May 23, 1944. E. P. OLSON 2,349,456

MEANS FOR APPLYING TUBULAR ARTICLES TO DIES AND THE LIKE

Filed March 18, 1943 5 Sheets-Sheet 1

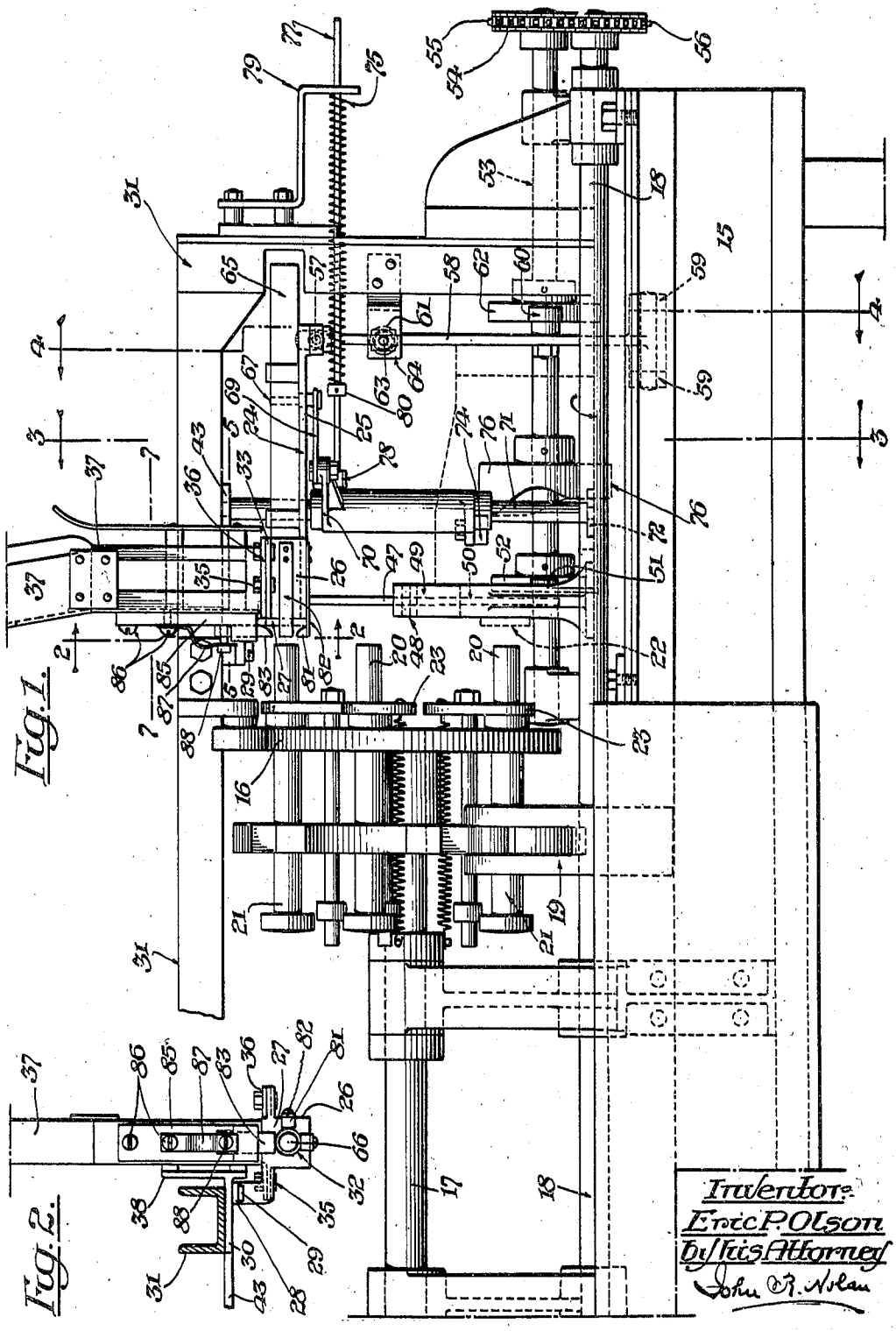


Fig. 1.

Fig. 2.

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Fig. 4.

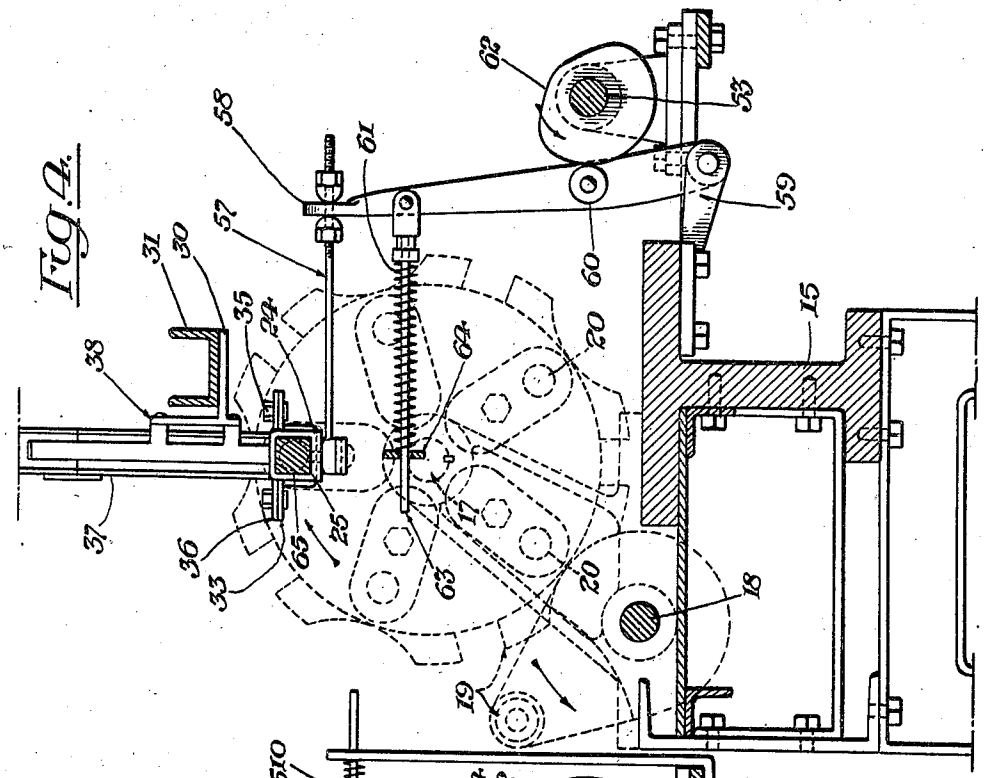
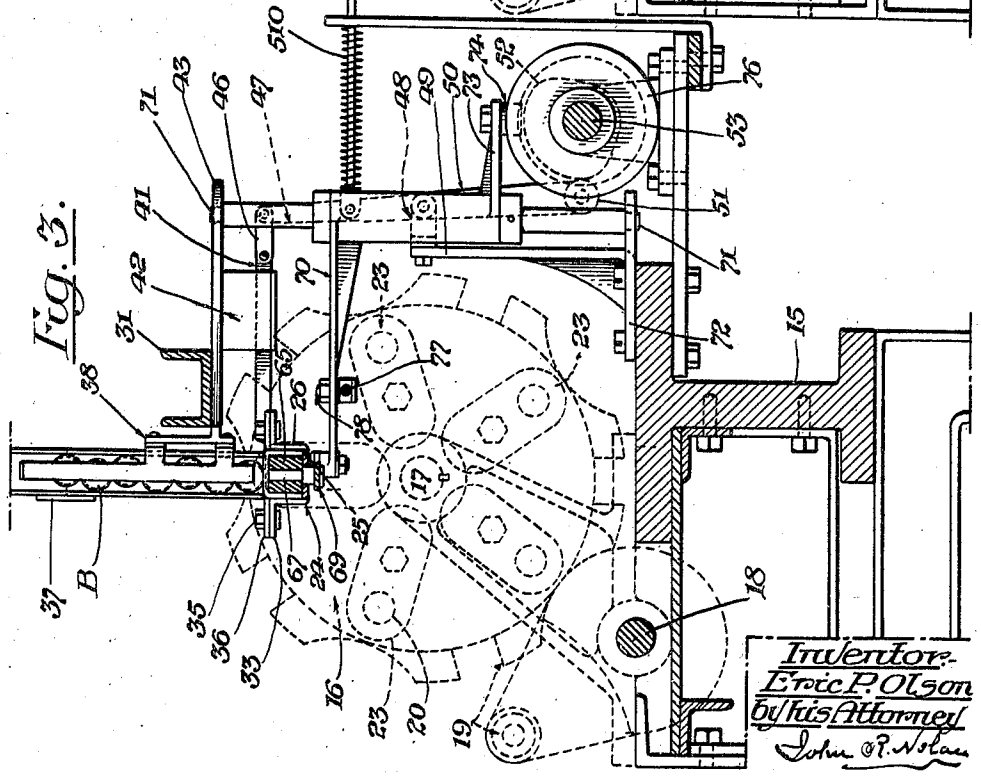


Fig. 3.



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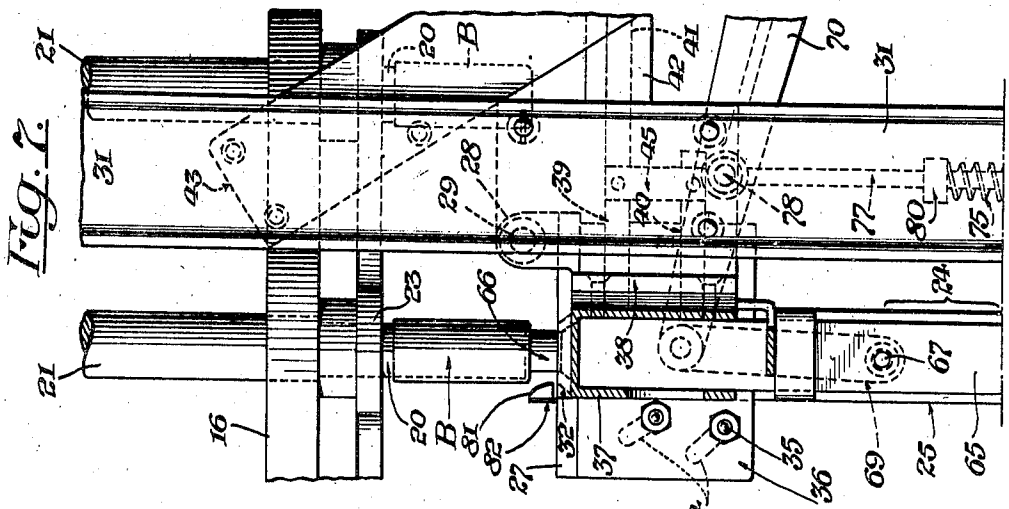


Fig. 2.

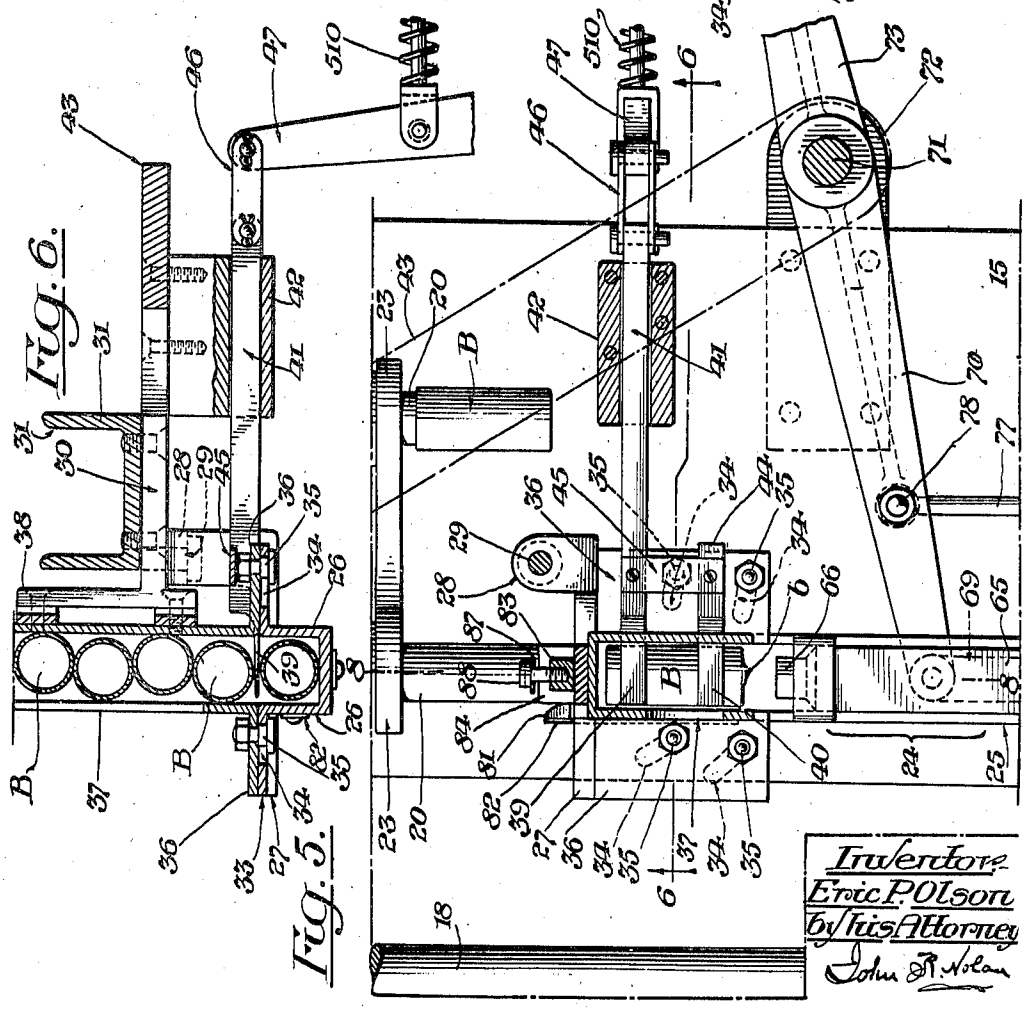


Fig. 6.

Fig. 5.

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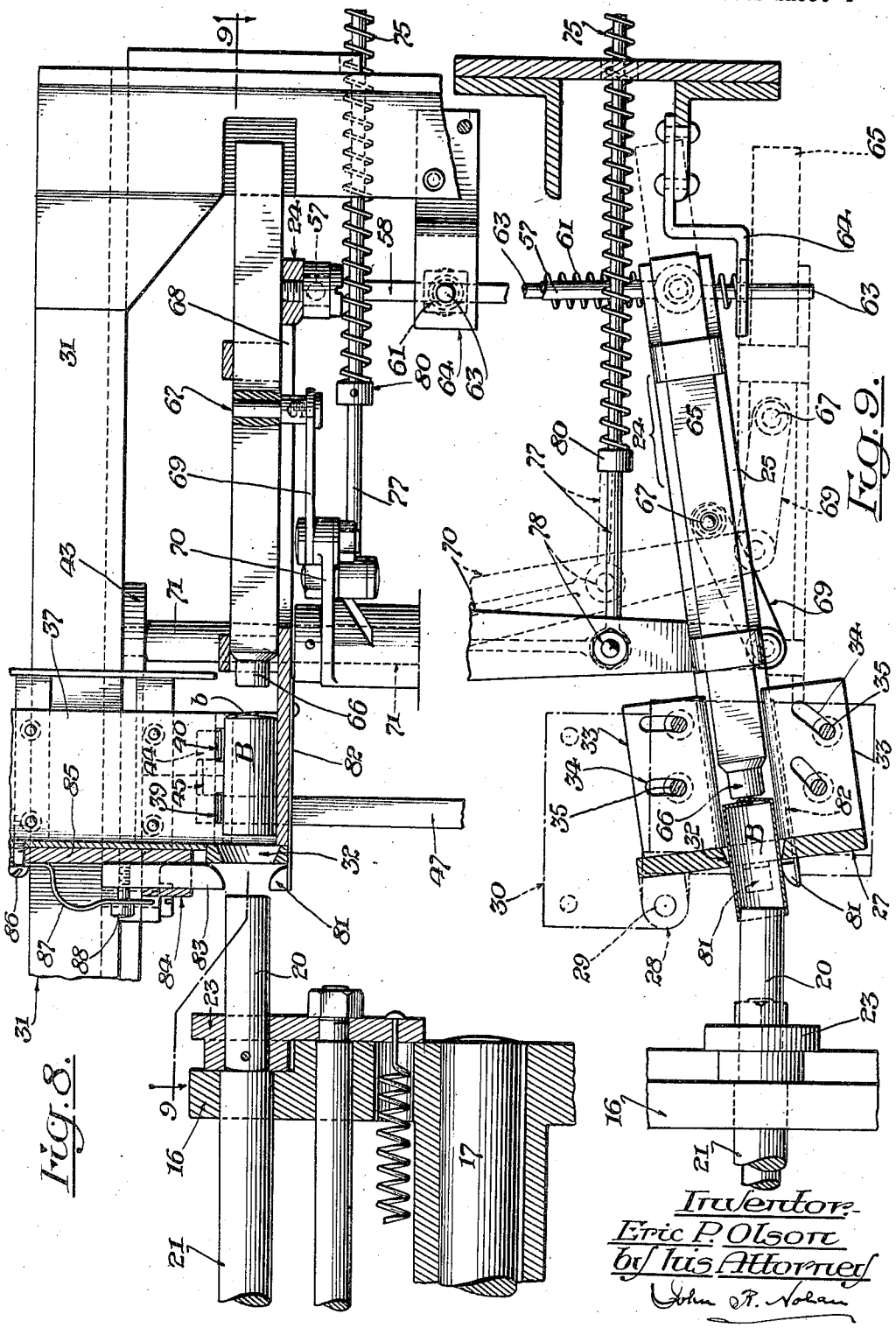


FIG. 8.

FIG. 9.

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MEANS FOR APPLYING TUBULAR ARTICLES TO DIES AND THE LIKE

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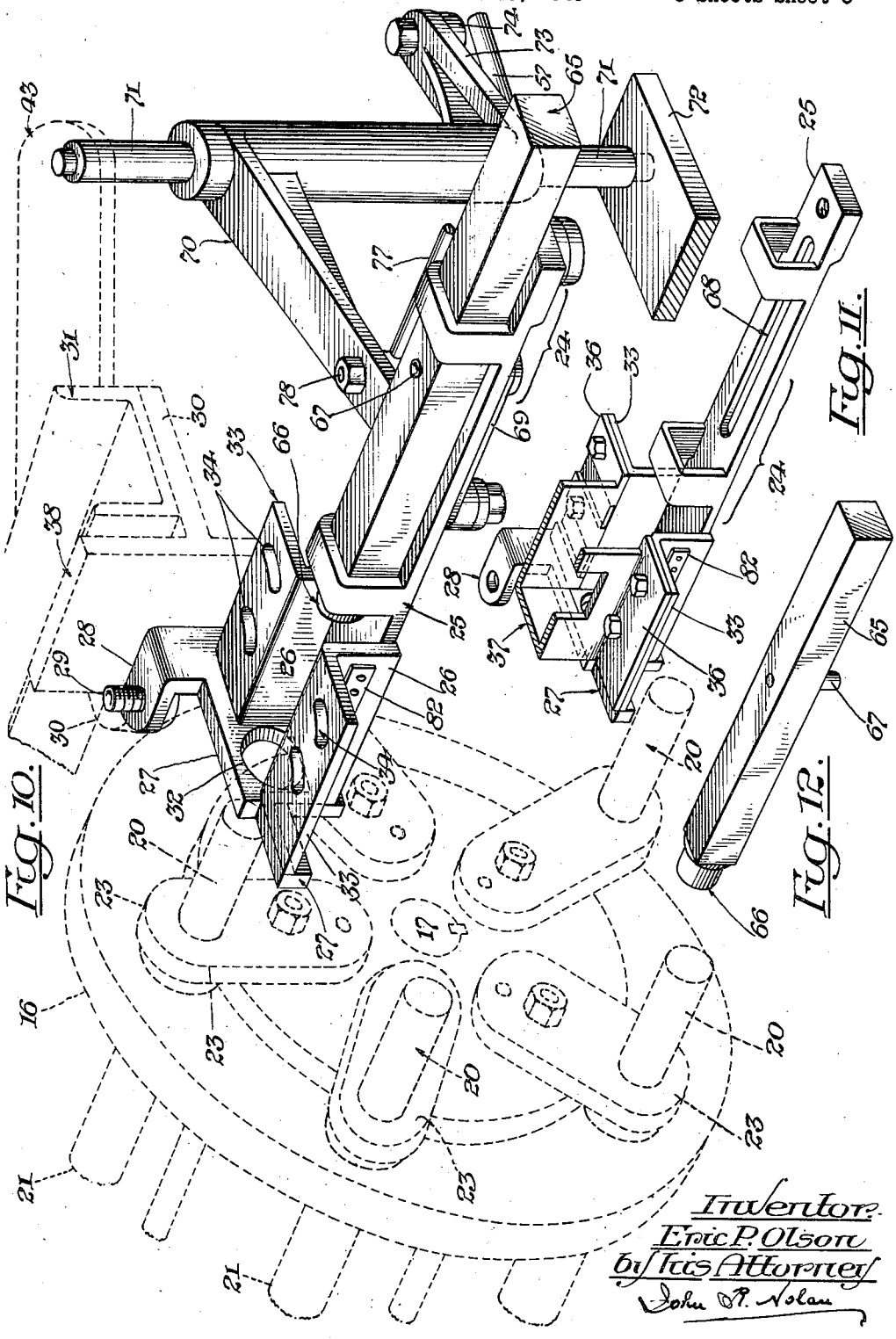


Fig. 10.

Fig. 11.

Fig. 12.

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UNITED STATES PATENT OFFICE

2,349,456

MEANS FOR APPLYING TUBULAR ARTICLES TO DIES AND THE LIKE

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Application March 18, 1943, Serial No. 479,584

8 Claims. (Cl. 214—1)

This invention relates to means for telescopically applying tubular articles to cylindrical dies, mandrels and other bodies of similar cross-sectional form.

The principal object of my invention is to effect the telescopic association of mating bodies, such, for example, as a tubular paper article and a supporting die or core therefor, and this irrespective of any slight deformation of the paper article that would be likely to abut the opposing end of, and preclude the free endwise application of the article to the inner member. Other objects of the invention will hereinafter appear.

A form of mechanism in accordance with my invention is illustrated as associated with an intermittently rotatable head carrying a series of bottom-finishing die members to each of which a tubular paper box having a partially finished bottom is endwise applied at a determined level, which mechanism is arranged and adapted to position each succeeding box with its open end in angular overlapping relation to the outer end of the adjacent die member of the rotatable head, and then to set the box bodily in coaxial alignment with said die member preparatory to the longitudinal telescopic movement of the box upon the die, all of which will be hereinafter described, and the scope of the invention then be expressed in the appended claims.

In the drawings—

Figure 1 is a side elevation of mechanism embodying my invention as applied to a machine for finishing the bottoms of tubular boxes, only so much of the machine being shown as is necessary to illustrate the invention.

Fig. 2 is a transverse vertical section adjacent a box magazine included in said mechanism, as on the line 2—2 of Fig. 1.

Fig. 3 is a similar section as on the line 3—3 of Fig. 1, parts of the finishing machine being indicated in dotted lines.

Fig. 4 is a similar section, as on the line 4—4 of Fig. 1.

Fig. 5 is a partial horizontal section in a plane through the lower part of the magazine, as on the line 5—5 of Fig. 1, showing a partly completed box as seated in an oscillatory carriage element and positioned thereby in axial alignment with a die member of the machine.

Fig. 6 is a transverse vertical section, as on the line 6—6 of Fig. 5, showing, in addition, the support for the magazine and the latter as supplied with tubular boxes.

Fig. 7 is a horizontal section through the magazine, as on the line 7—7 of Fig. 1, showing the tubular box as transferred from the oscillatory element to the adjacent die member by means of a reciprocating plunger which is borne by said element.

Fig. 8 is a transverse vertical section in a plane through the oscillatory element and adjuncts, as on the line 8—8 of Fig. 5.

Fig. 9 is a horizontal section in a plane through the oscillatory element, as on the line 9—9 of Fig. 8, but showing the oscillatory element and the box therein in angular relation to the die member, and the plunger partly advanced to position the mouth of the box on the end of the die member, the carriage and its associated parts when the box is in axial alignment with said member being indicated by dotted lines.

Fig. 10 is a perspective view of the oscillatory carriage and adjuncts, parts of the bottom-finishing machine adjacent thereto being indicated in dotted lines.

Fig. 11 is a similar view of the body of the carriage, showing the lower overhanging portion of the box magazine.

Fig. 12 is a separate view of the plunger for pushing the box upon the die member.

Referring to the drawings, 15 designates the supporting frame of a typical bottom-finishing machine for tubular paper boxes, and 16 designates the box supporting head of the machine. 17 designates the shaft for the head, which shaft is operatively connected with the parallel drive shaft 18 of the machine by a Geneva gear connection 19 whereby a uniform intermittent motion is imparted to the shaft 17 and the head 16. Projecting from the face of the head is a circular series of parallel male die members 20 constituted by the free ends of independently reciprocative plunger rods 21 which slidably extend through and rotate with the head. Each of the dies at a convenient part of its rotary path is adapted to receive and support a tubular paper box B having a partially formed bottom b that abuts the end of the die member, which member, by longitudinal motion of its plunger rod at another part of the path is in axial alignment with and is forced into a suitably disposed stationary complementary die member 22 suitably mounted on the supporting frame 15. Thus the bottom of the box carried by the die member 20 is driven into the opposing complementary die member 22, thereby compactly pressing the material of the bottom laps together and into and around the adjacent inner end of the tubular body of the box. Thereupon the plunger rod of the die member 20, together with the box thereon, is retracted

from the stationary die member. In a succeeding dwell of the head 16 the box is advanced to a level where it is ejected in the usual manner by means including a reciprocative stripper plate 23 through which the die member extends.

Mechanism for telescopically applying the boxes to the respective die members 20 according to the principle of my invention is of the following description.

24 designates an oscillatory carriage comprising a horizontally-disposed bar 25 whereof one end is arranged in proximity to each succeeding die member 20 on the intermittently movable head 16 when the die member is positioned at the receiving level. This end of the bar is provided with upstanding side walls 26 to afford a receptacle for a tubular article (such as a box B) with its open end pointing toward the path of the die members 20. At the discharging end of the receptacle is a transverse wall plate 27 having at one end an angular extension providing a lug 28 which is pivotally connected, as at 29, to the underside of the horizontal member 30 of a stationary angle bracket conveniently supported by a longitudinal channel bar 31 included in the frame structure of the machine. Thus the carriage has capacity for oscillation in a horizontal path, the construction and arrangement of the parts being such that at one end of its stroke the receptacle is in angular relation to the adjacent die member on the head, as seen in full lines in Fig. 9, and at the end of its succeeding stroke the receptacle is in axial alignment with the die member, as indicated by dotted lines in the same figure. The plate 27 has therein a bevelled guide orifice 32 of suitable area through which a tubular article previously seated in the receptacle can be longitudinally moved to position the open end of the article on the die member, as will hereinafter appear.

In the present case the side walls 26 of the receptacle have lateral angular extensions 33 in which are formed suitable arcuate slots 34 for the free passage of supporting screws 35 threaded in the laterally projecting feet 36 of an upstanding magazine 37 which is conveniently supported by the vertical member 38 of the stationary angle bracket previously mentioned. Thus the pivotal end of the carriage is well guided and supported in its movements in proximity to a die member 20.

The magazine 37 is adapted to contain a vertical row of tubular articles with their open ends facing the head. The lower end of the magazine, which is open, communicates with the open top of the carriage receptacle when the latter is in longitudinal alignment with the die member, thus delivering to and longitudinally of the receptacle, by gravity, the lowermost article of the magazine preparatory to the angular stroke of the carriage.

In order to exert frictional pressure on the box positioned within the receptacle so as to prevent upward displacement of the box in its longitudinal movement toward the orifice 32 in the end wall of the receptacle, and in order also to sustain the contents of the magazine above the path of the receptacle during the travel of the latter from its receiving to its setting position and back again, a pair of spaced parallel blades 39 and 40 are mounted to reciprocate across the open bottom of the magazine directly above and in timed relation to the travel of the receptacle. The blade 39 is formed on one end of a bar 41 which is slidably supported in a suitably-disposed bracket 42 fixed to the under side of a supporting arm 43 projecting from the channel bar 31 of the main frame, and the blade 40 is formed by the reduced portion of a short bar 44 which is connected by a spacer 45 to the slide bar. The outer end of the slide bar is pivotally connected by paired links 46 with the upper arm 47 of a vertical lever which is fulcrumed on a bracket 48 projecting from an upright 49 on the main frame. The lower arm 50 of the lever is provided with a roll 51 which is held by means of a suitably disposed spring 510 in operative contact with a cam 52 fast on a shaft 53 which is parallel with the drive shaft 18 previously mentioned and is driven therefrom by means, for example, of a chain 54 connecting sprocket wheels 55 and 56 fast on the respective shafts. (See Fig. 1.)

As a means for oscillating the carriage in timed relation to each succeeding die member 20, the outer end of the carriage bar 25 is pivotally connected by a link 57 with the upper end of an upstanding lever 58 which is fulcrumed at its lower end to a bracket 59 extending from the main frame. On this lever is a roll 60 which by the action of a suitable spring 61 is maintained in operative contact with a cam 62 on the driven shaft 53. The spring encircles a rod 63, whereof one end is pivoted to the lever while the opposite end is slidably supported by a suitably disposed fixture 64 on the main frame. (See Fig. 4.)

The means illustrated for transferring each succeeding tubular article longitudinally from the carriage to and upon the opposing cylindrical die member, comprises a reciprocative plunger 65 mounted on and longitudinally of the carriage bar 25. The forward or acting end of the plunger has a reduced portion 66 in axial alignment with the bottom of the article borne by the carriage. Intermediate its ends the bar is provided with a pin 67 which, depending freely through a longitudinal slot 68 in the bar, is pivotally connected by means of a link 69 with the upper longer arm 70 of a crank lever which is loosely mounted on a stationary vertical shaft 71 interposed between and secured at its respective ends to the supporting arm 43 and a foot plate 72 on the main frame of the machine. The lower shorter arm 73 of the lever is provided with a roll 74 which by the action of a suitable spring 75 is maintained in operative contact with a cam 76 on the driven shaft 53. In the present instance the spring encircles a rod 77 whereof one end is pivoted to the lower arm 70, as at 78, while the opposite end of the rod is slidably supported by an angle bracket 79 suitably secured to the main frame, the respective ends of the spring bearing against the bracket 79 and a collar 80 on the rod. (See Figs. 1 and 8.)

The contour of the cam 76 in relation to that of the cam 62 is such that when the carriage is at the limit of its angular stroke and the tubular article is within the receptacle, the plunger is initially moved forward to abut the article and project its open end through the orifice 32 of the receptacle and in lapping relation with the opposing end of the die member 20, a portion of the body of the article pivotally resting upon the outer peripheral edge of the orifice, as seen in Fig. 9. Thereupon the carriage swings the article, together with the plunger, into axial alignment with the die member, thus coincidentally straightening the article in relation to said member. This done, the forward stroke of the plunger is continued, thus pushing the box bodily upon and along the die member. The plunger is then retracted and another box is permitted to drop from the magazine into the receptacle preparatory to the next succeeding angular stroke of

the carriage, and so on. Hence in each reciprocation of the carriage an article is alternately positioned in spaced angular relation to, and in axial alignment with a die member 20, the plunger when the article is axially disposed being advanced to move the article to and within its open end in lapping relation with the opposing end of said die member, and when the article is in axial alignment with the die member the plunger being further advanced to complete the movement of the article upon the die member.

To ensure the accurate guidance of the leading open end of the advancing article to and around the die member 20, spaced jaws 81 are located at the outer peripheral edge of the orifice 32 in the wall plate 27 of the carriage, so as to press yieldingly against under and lateral points on the exterior surface of the article as it is advanced by the forward stroke of the plunger. In the present instance these jaws are supported by the projecting free ends of leaf springs 82 the opposite ends of which are secured to the bottom and one of the side walls of the article receptacle of the carriage. A bolt-like guide member 83 having its lower or acting end bevelled, is slidably mounted in a bracket 84 fixed to the lower end of a plate 85 which is fastened at its upper end, as at 86, to the adjacent wall of the magazine. A depending laterally bowed spring 87 is secured at its upper end to the plate, and is loosely connected at its lower end to the guide member 83 by means, for example, of a suitable screw 88 which projects from the pendant guide member to and through a suitable perforation in the spring. This spring, by virtue of its bow formation, maintains the member 83 resiliently depressed with its bevelled end in proper cooperative relation to the periphery of the orifice 32 and the proximate die member.

It is to be understood that my invention is not limited to the particular exemplifying form or construction herein shown and described, as the same may be modified within the principle of the invention and the scope of the appended claims.

I claim:

1. The combination with an element for telescopically receiving a tubular article, of means including an oscillatory carriage for alternately positioning such article in spaced angular relation to, and in axial alignment with said element, and means including an independently movable element supported by said carriage for moving the article to and in lapping relation with the opposing end of said element when the article is angularly disposed at one limit of movement of the carriage, and for moving the article longitudinally of and upon said element when the article is in axial alignment with the element at the other limit of movement of the carriage.

2. The combination with an element for telescopically receiving a tubular article, of means including a movable support for alternately positioning such article in spaced angular relation to, and in axial alignment with said element, and means, including a plunger mounted on said support and reciprocative longitudinally of and in axial alignment with the article, for moving the article to and in lapping relation with the opposing end of said element when the article is angularly disposed at one limit of movement of the support, and for moving the article longitudinally of and upon said element when the article is in axial alignment with the element at the other limit of movement of the support.

3. The combination with an element for telescopically receiving a tubular article, of means including an oscillatory carriage for alternately positioning such article in spaced angular relation to, and in axial alignment with said element, and means including a plunger reciprocative longitudinally of and in axial alignment with the article for moving the article to and in lapping relation with the opposing end of said element when the article is angularly disposed, and for moving the article longitudinally of and upon said element when the article is in axial alignment with the element.

4. The combination with an element for telescopically receiving a tubular article, of a carriage mounted for oscillation adjacent said element and including at its pivotal end a receptacle for a tubular article, means for actuating said carriage to position such article alternately in spaced angular relation to said element and in axial alignment with said element, a plunger supported by and reciprocative longitudinally of said carriage and in axial alignment with the contained article, and means for actuating said plunger to move the article to and in lapping relation with the opposing end of said element when the article is angularly disposed, and for moving the article longitudinally of and upon said element when the article is in axial alignment with the element.

5. The combination with an element for telescopically receiving a tubular article, of a carriage mounted for oscillation adjacent said element and including at its pivotal end a receptacle for a tubular article, means for actuating said carriage to position such article alternately in spaced angular relation to said element and in axial alignment with said element, a plunger supported by and reciprocative longitudinally of said carriage and in axial alignment with the contained article, and means for actuating said plunger to move the article to and in lapping relation with the opposing end of said element when the article is angularly disposed, and for moving the article longitudinally of and upon said element when the article is in axial alignment with the element, said receptacle having at its receiving end an orifice through which the leading end of the article is projected and thereby pivotally supported.

6. The combination with an element for telescopically receiving a tubular article, of a carriage mounted for oscillation adjacent said element and including at its pivotal end a receptacle for a tubular article, means for actuating said carriage to position such article alternately in spaced angular relation to said element and in axial alignment with said element, an article magazine having an open bottom through which each succeeding article is delivered to said receptacle when the receptacle is in alignment with said element, a plunger supported by and reciprocative longitudinally of said carriage and in axial alignment with the contained article, and means for actuating said plunger to move the article to and in lapping relation with the opposing end of said element when the article is angularly disposed, and for moving the article longitudinally of and upon said element when the article is in axial alignment with the element.

7. The combination with an element for telescopically receiving a tubular article, of a carriage mounted for oscillation adjacent said element and including at its pivotal end a receptacle

for a tubular article, means for actuating said carriage to position such article alternately in spaced angular relation to said element and in axial alignment with said element, an article magazine having an open bottom through which each succeeding article is delivered to said receptacle when the receptacle is in alignment with said element, means for temporarily obstructing the open bottom of the magazine and for exerting friction on the article deposited in the receptacle, a plunger supported by and reciprocative longitudinally of the carriage and in axial alignment with the contained article, and means for actuating said plunger to move the article to and in lapping relation with the opposing end of said element when the article is angularly disposed, and for moving the article longitudinally of and upon said element when the article is in axial alignment with the element, said receptacle having at its receiving end an orifice through which the leading end of the article is projected and thereby pivotally supported.

8. The combination with an element for telescopically receiving a tubular article, of a carriage mounted for oscillation adjacent said element and including at its pivotal end a receptacle for a tubular article, means for actuating said carriage to position such article alternately in spaced angular relation to said element and in axial alignment with said element, a plunger supported by and reciprocative longitudinally of said carriage and in axial alignment with the contained article, means for actuating said plunger to move the article to and in lapping relation with the opposing end of said element when the article is angularly disposed, and for moving the article longitudinally of and upon said element when the article is in axial alignment with the element, said receptacle having at its receiving end an orifice through which the leading end of the article is projected and thereby pivotally supported, and resilient jaws arranged exteriorly of the orifice to embrace and guide the article as it advances to the said element.

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