United States Patent [19]

Volkers

[11] **3,707,909**

[45] **Jan. 2, 1973**

[54] PRESSURE ROLL LOADING

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[22] Filed: **Aug. 13, 1971**

[21] Appl. No.: **171,619**

[52] **U.S. Cl.** **100/47,** 100/168, 100/170, 156/473

[51] **Int. Cl.**.....**B30b 15/14,** B30b 3/04

[58] **Field of Search**.....100/47, 155, 160, 162, 168, 100/170, 176; 156/473

[56] **References Cited**

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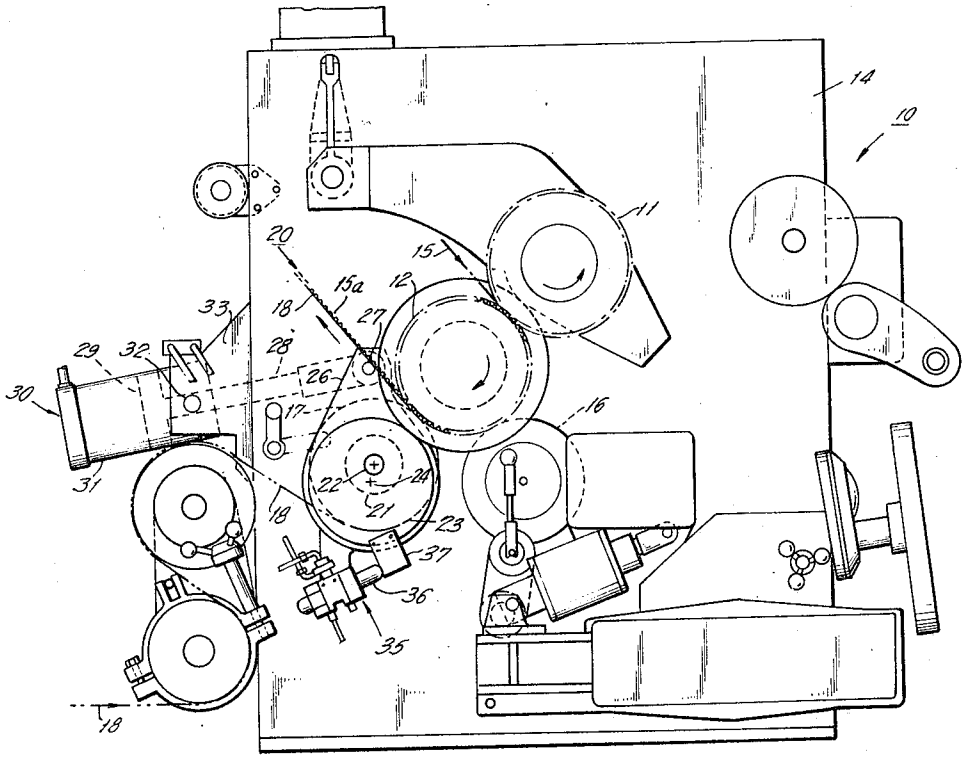
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[57] **ABSTRACT**

In a single facer, the roll for applying pressure to the liner web forcing it against the glue containing flute tips of the corrugated web is moved between operating and retracted positions by double acting power cylinder means operated by relatively high pressure fluid. When the pressure roll reaches its operating position, it operates a control valve to automatically control application of an opposing pressure, at lower than said high pressure, to the double acting cylinder means so that the net force maintaining the pressure roll in its operating position is derived from the net value of the high and opposing pressures.

6 Claims, 2 Drawing Figures



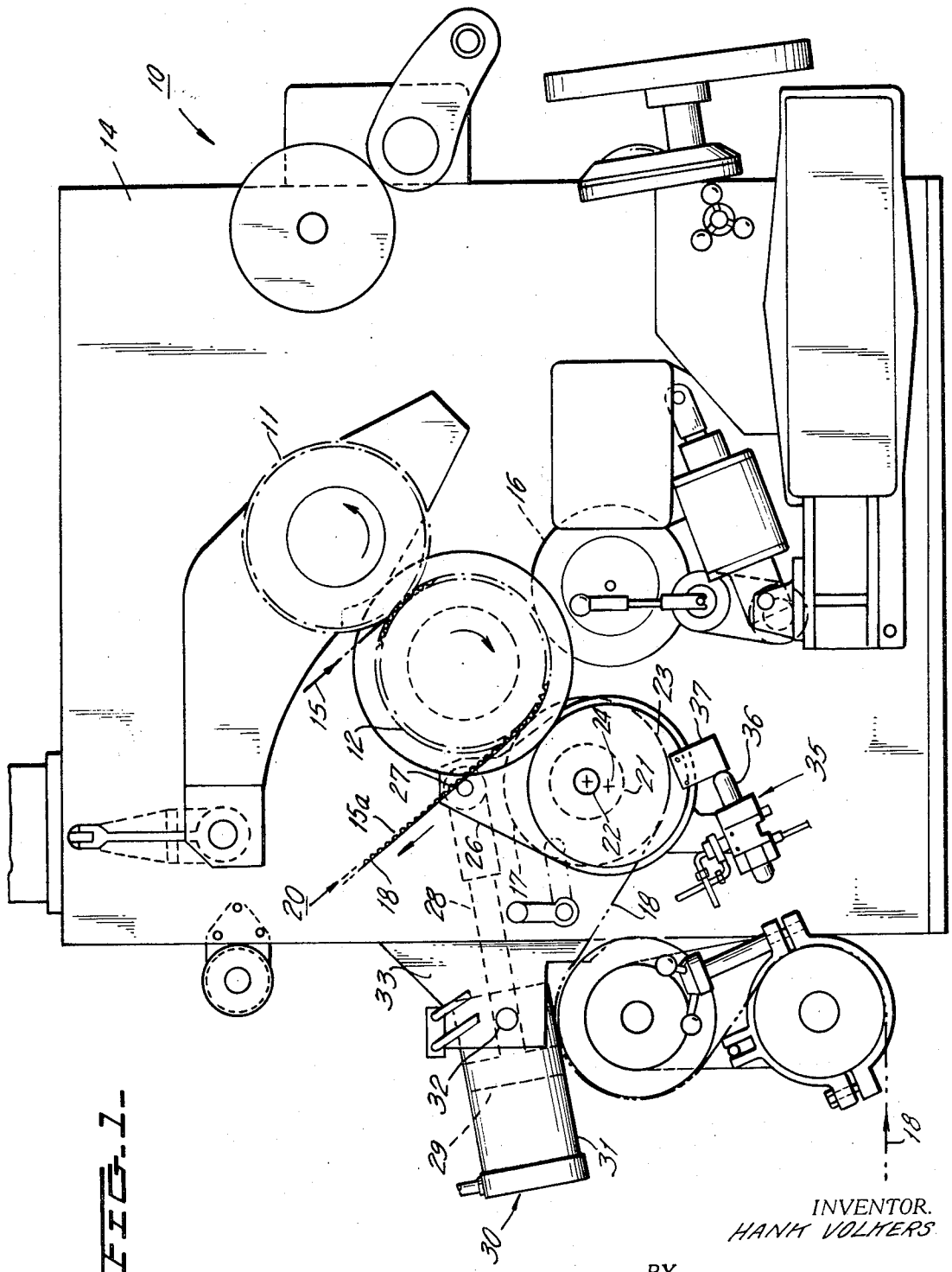


FIG. 1

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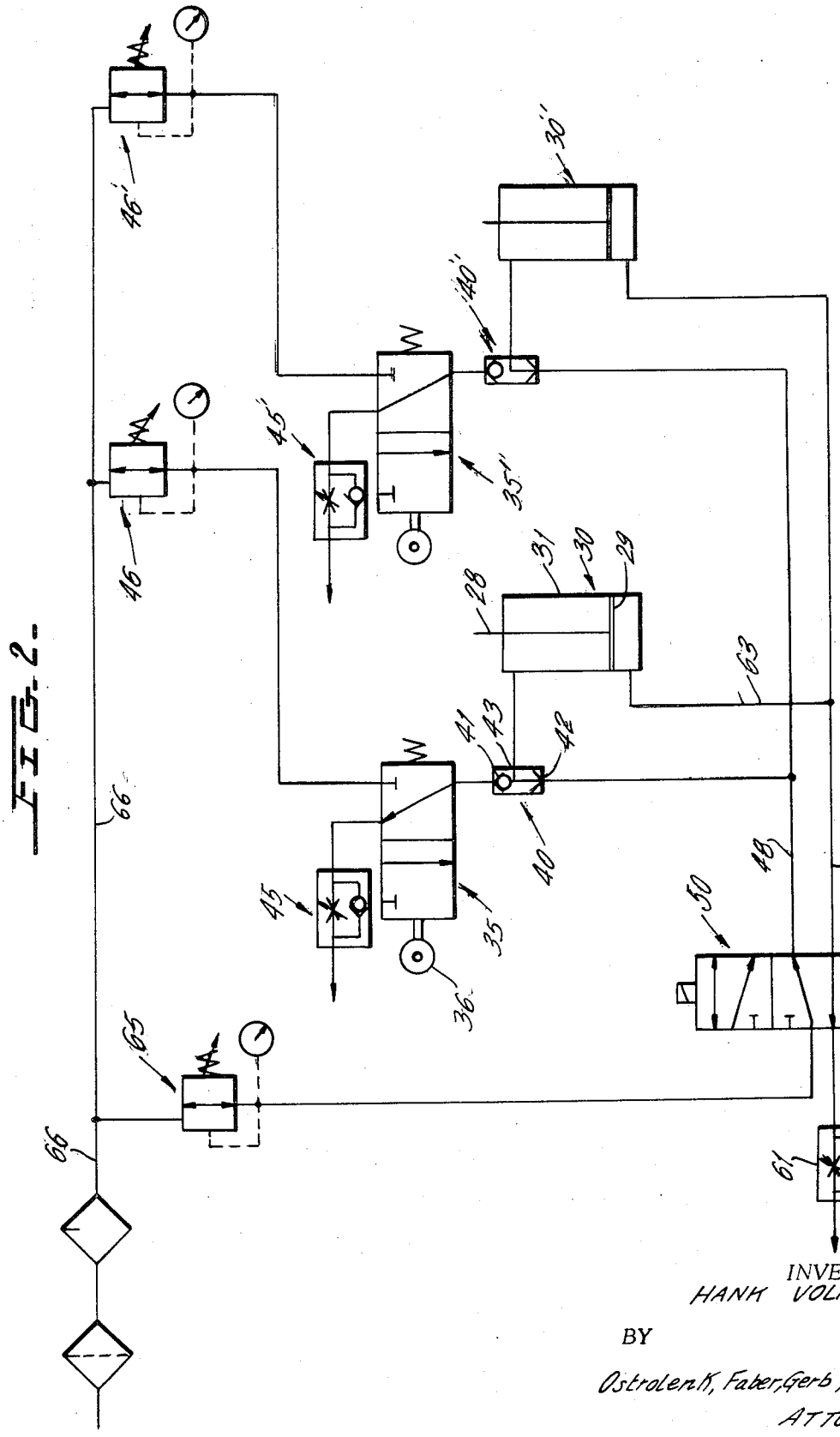


FIG. 2.

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PRESSURE ROLL LOADING

This invention relates to apparatus for producing corrugated paper board in general and more particularly relates to fluid pressure means for moving and loading the pressure roll that acts on the liner web.

In the production of single face corrugated board, a web of paper is passed between a pair of cooperating corrugations rolls which apply transverse corrugations to this web. Glue is then applied to the flute tips of the corrugations, and shortly thereafter a liner web is joined to the glue coated flute tips. A pressure roll acting on the liner sheet urges the latter into firm engagement with the glue bearing flute tips, while the corrugated web is still in engagement with one of the corrugating rolls.

In order to permit the corrugated and flat webs to be threaded between the pressure roll and the corrugated roll adjacent thereto, and also to permit idling the machine without paper, it is necessary for the pressure roll to be mounted for limited movement transverse to its rotational axis, toward nd away from the last noted corrugated roll. In accordance with the instant invention, this movement of the pressure roll is effected by means of a pair of double acting cylinders connected to opposite ends of the pressure roll. As will hereinafter be seen, high pressure is used to move the pressure roll into and out of operating position, and when the pressure roll is in its operating position a control valve is operated to automatically apply an opposing regulated fluid pressure to the double acting cylinder means to partially offset the effects of the relatively high pressure which moves the pressure roll into operating position.

Accordingly, a primary object of the instant invention is to provide a novel means for moving a pressure roll and maintaining it in operating position.

Another object is to provide means of this type which utilizes double acting fluid pressure cylinder means.

A further object is to provide apparatus of this type in which differential pressure is utilized to derive the force maintaining the pressure roll in its operative position.

A still further object is to provide apparatus of this type which roll pressure may be readily adjusted.

These objects as well as other objects of this invention will become readily apparent after reading the following description of the accompanying drawings in which:

FIG. 1 is a side elevation of a single facer including pressure roll moving and loading means constructed in accordance with teachings of the instant invention.

FIG. 2 is a schematic of the fluid operating system for the double acting fluid power cylinder means which operates the pressure roll.

Now referring to the Figures. For purposes of describing the instant invention, only a very brief description of single facer **10** is included herein. A more detailed description of single facer **10** is found in the A. F. Shields U.S. Pat. No. 2,711,206 issued June 21, 1955. That is, single facer **10** includes a pair of cooperating driven elongated corrugated rolls **11, 12**, having the ends thereof supported by transversely spaced frame members **14**. Web **15**, after passing between corrugating rolls **11, 12**, continues in a clockwise direction about corrugating roll **12** past glue roll **16** which applies glue to the flute tips of corrugations **15** formed in web **15**.

Web **15** then moves past pressure roll **17** where liner web **18** is forced against the glue bearing flute tips of corrugated web portion **15***a* to produce single face corrugated board **20**.

Each end of pressure roll **17** is rotably mounted in bearing means **21** for rotation about longitudinal axis **22**. Bearing means **21** is fixedly mounted in an eccentric position to circular carrier **23** that is pivotally mounted to frame **14**. The center of rotation for carrier **23** is indicated by reference numeral **24**. Crank arm **26**, fixedly secured to carrier **23** and extending radially therefrom, is secured by pin **27** to the free end of arm **28** connected to movable piston **29** within cylinder **31** of double acting fluid operated power cylinder **30**. Pins **32**, extending in opposite directions from the side of cylinder **31**, pivotally mount power cylinder **30** between brackets **33** connected to the left side of frame **14**. Two-way fluid control **35**, mounted to frame **14**, includes operating extension **36** engageable by element **37** secured to carrier **23** and projecting therefrom.

In FIG. **1** pressure roll **17** is shown in its operating position adjacent to corrugating roll **12**. For various reasons well known to the art, it often becomes necessary to move pressure roll **17** to a position remote from corrugating roll **12**. This is accomplished by operating piston **27** to the rear, or left of the position illustrated in FIG. **1**. This pivots carrier **23** in a counterclockwise direction and disengages member **37** from control extension **36**. This disengagement permits control **35** to return to its normal position illustrated in FIG. **2**, wherein control **35** connects input **41** of shuttle valve **40** to ambient pressure through quick exhaust valve **45**. When control **35** is in the actuated position of FIG. **1**, shuttle valve input **41** is connected to the output of relatively low fluid pressure regulator **46**. The input of regulator **46** is fed with relatively high unregulated fluid pressure in line **66**.

Output **43** of shuttle valve **40** is connected to the interior of cylinder **31** forward of piston **29** and the other input **42** of shuttle valve **40** is connected through line **48** to three-way control valve **50**. In the position shown in FIG. **2**, control **50** connects quick exhaust valve **61** through lines **62** and **63** to the interior of cylinder **31** at the rear of piston **29** and connects line **48** to the output of relatively high pressure regulator **65**.

Thus, with control valves **35** and **50** in the positions shown in FIG. **2**, ambient pressure is at the rear of piston **29** and relatively high pressure is at the front thereof. The latter condition is a result of the fact that shuttle valve **40** is so constructed that the pressure appearing at output **43** thereof is the higher of the two pressures appearing at inputs **41, 42**. In this case relatively high pressure appears at input **42** so that relatively high pressure is acting at the front of piston **29** driving it rearward to retract roll **17** from the position shown in FIG. **1**.

To move pressure roll **17** toward its operating position, control valve **50** is operated to the position not shown in FIG. **2** in which line **62** is connected to relatively high fluid pressure and pressure is removed from line **48**. Thus, piston **29** moves forward, pivoting carrier **23** clockwise, thereby moving pressure roll **17** forward to its operative position. By the time pressure roll **17** reaches its operative position of FIG. **1**, member **37** engages extension **36** and operates control **35** to its posi-

tion not shown in FIG. 2, wherein relatively low pressure is applied to shuttle valve input **41**. At this time the higher of the pressures appearing at shuttle valve inputs **41, 42** is a relatively low pressure provided by adjustable fluid pressure regulator **46** so that this relatively low pressure appears at output **43** and is applied at the front of piston **29** to act in opposition to the relatively high pressure provided at the rear of piston **29** by adjustable fluid pressure regulator **65**. Thus, pressure roll **17** is held in its operative position by the net force acting on piston **29**, with this force being derived from the relatively high pressure of regulator **65** opposed by the relatively low pressure of regulator **46**.

Double acting power cylinder **30** acts on one end of pressure roll **17** and an identical double acting power cylinder **30'** acts on the other end of pressure roll **17**. Since the operating elements for controlling power cylinders **30** and **30'** are identical, these operating elements for the latter will not be described but will merely be noted. That is, elements **35' 40' 45'** and **46'** for the operation of double acting power cylinder **30'** are identical to the respective elements **35, 40, 45, 46** and operate essentially at the same time as the respective elements.

Thus, it is seen that the instant invention provides novel fluid pressure operated means for fast movement of a pressure roll and application of readily adjustable differential pressure means to maintain the pressure roll in its operative position.

Although in the foregoing this invention has been described in connection with preferred embodiments, many modifications will now become apparent to those skilled in the art, and it is therefore preferred that this invention be limited not by the foregoing description but only by the appending claims.

The embodiments of the invention in which an exclusive privilege or property is claimed are defined as follows.

1. Apparatus including first and second elongated rolls for acting upon elongated web means moving therebetween; said rolls being mounted for rotation on parallel axes; fluid operated means or moving said first roll relative to said second roll, transverse to the axes thereof, between a retracted position remote from said second roll and an operating position forward of said retracted position and adjacent to said second roller; said fluid operating means including double acting power cylinder means having a movable member connected to said first roll for moving the latter and maintaining it in said operating position; means for supplying fluid at first and second pressure levels with said first pressure level being above said second pressure level; a first control means operable between a first and a second position; said first control means when in said first position introducing fluid at said first pressure level to the rear of said movable member, thereby moving the latter forward to move said first roll forward at relatively high speed; said first control means when in said second position introducing fluid at said first pressure level to the front of said movable member thereby moving the latter rearward to move said first roll to its retracted position; a second control means operable from a normal first to a second position by said first roll as the latter reaches a predetermined position in moving toward its operating position; said second control means when in its said second position introducing fluid at said second pressure level to the front of said movable member whereby said first roll is maintained in its operating position by forces derived from the net effect of fluid at said second pressure level acting in opposition to fluid at said first pressure level.

2. Apparatus as set forth in claim **1** in which said double acting power cylinder means includes first and second sections acting essentially in unison and connected to said second roll at opposite ends thereof.

3. Apparatus as set forth in claim **1** in which there is a third valve means interposed between the front of said movable member and both said first and said second control means; said third control means including a first input connected to said first control means, a second input connected to said second control means, an output connected to said double acting power cylinder means in front of said movable member, and means which automatically connects said output to the one of said first and second input at which a higher pressure level is present.

4. Apparatus as set forth in claim **3** in which said first control means when in its said second position connecting the rear of said movable member to ambient.

5. Apparatus as set forth in claim **4** in which said second control means when in its said first position connecting the front of said movable member to ambient.

6. Apparatus as set forth in claim **5** in which said double acting power cylinder means includes first and second sections acting essentially in unison and connected to said second roll at opposite ends thereof.

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