. In a paper bottle making machine, the combination with the rotatable turrets, means for rotating the turrets by a step by step movement, bottle body supporting mandrels carried by each turret, and stripper mechanism coacting with each mandrel, of rotatable transfer units, means for rotating the units by a step by step movement synchronizing with the step by step movement of the turrets, bottle body receivers carried by the transfer units, an ejecting mechanism in each receiver, a reciprocating mechanism operated from one of the revolving turrets and coacting with the stripper mechanism and ejecting mechanism to operate the same between each step by step movement of the turrets.

26. In a paper bottle making machine, the combination with rotatable turrets, means for rotating the turrets by a step by step movement, bottle body supporting mandrels carried by each turret, and stripper mechanism coacting with each mandrel, of rotatable transfer units, means for rotating the units by a step by step movement synchronizing with the step by step movement of the turrets, bottle body receivers carried by the transfer units, an ejecting mechanism in each receiver, and means operating a stripping and ejecting mechanism simultaneously between each step by step movement of the turrets.

27. In a paper bottle making machine, the combination with rotatable turrets having parallel mandrels, of rotatable mechanism for transferring the bottle bodies from the mandrels of one turret to the mandrels of the next adjacent turret.

28. In a paper bottle making machine, the combination with the main driving shaft, of a plurality of rotatably mounted turrets, bottle body supporting mandrels carried by each turret, a rotatable device for transferring the bottle bodies from the mandrels of one turret to the mandrels of the adjacent turret, a counter shaft driven from the main shaft, and means driven from each end of the counter shaft for rotating the turrets and transfer device respectively.

29. In a paper bottle making machine, the combination with the main driving shaft, of a plurality of rotatably mounted turrets, bottle body supporting mandrels carried by each turret, a rotatable device for transferring the bottle bodies from the mandrels of one turret to the mandrels of the adjacent turret, a counter shaft driven from the main shaft, a cam at each end of the counter shaft and driven therefrom, and mechanism operated by the cams for respectively rotating the turrets and transfer device by a step by step movement.

30. In a paper bottle making machine, the combination with the main driving shaft, of a plurality of rotatably mounted turrets, bottle body supporting mandrels carried by each turret, a rotatable device for transferring the bottle bodies from the mandrels of one turret to the mandrels of the adjacent turret, a counter shaft driven from the main shaft, a cam at each end of the counter shaft and driven therefrom, a shaft for each of the turrets and transfer device, and a rack mechanism driven from each cam for actuating the shafts of the turrets and of the transfer device respectively.

31. In a paper bottle making machine, the combination with the main shaft, a rotatable member for carrying a plurality of bottle bodies, and a shaft on which the bottle carrying member is mounted, of means for imparting a step by step movement to the bottle body carrier comprising ratchet and pawl operating mechanism mounted on the shaft, a rack and gear for operating the ratchet and pawl, and means for reciprocating the rack operated from the main shaft.

32. In a paper bottle making machine, the combination with the main shaft, a rotatable member for carrying a plurality of bottle bodies, and a shaft on which the bottle carrying member is mounted, of means for imparting a step by step movement to the bottle body carrier comprising ratchet and pawl operating mechanism mounted on the shaft, a rack and gear for operating the ratchet and pawl, means for reciprocating the rack operated from the main shaft, and means for releasably locking the shaft of the bottle body carrier between each operation of the ratchet.

33. In a paper bottle making machine, the combination with the main shaft, a rotatable member for carrying a plurality of bottle bodies, and a shaft on which the bottle carrying member is mounted, of means for imparting a step by step movement to the bottle body carrier comprising ratchet and pawl operating mechanism mounted on the shaft, a rack and gear for operating the ratchet and pawl, means for reciprocating the rack operated from the main shaft, and a locking means for the bottle body carrier operated by the reciprocation of the rack.

34. In a paper bottle making machine, the combination with the main shaft, a rotatable member for carrying a plurality of bottle bodies, and a shaft on which the bottle carrying member is mounted, of means for imparting a step by step movement to the bottle body carrier comprising a disc secured to the shaft of the bottle carrying member and having a plurality of spaced apart ratchet notches in its periphery, a gear segment swung upon the shaft, a spring pressed pawl pivotally mounted on the gear segment and coacting with the ratchet notches, a reciprocating rack meshing with the gear segment.

35. In a paper bottle making machine, the combination with the main shaft, a rotatable member for carrying a plurality of bottle bodies, and a shaft on which the bottle carrying member is mounted, of means for imparting a step by step movement to the bottle body carrier comprising a disc secured to the shaft of the bottle carrying member and having a plurality of spaced apart ratchet notches in its periphery, a gear segment swung upon the shaft, a spring pressed pawl pivotally mounted on the gear segment and coacting with the ratchet notches, a reciprocating rack meshing with the gear segment, and means coacting with the disc and rack for releasably locking the bottle carrying member between each step by step movement.

36. In a paper bottle making machine, the combination with the main shaft, a rotatable member for carrying a plurality of bottle bodies, and a shaft on which the bottle carrying member is secured, of driving means for imparting a step by step movement to the carrier operated from the main shaft, and means for locking the carrier between each movement comprising an annular notched member secured to the carrier shaft, a spring pressed plunger engaging one of the notches at each step by step movement, and means operated by the actuation of the driving means for withdrawing the plunger to engage the periphery of the notched member during the step by step movement of the carrier.

37. In a paper bottle making machine, the combination with the main frame and main shaft, a rotatable member for carrying a plurality of bottle bodies, and a shaft on which the bottle body carrying member is secured, of driving means including a reciprocating bar for imparting a step by step movement to the carrier operated from the main shaft and means for locking the carrier between each step by step movement comprising an annular notch member secured to the carrier shaft, a spring pressed plunger mounted in the main frame to engage the notched member and having a lateral projection, a bell crank pivotally carried on the main frame one arm of which is spring held against the aforesaid projection, and means carried by the reciprocating bar and coacting with the other arm of the bell crank for forcing the plunger to the disengaged position at the end of the return movement of the reciprocating bar.

38. In a paper bottle making machine, the combination with the main frame and main shaft, a rotatable member for carrying a plurality of bottle bodies, and a shaft on which the bottle body carrying member is secured, of driving means including a reciprocating bar for imparting a step by step movement to the carrier operated from the main shaft, and means for locking the carrier between each step by step movement comprising an annular notch member secured to the carrier shaft, a spring pressed plunger mounted in the main frame to engage the notched member and having a lateral projection, a bell crank pivotally carried on the main frame one arm of which is spring held against the aforesaid projection, a block secured to the reciprocating bar and coacting with the other arm of the bell crank for forcing the plunger to the disengaged position at the end of the return movement of the reciprocating bar.

39. In a paper bottle making machine in which a conical neck and cylindrical body are connected by an overlapping joint, the combination with the cylindrical bottle receiver of a transmission unit, of means for resiliently gripping the inserted bottle body around its periphery at the aforesaid joint at the junction of the neck and body proper as the bottle body is inserted.

40. In a paper bottle making machine in which a conical neck and cylindrical body are connected by an overlapping joint, the combination with the cylindrical bottle body receiver of the transfer mechanism, of an annular supporting member secured within the cylinder towards its inner end, inwardly curved spring fingers extending longitudinally from the supporting member and secured thereto at one end and bearing upon the aforesaid joint of the inserted bottle at its opposite end.

41. In a paper bottle making machine in which a conical neck and cylindrical body are connected by an overlapping joint, the combination with the cylindrical bottle body receiver of a transfer mechanism having an internal annular groove adjacent its open end, of an annular supporting member secured within the cylinder towards its inner end, inwardly curved spring fingers extending longitudinally from the supporting member and secured thereto at one end and bearing upon the aforesaid joint of the inserted bottle at its opposite end, supports carried by the open end of the receiver, spring fingers carried by the supports intermediate of its length and having turned ends extending into the groove adjacent the free ends of the aforesaid fingers, an annular member supported in front of the open end of the receiver and having orifices therein, and pins extending from the outer ends of the last mentioned fingers freely into the orifices.

42. In a paper bottle making machine, the combination with a plurality of rotatable turrets,

a plurality of mandrels mounted on each turret, and a separate means coacting with the mandrels of one turret for automatically winding the bottle blank with the mandrels of the second turret for spinning the bottle neck and with the mandrels of the third turret for swaging the bottle neck and finishing the bottle body bottom, of means for transferring the bottle body from the mandrels of one turret to the mandrels of the next turret after each of the aforesaid operations.

43. In a paper bottle making machine, the combination with a rotatable turret, and mandrels carried thereby on which a bottle body forming operation is performed, of an endless conveyor having annular bottle receivers, means for successively discharging the bottle bodies horizontally from the mandrels, means for gripping each bottle body as it is discharged, means for swinging each gripped bottle body from a horizontal to a vertical position over the annular receiver, and means for then releasing the bottle body to drop into the receiver to be conveyed to the point desired.

44. In a paper bottle making machine, the combination with a horizontal bottle body carrying mandrel, and means for ejecting the bottle body horizontally therefrom, of a conveyor having means for receiving and holding bottle bodies in a vertical inverted position, and means for receiving and releasably holding the horizontally ejected bottle body and swinging it to assume a vertical inverted position and means for releasing the bottle to drop into the receiving means of the conveyor.

45. In a paper bottle making machine, the combination with a horizontal bottle body carrying mandrel, and means for ejecting the bottle body therefrom, of a bottle discharging device comprising a pivoted bracket, a bottle body receiver carried by the bracket and comprising a pair of opposing arms one of which is stationary and the other spring held, a pair of fingers carried by the stationary arm and bearing against the upper face of the received bottle, and a finger carried by the spring held arm and bearing against the lower face of the received bottle, and means for automatically swinging the spring held finger away from the stationary fingers when the bottle assumes the vertical position to release the same.

46. In a paper bottle making machine, the combination with a bottle body carrying mandrel, and means for ejecting the bottle body therefrom, of a discharging mechanism comprising a supporting bracket, a spindle extending therefrom, a pair of bracket members one of which is secured to the spindle and the other swung thereon and spring held together, an arm extending from each bracket member having fingers extending therefrom to form a bottle body receiver, and means for automatically rotating the spindle to swing the receiver from a horizontal to a vertical position.

47. In a paper bottle making machine, the combination with a bottle body carrying mandrel and means for ejecting the bottle body therefrom, of a discharging mechanism comprising a supporting bracket, a spindle extending therefrom, a pair of bracket members one of which is secured to the spindle and the other swung thereon and spring held together, an arm extending from each bracket member having fingers extending therefrom to form a bottle body receiver, means for automatically rotating the spindle to swing the receiver from a horizontal to a vertical position, and a stop carried by the bracket member swung on the spindle to engage the supporting bracket when the receiver assumes a vertical position.

48. In a paper bottle making machine the combination with the swaging turret and the bottom spinning turret, mandrels carried by each turret, and means for ejecting the bottle bodies from the mandrels of the bottom spinning turret, of a bottle body discharging device comprising a pivoted receiver into which the bottle body is ejected horizontally, and means actuated by the mandrels of the swaging turret for swinging the receiver from a horizontal to a vertical position to discharge the bottle body.

49. In a paper bottle making machine, the combination with a bottle body carrying mandrel and means for ejecting the bottle therefrom, of a bottle body discharging mechanism comprising a supporting bracket, a spindle journalled in the bracket, a bottle body receiver carried by the spindle into which the bottle body is thrust horizontally as it is ejected, and means for swinging the receiver from a horizontal to a vertical position to discharge the bottle body.

50. In a paper bottle making machine, the combination with a turret provided with mandrels from which the bottle bodies are finally ejected, and a rotating member, of a bottle body discharging device comprising a pivoted receiver into the open end of which the bottle bodies are ejected horizontally, a bell crank member pivotally mounted on a suitable support, one arm of which is in the path of the rotating member, and means connecting the other arm of the bell crank to the receiver to impart its tilting movement thereto.

51. In a paper bottle making machine, the combination with a turret provided with mandrels from which the bottle bodies are finally ejected, and a rotating member, of a bottle body discharging device comprising a supporting bracket, a rocking spindle journalled in the bracket, a receiver carried by the spindle to assume alternately a horizontal and vertical position and into the open end of which the bottle body is fed, a bell crank lever one arm of which is in the path of the rotating member, and a link and lever connection between the other arm and the spindle of the receiver.

52. In a paper bottle making machine, the combination with the rotatably driven winding turret, turret shaft, and the rotatably driven mandrels of the turret supporting bottle bodies, of a wax bath, a bracket carrying spindles, a series of discs mounted on the spindles to contact with the periphery of the bottle body and revolve freely in the wax as each rotating bottle body is carried into contact therewith by the rotating turret.

53. In a paper bottle making machine, the combination with the rotatably driven winding turret, turret shaft, and the rotatably driven mandrels of the turret supporting bottle bodies, of a wax bath, a bracket carrying spindles, a series of discs mounted on the spindles to contact with the periphery of the bottle body and revolve freely in the wax as each rotating bottle body is carried into contact therewith by the rotating turret, and means for distributing the wax picked up by the rotating bottle body periphery from the discs over the surface of such periphery.

54. In a paper bottle making machine, the combination with the rotatably driven winding turret, turret shaft, and the rotatably driven mandrels

of the turret supporting bottle bodies, of a wax bath, a bracket carrying spindles, a series of discs mounted on the spindles to contact with the periphery of the bottle body and revolve freely in the wax as each rotating bottle body is carried into contact therewith by the rotating turret, a heating element, and means for carrying the heating element into contact with each bottle periphery to distribute the wax picked up thereon.

55. In a paper bottle making machine, the combination with the rotatably driven winding turret, turret shaft, and the rotatably driven mandrels of the turret supporting bottle bodies, of a wax bath, a bracket carrying spindles, a series of discs mounted on the spindles to contact with the periphery of the bottle body and revolve freely in the wax as each rotating bottle body is carried into contact therewith by the rotating turret, a heating element, means for carrying the heating element into contact with each bottle periphery to distribute the wax picked up thereon, and means for resiliently pressing the heating element into contact with the disc when engaging therewith.

56. In a paper bottle making machine, the combination with the rotatably driven winding turret, turret shaft, and the rotatably driven mandrels of the turret supporting bottle bodies, of a wax bath, a bracket carrying spindles, a series of discs mounted on the spindles to contact with the periphery of the bottle body and revolve freely in the wax as each rotating bottle body is carried into contact therewith by the rotating turret, a heating element, and means actuated by the rotating mandrel shaft for carrying the heating element into contact with each bottle periphery when in engagement with the waxing discs.

57. In a paper bottle making machine, the combination with the rotatably driven winding turret, turret shaft, and the rotatably driven mandrels of the turret supporting bottle bodies, of a wax bath, a bracket carrying spindles, a series of discs mounted on the spindles to contact with the periphery of the bottle body and revolve freely in the wax as each rotating bottle body is carried into contact therewith by the rotating turret, means for distributing the wax picked up by the rotating bottle body periphery from the discs over the surface of such periphery comprising a lever pivotally mounted in a suitable support intermediate of its length, a heating element carried at one end of the lever, a longitudinally movable rod slidably held in a suitable support and pivotally connected to the opposite end of the lever in such a position as to hold the lever past a dead centre position when in engagement with the bottle body and to allow its being carried to and held in its normal position by the travel of the mandrel towards its next position, and means on the rotating turret shaft for forcing the lever to its operative position as each bottle body assumes the waxing position.

58. In a paper bottle making machine, the combination with the rotatably driven winding turret, turret shaft, and the rotatably driven mandrels of the turret supporting bottle bodies, of a wax bath, a bracket carrying spindles, a series of discs mounted on the spindles to contact with the periphery of the bottle body and revolve freely in the wax as each rotating bottle body is carried into contact therewith by the rotating turret, means for distributing the wax picked up by the rotating bottle body periphery from the discs over the surface of such periphery comprising a lever pivotally mounted in a suitable support intermediate of its length, a heating element carried at one end of the lever, a longitudinally movable rod slidably held in a suitable support and pivotally connected to the opposite end of the lever in such a position as to hold the lever past a dead centre position when in engagement with the bottle body and to allow its being carried to and held in its normal position by the travel of the mandrel towards its next position, a series of cam projections extending from the turret shaft, and a lateral projection extending from the lever with which the cam projections successively engage.

59. In a paper bottle making machine, the combination with a revolving turret, and mandrels arranged in parallel positions one to the other and to the turret axis, of a rotating turret mounted in a higher plane to the aforesaid turret, cupped mandrels mounted on the second turret and arranged similarly to the mandrels of the lower turret, means for imparting a step by step movement to the turrets so the one mandrel of each turret is brought successively into longitudinal alignment, and means for stripping a bottle body from each of the mandrels of the lower turret into the cupped mandrel in a line therewith.

60. In a paper bottle making machine, the combination with a rotatable turret, a cupped mandrel mounted on the turret to revolve therewith and adapted to receive a bottle body, and bottle body clamping mechanism within the cup, of a longitudinally movable spindle mounted on the cup for operating the clamping mechanism, an enlargement at the outer end of the spindle, and stationary cams engaging the enlargement at different points in the revolution of the turret to move the spindle in opposition direction to engage and disengage the clamping mechanism.

61. In a device of the class described, a mandrel carrying a bottle body projecting beyond the mandrel at its neck end, a revolvably driven spring head opposing the mandrel head, and yieldable means for supporting the projecting end of the bottle during the spinning operation.

62. In a paper bottle making machine, the combination with a plurality of rotatable turrets, means for rotating the turrets and a plurality of bottle body carrying mandrels mounted on the turrets, of a stripper mechanism mounted on the turret and including a collar surrounding each mandrel, a laterally slidable bar mounted in the machine and so formed as to engage simultaneously one stripping mechanism of each turret, and means for actuating the bar and the stripping mechanism engaged therewith to carry the collars against the bottle bodies simultaneously when in the stripping position.

63. In a device of the class described, the combination with a bottle body supporting mandrel, of means for automatically spinning a bead in the end of the bottle neck, and means for automatically crushing that portion of the internal periphery of the bead adjacent the bottle mouth to form in the bead an annular internal shoulder.

64. In a paper bottle making machine, the combination with a plurality of rotatable turrets, means for rotating the turrets and a plurality of bottle body carrying mandrels mounted on each turret, of a stripper mechanism for each mandrel, each mechanism including a collar surrounding the mandrel, and means for actuating one stripper collar of each turret simultaneously against the inner ends of the bottle bodies as the mandrels of each turret successively assume the bottle stripping position.

65. In a paper bottle making machine, the combination with a plurality of turrets and a plurality of bottle body carrying mandrels mounted on each turret, of a stripper mechanism for each mandrel, each mechanism including a collar surrounding the mandrel, and means for actuating in succession the stripper collars of each turret and one stripper collar of each turret simultaneously.

66. In a paper bottle making machine, the combination with a plurality of turrets, and a plurality of bottle body carrying mandrels mounted on each turret, of a stripper mechanism for each mandrel, and means for actuating the stripper mechanism of each turret in succession and one stripper mechanism of each turret simultaneously.

ANDREW BODOR.