Sept. 2, 1958 G. J. SELVIN ET AL 2,850,140

ROD FEEDING DEVICE

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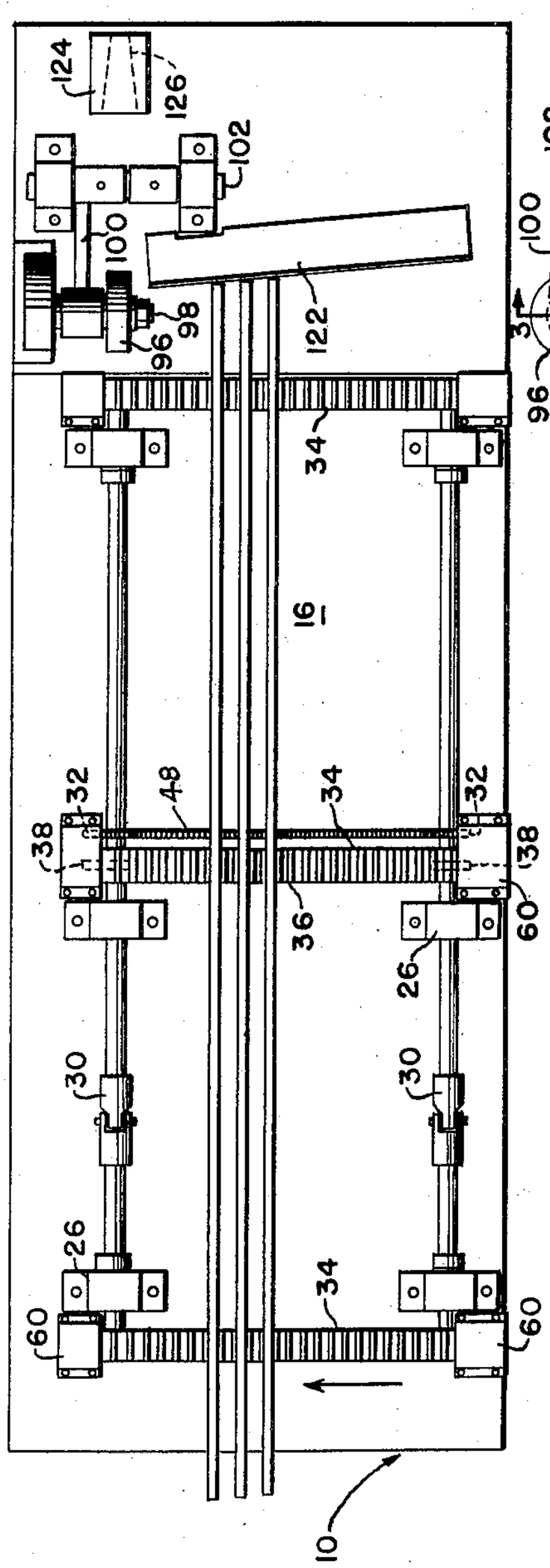

FIG. 1.

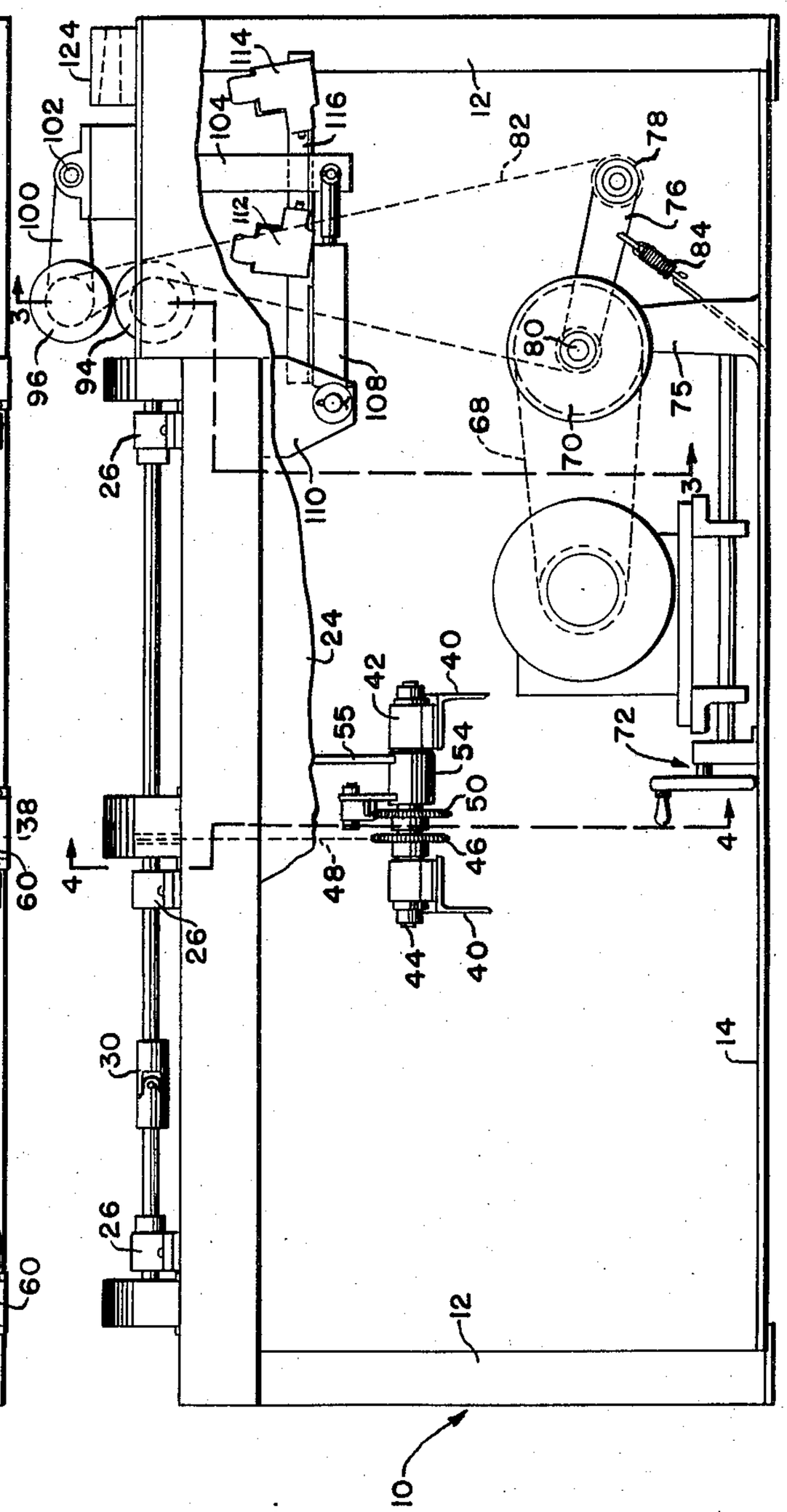

FIG. 2.

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FIG.4.

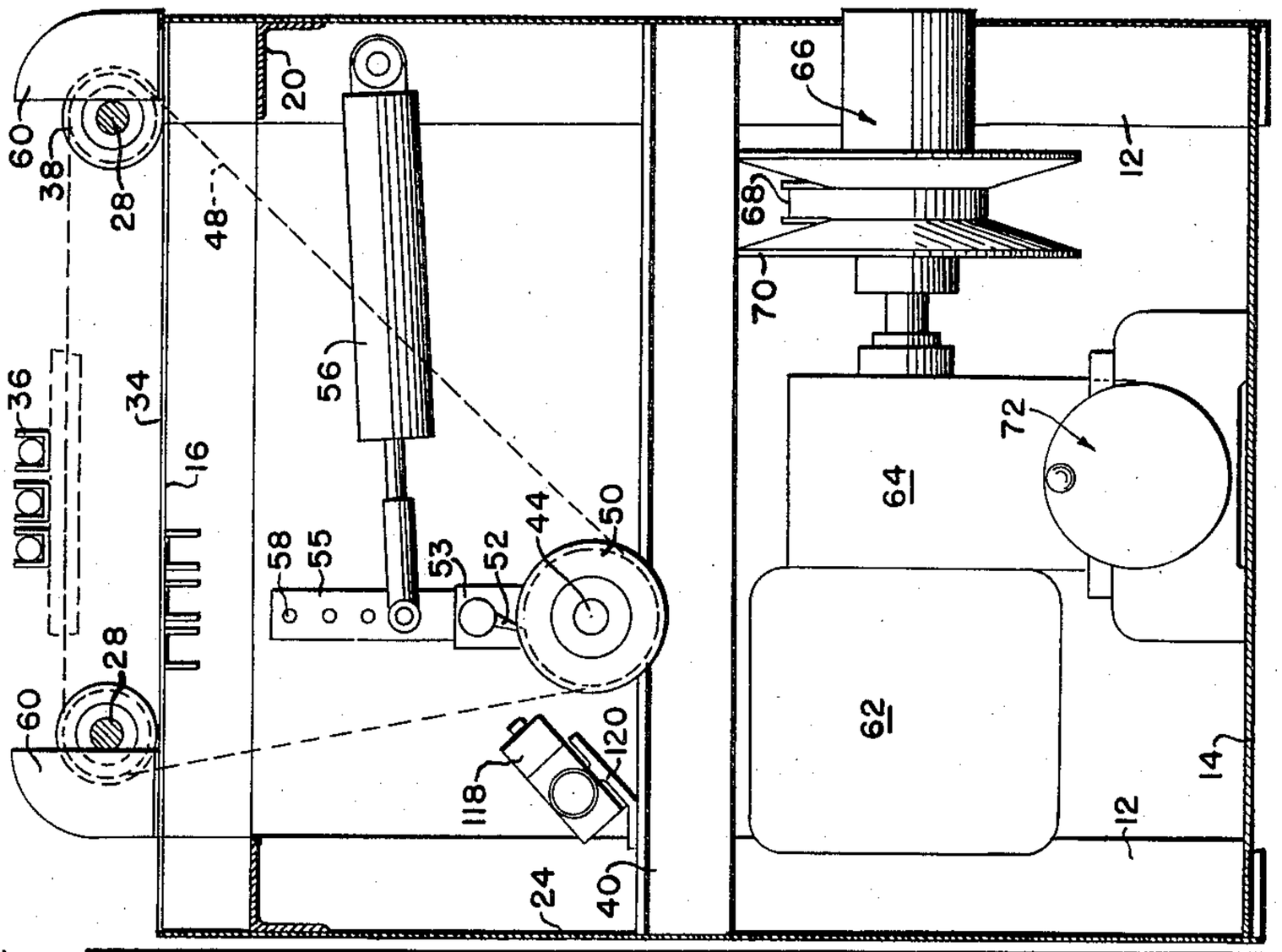
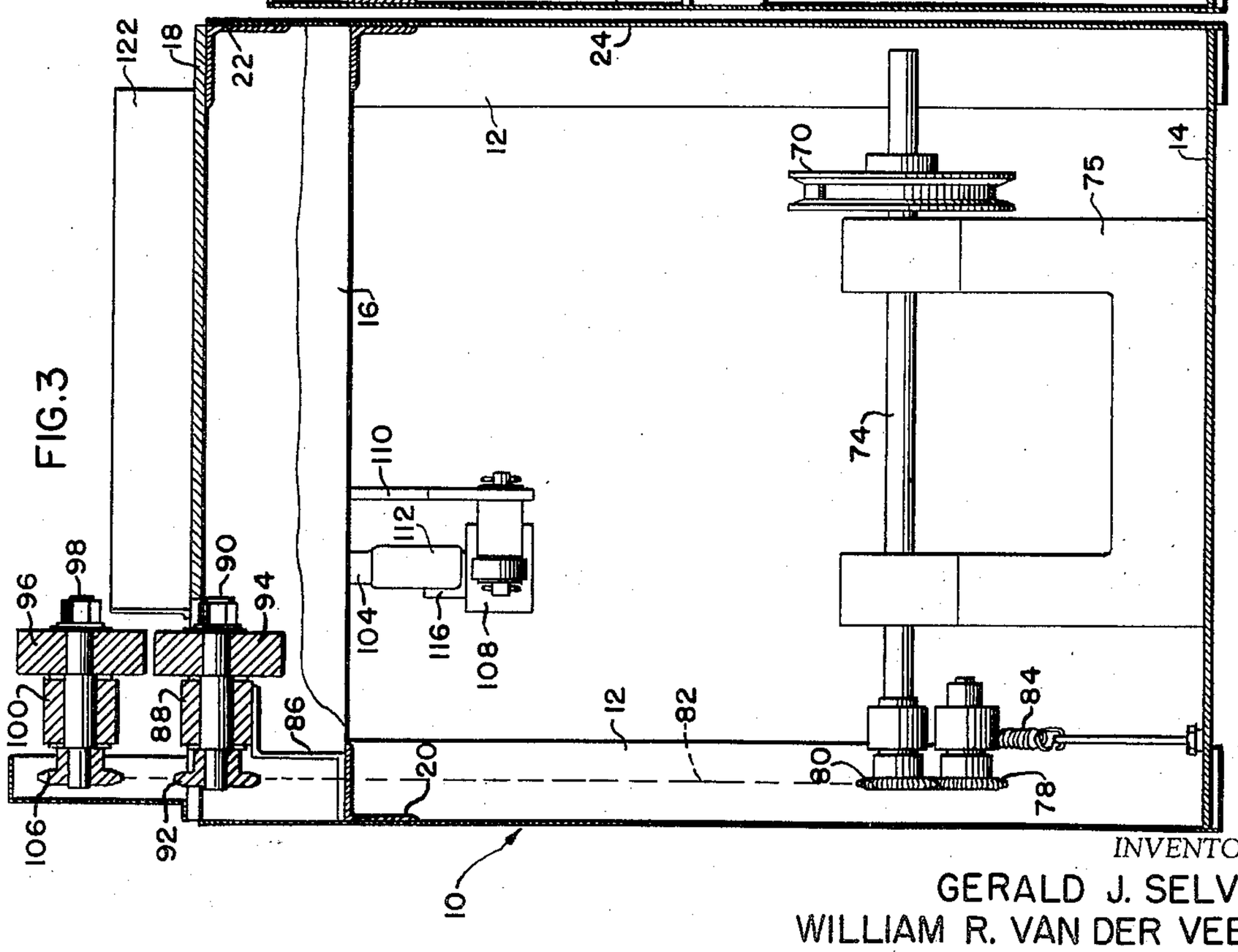


FIG.3



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ROD FEEDING DEVICE

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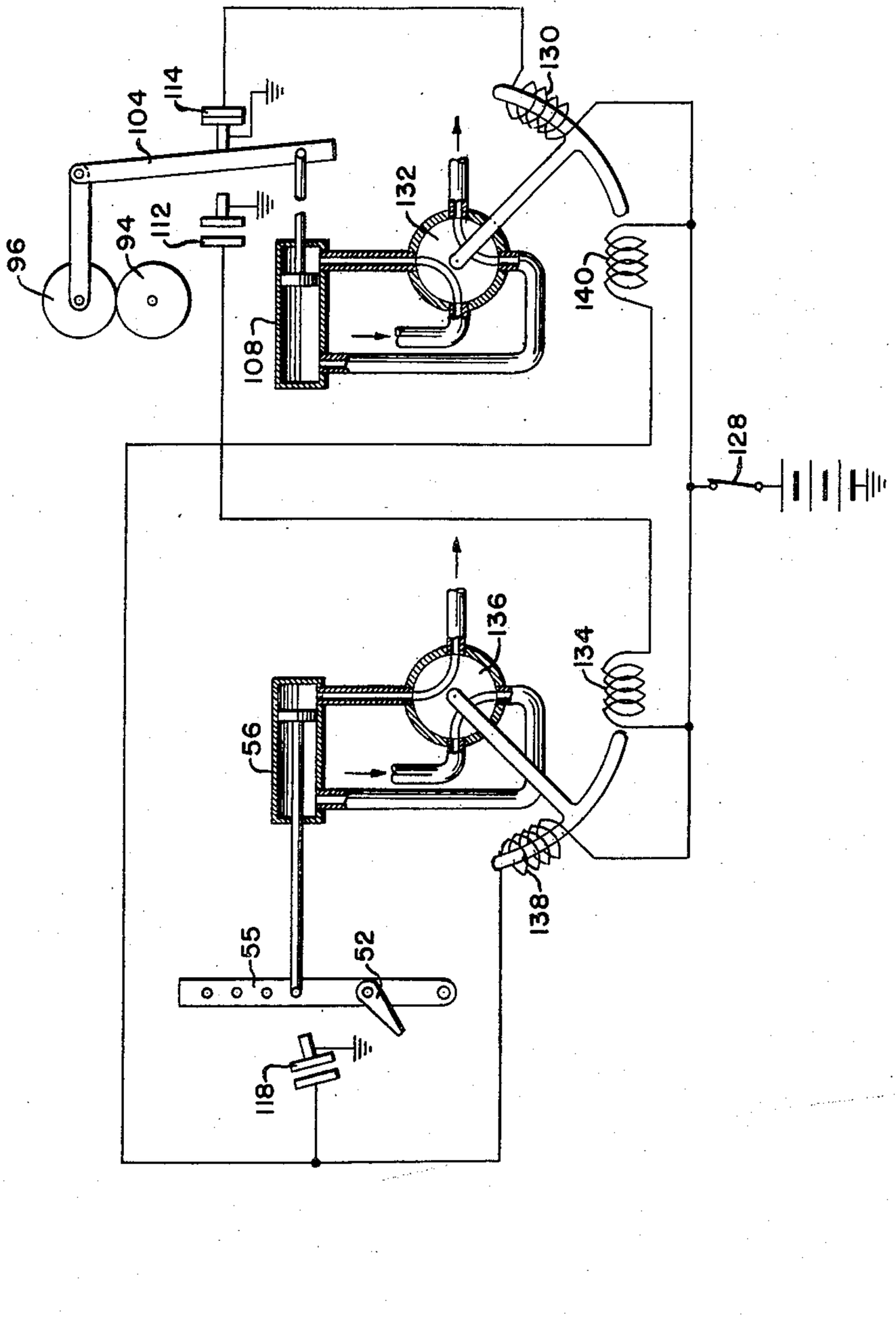
FIG.5.



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ROD FEEDING DEVICE

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Application March 22, 1955, Serial No. 495,954

8 Claims. (Cl. 198—20)

This invention relates to apparatus for feeding slender, very long articles. In particular, the invention relates to means for automatically feeding thin rods or tubes to a furnace. For the sake of brevity hereafter, the word rod should be interpreted to mean any long article, such as a tube.

It is an object of the invention to provide for automatic lateral and longitudinal feed of the rods.

It is a further object of the invention to provide for control of lateral and longitudinal feed of the rods in accordance with the presence of a rod at a longitudinal feeding station of the machine.

These and other objects will be apparent after reading the following specification and claims, when taken in conjunction with the accompanying drawings in which

Fig. 1 is a plan view of the machine.

Fig. 2 is a front elevation thereof with a side cover plate broken away to expose driving mechanism.

Fig. 3 is a section on the line 3—3 of Fig. 2.

Fig. 4 is a section on the line 4—4 of Fig. 2, and

Fig. 5 is a diagrammatic view of switch and valve control mechanism utilized in the machine.

Referring to the drawings with greater particularity, at **10** there is indicated a frame having corner angle irons **12**, a bed plate **14**, and a table top comprised of two plates **16** and **18** at different elevations. The lower level table top **16** is an open bottomed box supported on longitudinal angle irons **20**, while the upper table top is supported by angles **22**, mounted on side cover plates **24**.

Mounted on the table top **16** are two sets of aligned bearing blocks **26** journaling two shafts **28**, each in sections and joined by universal joints **30** to take care of possible misalignment of the shafts in the bearing blocks. Mounted on these shafts are a number of spaced apart sprockets **32**. In this illustration, each shaft **28** drives three sprockets. Trained about opposite pairs of sprockets are rod conveyor belts **34** each carrying equally spaced apart rod support channels or cleats **36**. Each cleat is U-shaped in form with the base of the cleat fastened to the belt and the distance between the legs of the U a little greater than the diameter of the rods to be fed by the conveyor belts.

Mounted on the shafts and about midway of their length are sprockets **38**. Supported on angle irons **40** running transversely of the machine is a pair of bearing blocks **42**, rotatively supporting a shaft **44** on which is mounted a sprocket **46** in the vertical plane of the sprockets **38**. Trained about the sprockets **38** and **46** is the driving chain **48**. In order to drive the sprocket **46**, shaft **44** fixedly mounts a ratchet **50** driven by a pawl **52** pivotally mounted on an upright **53** on a sleeve **54**, rotatively mounted on the shaft **44**, and to which sleeve is integrated an arm **55**. This arm is driven in opposite directions by a double acting fluid motor **56**, as will be described. Thus each time the arm **55** is oscillated counterclockwise (in Fig. 4), the rods will be advanced to the left a distance determined by the stroke of the pawl. The stroke of the pawl may be varied

in various ways, as for example by providing the arm **55** with a series of aligned holes **58** to which the piston rod of the motor **56** may be coupled. The stroke is adjusted so that with each counterclockwise movement of the arm **55**, a cleat **36** will be moved a distance equal to the distance between cleats. The belts **34** run through suitable openings in the table top and safety shields **60** are placed at the ends of the runs of the belts to prevent injury to an operator. In the illustrative embodiment of the invention three conveyor belts **34** are disclosed although obviously with longer rods to be fed, a greater number of belts may be employed. It is sufficient to employ only one chain **48** to drive the shafts **28** and through them all of the belts.

The conveyor belts just described serve to move rods laid in the cleats, step by step, toward the rear of the machine and in the direction of the arrow in Fig. 1. When a rod has reached a position in line with longitudinal feed rollers to be described, it will be fed longitudinally.

The longitudinal rod feeding mechanism will now be described.

Mounted on the bed plate **14** of the machine is a motor **62** which, through a reducing gear in a housing **64** and a Reaves transmission **66**, drives a V-belt **68** and pulley **70**. The motor and its driven parts may be adjusted relative to the pulley **70** by conventional motor base adjusting mechanism as indicated at **72**. The pulley **70** is mounted on a shaft **74** carried by a standard **75**. Pivotally mounted on shaft **74** between collars thereon is an arm **76** carrying a small sprocket **78**. Also mounted on the same shaft as pulley **70** is a second small sprocket **80**. Trained about these sprockets and other sprockets, to be described, to drive rolls which will feed rods longitudinally, is a chain **82**, and to keep the chain taut at all times is a coiled tension spring **84** fastened at one end to the arm **76** and at the other end to bed plate **14**.

Mounted on a bracket **86** secured to one of the angle irons **20** is a bearing **88** supporting a shaft **90** on the rear end of which is fastened a sprocket **92** and on the front end of which there is a rod driving roll **94**. A cooperating shiftable driving roll **96** is mounted on a shaft **98** mounted in the end of an arm **100** fast at its other end on a shaft **102** rotatively mounted in suitable bearings and to which shaft is also secured a depending roll shift and switch control arm **104**. The shaft **98** also carries a sprocket **106** aligned with the sprockets **92**, **80**, and **78**, and the chain **82** passes over the sprockets in such a direction that the rolls **94** and **96** will effect drive of a rod to the right in Fig. 2 when the top roll is forced down onto a rod resting on the bottom roll.

The roll **96** may be raised and lowered by the action of a double acting fluid motor **108** whose cylinder block is pivotally hung on a bracket **110** and whose piston is pivotally connected to the lower end of the arm **104**. In the path of the movement of the arm **104** is a pair of switches **112** and **114**, one on each side of the arm. The switches are carried in spaced apart relation on an angle bar **116** secured to the cylinder block. Referring to Fig. 4, it will be noted that a switch **118** pivotally adjustably mounted on a plate **120** supported on a bar **40** is in the path of movement of the arm **55**.

The switch **118** and switches **112** and **114** control the operation of the fluid motors. The rods are intermittently fed transversely of their lengths, see Fig. 1, in a direction toward the rolls **96** and **94** and to a position between the rolls, roll **96** for this purpose being raised away from roll **94** when the rod reaches the plane of the rolls. To ensure the front ends of the tubes being in proper position and to render it easy to initially place the rods in the cleats, an inclined guide board **122** is provided against which the rods are pressed by the operator in

laying the rods in the cleats. Thereafter the board cams the bars to proper position as they approach the feed rolls **96**, **94**. To guide the rods in their passage away from the machine a block **124** with a conical bore **126** is provided, as seen in Figs. 1 and 2, through which the rods thread as they are moved longitudinally of the machine.

Each of the cylinders **56** and **108** is provided with a fluid pressure reversing valve. These valves may be four way valves as indicated diagrammatically in Fig. 5, operated by electro-magnets under control of the switches **118**, **112** and **114**.

Fig. 5 assumes a normal position of parts but after closure of a main switch. It may be assumed that there are a number of parallel rods lying in the cleats **36** with no rod in position to be fed by the rolls **96** and **94**. Since there is no rod between the feed rolls **96** and **94** the rolls are in contact and the arm **104** has closed switch **114**. Now with the main switch **128** closed, current flows from the source of power to a solenoid **130** to rotate a four way valve **132**. This causes fluid pressure to flow to cylinder **108** to lift the roll **96** so that a rod may move laterally to position between the rolls **96** and **94**. At the end of the lift motion of the roll **96**, arm **104** closes switch **112**, closing the circuit to solenoid **134** thereby operating four way valve **136** to admit fluid pressure to the cylinder **56** to cause the arm **55** to move the pawl **52** which in turn advances the conveyor belts one step. At the end of the stroke of arm **55**, switch **118** is closed, energizing solenoid **138** to cause valve **136** to reverse, to restore pawl **52** to its initial position. Also closure of switch **118** energizes solenoid **140**, causing valve **132** to reverse to force roller **96** toward roller **94**. If a rod will have been positioned between the rollers **96** and **94** by the previously described movement of the conveyor belts, then the roll **96** will not move far enough to permit switch **114** to close and the rolls will feed the rod longitudinally. If due to the absence of a rod in the cleats, a rod had not been positioned between the rolls, then roll **96** will move down all the way to roll **94**, switch **114** will be closed, and the cycle of operations just described will be repeated. When a rod is positioned between the rolls it will be fed into the guide block **124** and out from between the rolls. As the rod leaves the rolls, the switch **114** is again closed and another rod will be automatically positioned between the rolls.

Having thus described our invention, what we claim as new is:

1. In object feeding mechanism, a first means for feeding an object transversely of its length, a second feeding means in position to receive the object from the first means to feed the object longitudinally of its length and normally ineffective to cause said object to be moved, means sensitive to the absence of an object at the second feeding means for effecting an object feeding movement of the first means, and further means rendered operative at the completion of movement of the first means for rendering the second means effective for object movement.

2. In a rod feeding machine, an intermittently driven means for feeding rods transversely of their lengths, a continuously driven feeding means having rod driving elements normally spaced apart to receive between them a rod delivered by said first means, means operative at the completion of intermittent movement of the first means for effecting engagement of at least one of said driving elements with said rod to effect longitudinal movement thereof, and means sensitive to the absence of a rod at the second feeding means for effecting a spacing apart of the driving elements and for effecting a rod feeding movement by said first means.

3. In a rod feeding machine, a first means for feeding rods transversely of their lengths, a second means in position to receive a rod from the first means, said second means having a rod feeding element normally out of engagement with said rod, means sensitive to the absence of a rod at the second feeding means for effecting a rod feeding movement of said first means, and means operative at the completion of movement of the first means for shifting the feeding element into engagement with a rod to move the same in a longitudinal direction.

4. In a rod feeding machine, a first means for feeding rods transversely of their lengths, a second means in position to receive a rod from the first means, said second means having a rod feeding element in a normally inoperative position out of engagement with said rod, means sensitive to the absence of a rod at the second feeding means for effecting a rod feeding movement of said first means, means operative at the completion of movement of the first means for shifting the feeding element into operative engagement with a rod to move the same in a longitudinal direction, and means operative upon completion of longitudinal rod movement to shift said feeding element in a reverse direction back to its normally inoperative position.

5. In a rod feeding machine a first means for feeding rods transversely of their lengths, a second means in position to receive the rods from the first means for feeding rods in a path longitudinally of their lengths, said second means being movable toward and from the rods and including control means fixed for movement with said second means, a first stationary control element operative by said control means upon movement of said second feeding means away from the path of the rods, a second stationary control element operated by said control means upon movement of said second feeding means into the path of longitudinal movement of said rods when no rod is present at said second feeding means, means responsive to the operation of said first stationary control element for effecting movement of said first feeding means, means effective at the end of movement of said first feeding means for moving the second feeding means toward the path of longitudinal movement of the rods, and means responsive to the operation of said second control element for moving the second feeding means away from the path of longitudinal movement of the rods, and to a position where the first control element is operated.

6. In a rod feeding machine, a first means for feeding rods transversely of their length, said means including an oscillatory member operative to feed the rods on a first half cycle, only, of its movement, a second means in position to receive the rods from the first means for feeding rods in a path longitudinally of their length, said second means being movable toward and from the rods and including control means fixed for movement with said second means, a first stationary control element operative by said control means upon movement of said second feeding means away from the path of the rods, a second stationary control element operated by said control means upon movement of said second feeding means into the path of longitudinal movement of said rods when no rod is present at said second feeding means, means responsive to the operation of said first stationary control element for effecting a movement of the first means through its first half cycle, only, means operative at the end of the half cycle movement of the first means to move said first means through its second half cycle and to effect movement of said second feeding means toward the path of longitudinal movement of the rods, and means responsive to the operation of said second control element for moving the second feeding means away from the path of longitudinal movement of the rods, and to a position where the first control element is operated.

7. In a rod feeding machine, means for feeding a rod longitudinally comprising a pair of rod engaging rolls at least one of which is rotatively driven, means for shifting one of the rolls toward and from the other for respec-

tively, effecting a feeding movement of a rod and for facilitating the placing of a rod between the rolls and means, including a conveyor, under control of the position of the shiftable roll for effecting the placement of a rod between the rolls.

8. In a rod feeding machine, means for feeding a rod transversely of its longitudinal axis comprising a conveyor with rod positioners spaced at equal distances along the conveyor, pawl and ratchet means for stepping the conveyor along in increments equal to the spacing of said positions, means operative at the end of advancing pawl movement for retracting the pawl to initial position, means in position to receive the rods from the first means for feeding the rod longitudinally of its length, set into operation at the end of advancing pawl movement and

means under control of the position of the longitudinal rod feeding means for effecting a movement of the pawl in a conveyor feeding direction.

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