

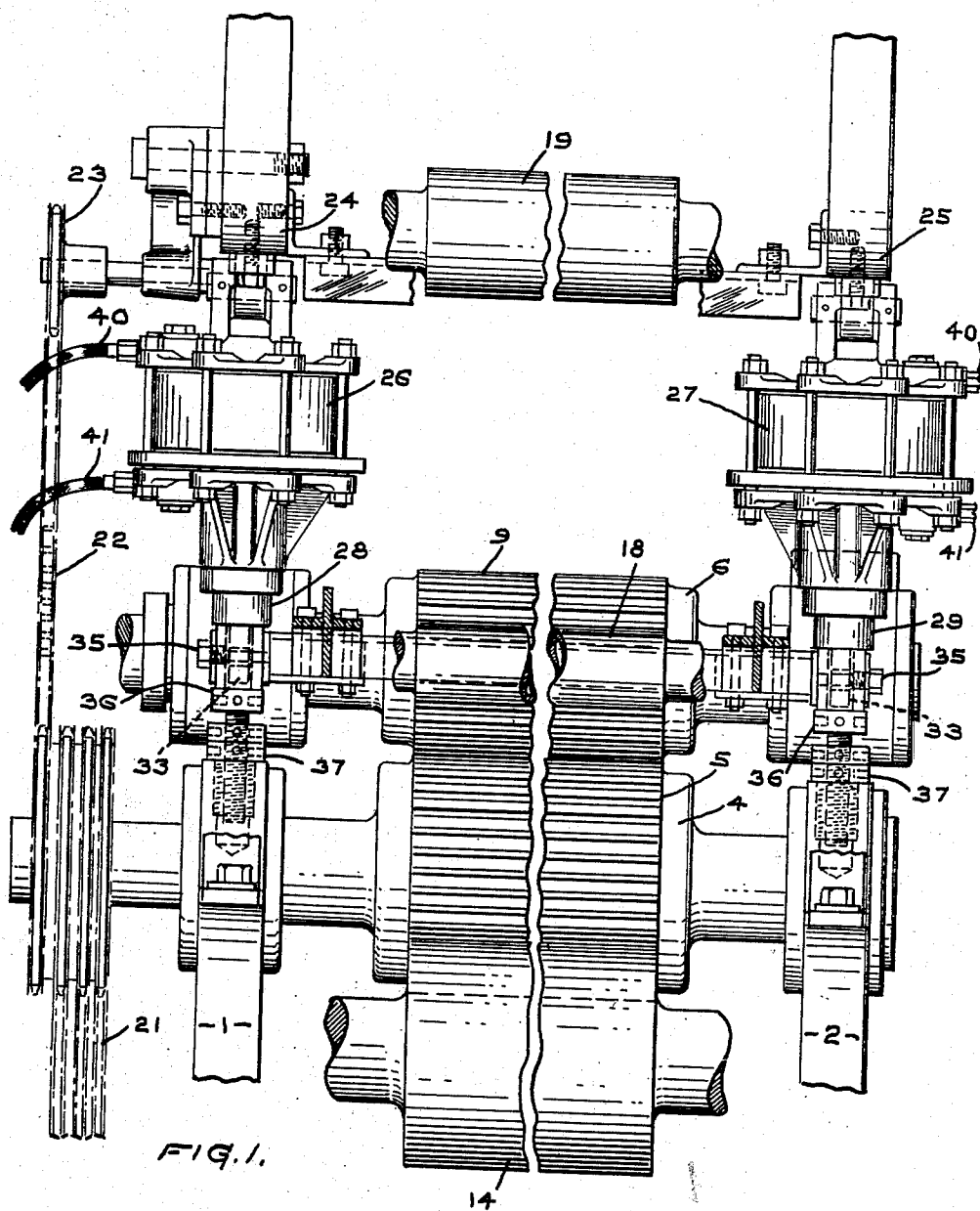
Aug. 24, 1954

R. F. HOLLIS
CORRUGATOR ROLL MOUNTING

2,687,165

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4 Sheets-Sheet 1



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4 Sheets-Sheet 2

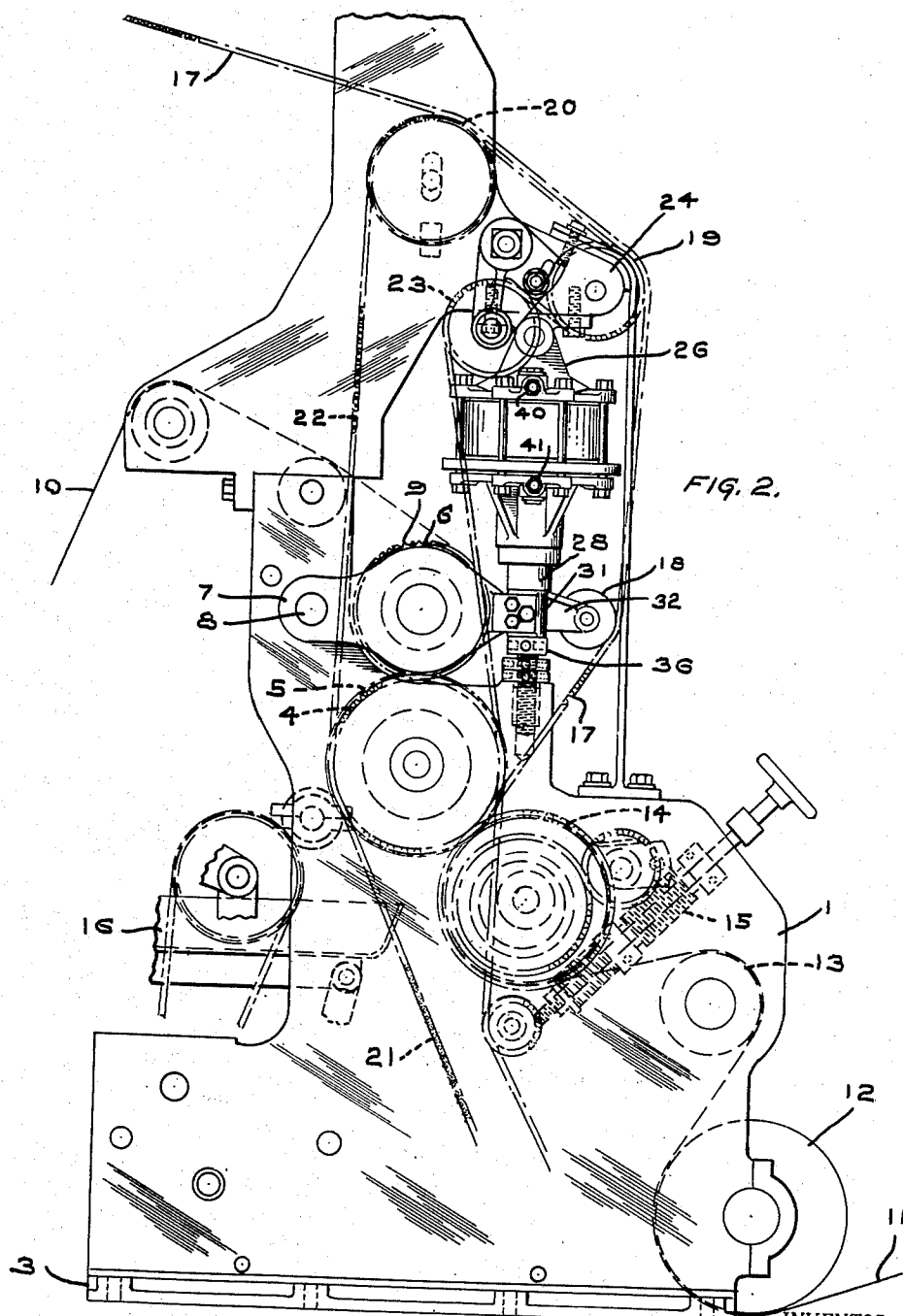


FIG. 2.

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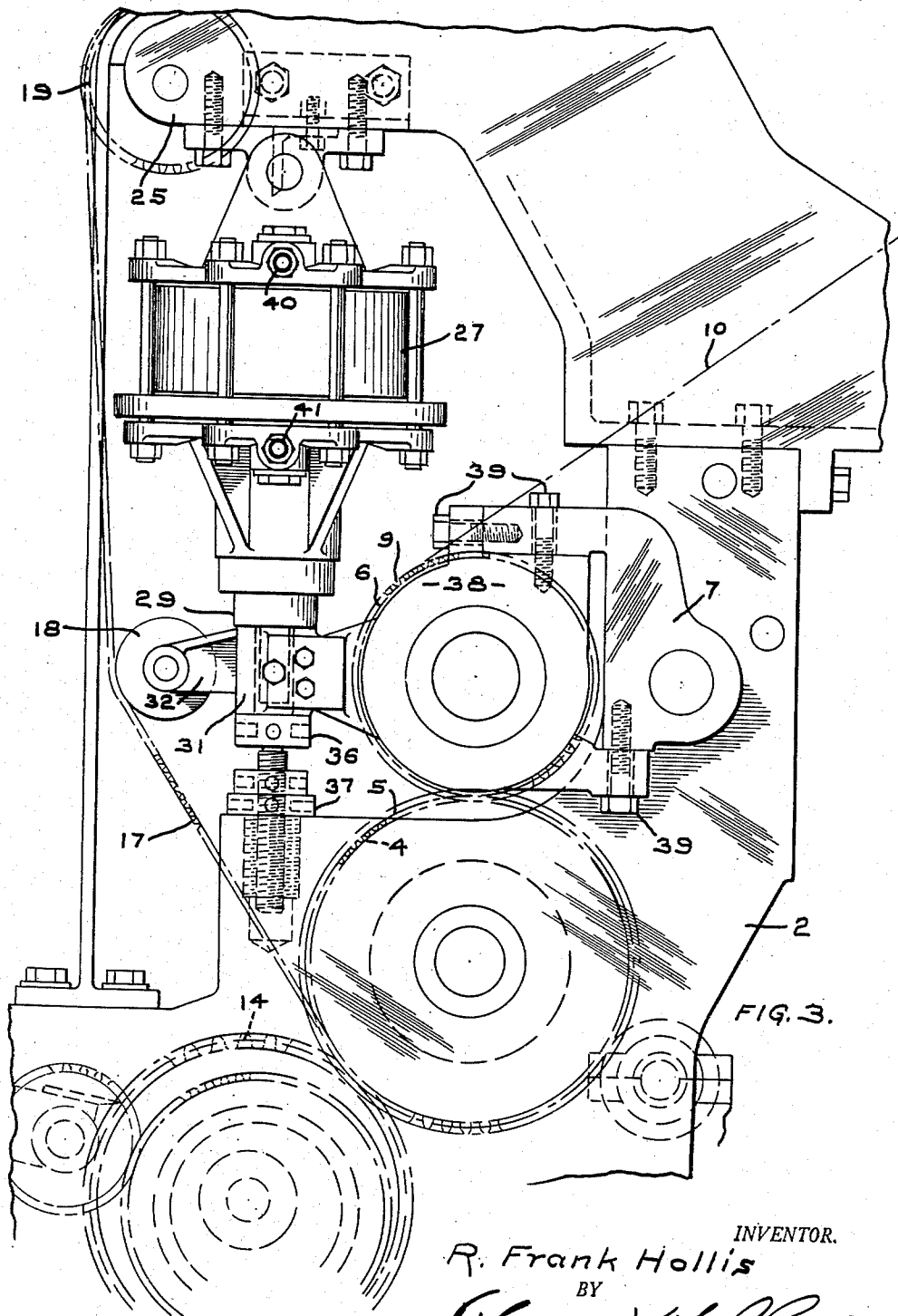


FIG. 3.

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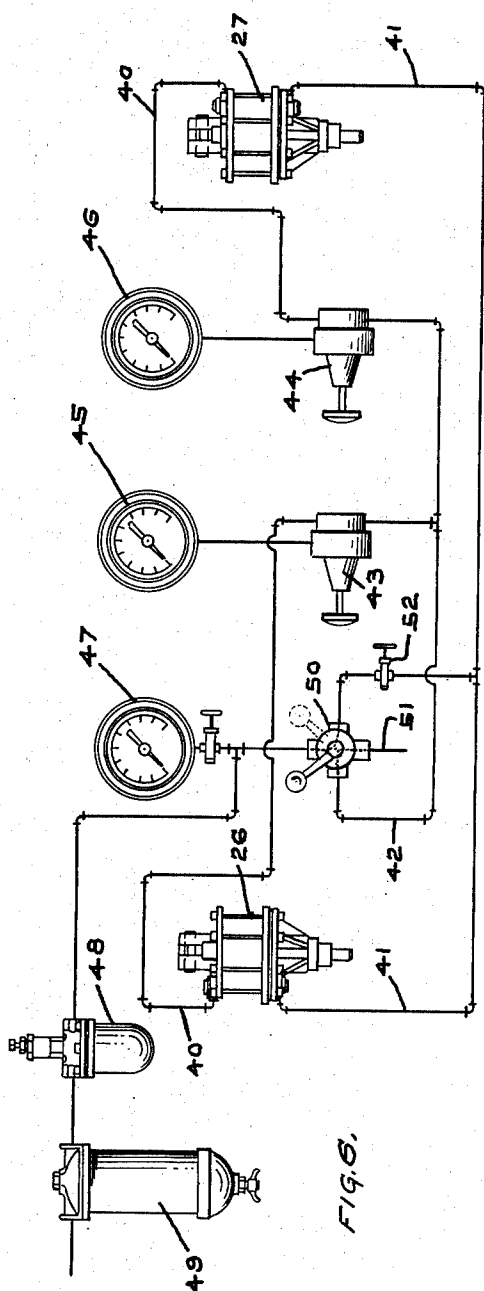
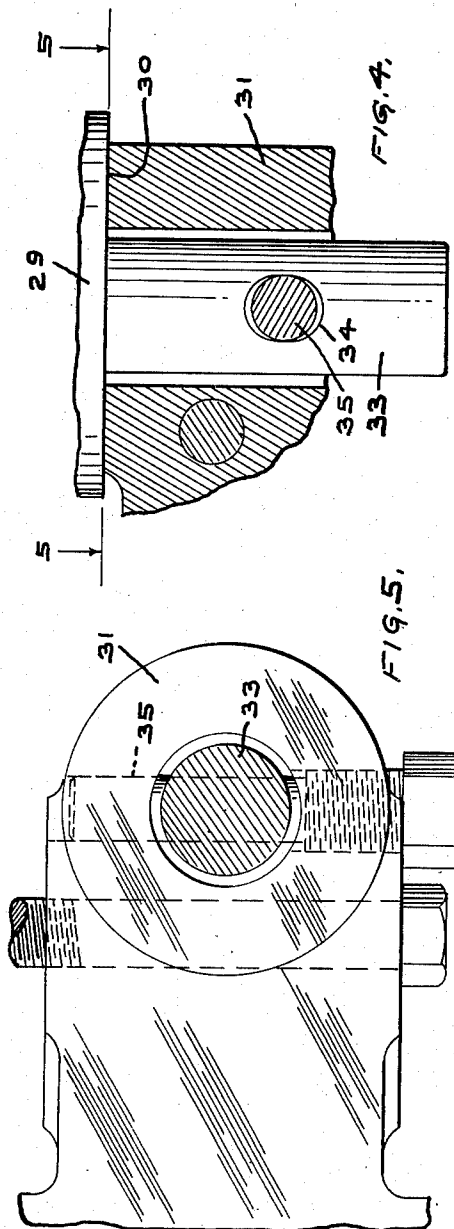
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4 Sheets-Sheet 4



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CORRUGATOR ROLL MOUNTING

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9 Claims. (Cl. 154—30)

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This invention relates to an improvement in a machine for making corrugated paper board. The invention is illustrated as applied to what is commonly known as a single facer. In making corrugated board on such a machine a single sheet of paper is drawn between two rolls which are fluted longitudinally, having crowns and valleys, and these flutes crease similar flutes into the paper. While the fluted paper is still on one of the corrugating rolls adhesive is applied to the crowns of the fluted paper and then a face or liner is pressed firmly against the adhesive coated crowns to make a corrugated sheet with a face or liner firmly affixed to one side. This single faced board could then be passed to a double facer to receive another liner or face on the unlined side of the corrugations or the board could be used in its single faced condition.

The board as it passes between the corrugating rolls varies considerably in thickness with different qualities of stock and it also varies considerably in stiffness so that more or less pressure may be required between the rolls to give the paper the desired fluting or depth of corrugations, without breaking the paper at the bends forming the corrugations. Also the pressure on the roll must be adjusted when different widths of stock are corrugated.

When the flutes are cut in the rolls, those in the lower roll are cut straight across the roll, those in the upper roll are cut to give the roll a barrel shape, larger at the center. This is done to keep the surfaces of the rolls parallel when in use, under pressure in corrugating. Both rolls bend lengthwise under their normal corrugating pressure, and they bend differently depending upon the width of the board or paper passing between them. With the proper pressure to corrugate a given board, with the upper roll being of larger center than end diameter, the rolls will be parallel and the board corrugated evenly across its width. Even with a properly cut roll, if the pressure is too little, the sides of the board will not be corrugated as deeply as the center, and with too much pressure, the sides of the board will be corrugated more deeply.

It has heretofore been proposed to mount the rolls with springs at the ends of one of the rolls to hold it in close proximity to the other corrugating roll and these springs have at times

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been made adjustable to regulate the spring pressure as it is applied to the corrugating roll and in turn to the paper to be corrugated.

It is well-known that springs vary in the pressure which they exert. They also lose their power to exert the same force over a period of time. It is also nearly impossible to obtain two springs, one for each end of the roll, which will apply equal pressure to both ends of the roll, as a consequence one side of the board will often be fluted with deeper valleys than the other side. All springs also have a period of vibration and this period of vibration varies with their age and use. As the flat paper enters between the two fluted rolls the movable roll tends to vibrate strongly. The springs are intended to absorb this vibration and yet maintain the rolls in fluting relation. When the rolls have been run slowly this vibration of the roll against the springs has not had serious consequences but as the requirement to run the machines faster to produce more corrugated board feet per minute has increased, it has been found that the vibration of the movable roll at times equals the period of vibration of the springs and when this occurs the springs act erratically so that the fluting may not take place at all, or it may take place with very shallow flutes or be fluted for a section and then not at all, and the produced corrugated paper or board turns out quite unsatisfactorily.

It is the aim of the present invention to provide a movable corrugating roll on which the pressure may be applied through fluid pressure chambers and pistons at each end of the movable roll so that there will be no period of vibration and so that the movable roll can be placed into an exact relationship with the stationary corrugating roll to always give the same depth of flute to the paper without fail. Another object of the invention is to apply this firm and relatively unyielding pressure to both ends of the roll and to balance the pressure between both ends of the roll, it will be understood that some resiliency is left in the fluid pressure line because of possible warping of the rolls in heating and cooling. Another object of the invention is to provide a pressure applying mechanism for both ends of the roll that can be adjusted quickly and accurately, should the width of the stock be changed or should variations in the stock in successive rolls

appear. Another object of the invention is to provide a quick means of releasing the pressure on both ends of the roll and for opening the rolls so that should the paper tear and become wound around either of the rolls, after separating the rolls by simply throwing a single lever, the paper can be removed.

Another object of the invention is to be able to determine, accurately and rapidly in advance, the proper difference in the diameter of the upper roll at its center and at its ends. The pressure required to properly corrugate a given paper of a given width can be determined, then the amount of bending of the rolls under that pressure can be determined, and with these two known factors, the upper roll can be cut so that, as both rolls bend in operation, their surfaces will remain parallel, so that the paper will be corrugated evenly across its width.

The simpler and more certain control of the pressure between the rolls provided by this invention gives better quality of board at much higher speed and with less wear on the rolls, also the wear is distributed equally across the length of the rolls, also the machine is out of use for adjustment for much less time.

The above and other objects and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawings forming a part hereof and in which:

Figure 1 is a partial end view of the single facer showing the mounting of the corrugating rolls.

Figure 2 is a left elevational view of the single facer.

Figure 3 is a partial right elevational view of the single facer.

Figure 4 is a fragmentary elevational view of the connection between the piston and the levers supporting the movable roll.

Figure 5 is a sectional view on line 5—5 of Figure 4.

Figure 6 is a schematic view of the compressed air circuit for operating the pistons.

In the drawings similar numerals refer to similar parts throughout the several views.

The single facer has side frames 1 and 2 supported on base 3. A lower corrugating roll 4 with flutes 5 therein is mounted centrally of the machine between the frames 1 and 2 and a movable corrugating roll 6 is mounted above roll 4, being journaled in levers 7 swinging on fixed pivots 8 in the frames. Flutes 9 on roll 6 intermesh with the flutes 5 on roll 4 to make corrugations in paper 10 as it passes therebetween. The liner 11 enters the machine by passing over rolls 12 and 13 and pressure roll 14. The pressure roll may be adjusted in its proximity to corrugating roll 5 by eccentric adjusting mechanism 15. Adhesive from the receptacle 16 is applied to the crowns of the corrugated paper on roll 4, which rotates in a counterclockwise direction in Figure 2, and after the crowns receive their adhesive the liner 11 is pressed thereagainst by the pressure roll 14 and the formed single faced corrugated board 17 then passes upwardly from between rolls 4 and 14 around rolls 18, 19 and 20. The lower corrugating roll 4 is driven by chains 21 and the rolls 19 and 20 are driven by single chain 22 which passes around idler slack take-up sprocket 23. The frames 1 and 2 have projecting heads 24 and 25 to the lower portions of which are pivoted fluid chambers or cylinders 26 and 27. These

chambers or cylinders have fluid operated pistons 28 and 29 therein, the piston shoulders 30 bearing on the tops of sleeves 31 projecting outwardly beyond the roll 6 and forming the outward extensions or free ends of the levers 7, roller 18 is mounted on the brackets 32 attached to these levers 7. Pistons 28 and 29 have similar projections 33 thereon which project into the sleeves 31 in the levers 7. Projections 33 have elongated openings 34 therein through which are passed pins 35, through each sleeve 31. Because of the elongation of the openings 34 the levers are allowed a measure of play on the pins 35 but this is strictly limited by the bottom of the piston 30 bearing directly on the sleeves from the top and by the head of the stop screw 36 which may be adjusted in position by its screw threads in the side frames 1 and 2. These screws 36 may be locked in position by the two lock nuts 37 on each screw 36. Bearing housing 38 on right lever 7 for one end of roll 6 may be adjusted to accurately align the flutes in the two rolls by means of screws 39, which when loose, allow movement of their supported housing.

The pistons 28 and 29 in the chambers or cylinders 26 and 27 may be raised or lowered in the chambers by means of admitting fluid, air or hydraulic, pressure to the bottom or top of the chambers through lines 41 and 40.

As shown in Figure 6, line 40 as it leads from the common supply 42 applies pressure equally to the top of the chambers 26 and 27. Valves 43 and 44 are in these respective lines to adjust the admission of pressure thereto equally and pressure gages 45 and 46 are provided in these respective lines to indicate the pressure introduced to the chambers 26 and 27. A line gage 47 is also provided as is also a lubricator 48 and a filter and condenser 49 in the supply line 42.

Valve 50 is in the pressure line and when it is in one position, it admits pressure to the top of the chambers, when in its opposite position it admits pressure to the bottom of the chambers to raise the pistons and thereby to raise the movable corrugating roll. Exhaust from either lines 40 or 41 passes through valve 50 and out exhaust pipe 51. The rate of exhaust is determined by the setting of valve 52. The raising of the movable roll will allow a broken piece of paper which may have wrapped around any of these rolls to be removed.

It will be apparent from the above description that a mounting for the movable roll has been provided which allows free access to the corrugating rolls and which may have its pressure rapidly adjusted from a single source, as it is applied to both ends of the roll and the rolls may be quickly separated to allow for their cleaning. Also the natural vibration of the roll is cut to a minimum and the holding means, having no period of vibration, never allows the complete separation of the corrugating rolls and the pressure on both ends of the roll is maintained balance and constant and positive to the desired degree, depending only on the pressure applied to the line under the direct control of the operator.

It will be apparent that various modifications and changes may be made in the structure above illustrated and described in detail without departing from the invention as set forth in the following claims.

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What is claimed as new and is desired to be secured by Letters Patent is:

1. A machine for making single faced corrugated board comprising a pair of parallel axis revolvable fluted rolls normally disposed to intermesh the crowns and valleys of the two rolls, one of said rolls operating on an axis shiftable with respect to the axis of the other roll, a pair of spaced levers, fixed pivot means for one end of said levers, said shiftable roll being journaled in said levers intermediate the lever ends, the levers extending beyond both sides of the roll, separate positive pressure applying means attached to said levers at their free ends, whereby pressure applied to the levers urges the shiftable roll toward the other roll to intermesh their respective crowns and valleys, adjusting means common to said two pressure applying means for balancing their pressure equally simultaneously.

2. A machine for making single faced corrugated board comprising a pair of parallel axis revolvable fluted rolls normally disposed to intermesh the crowns and valleys of the two rolls, one of said rolls operating on an axis shiftable with respect to the axis of the other roll, a pair of spaced levers, fixed pivot means for one end of each of said levers, said shiftable roll being journaled in said levers and spaced from said pivot means of each lever, a fluid chamber and a fluid operated piston therein operatively connected to each said lever adjacent its free end to apply pressure to said levers whereby the pressure applied to the levers urges the shiftable roll toward the other roll to intermesh their respective crowns and valleys, adjusting means common to said fluid chambers to adjust their pressure on said shiftable roll through said levers simultaneously.

3. A machine for making single faced corrugated board comprising a pair of parallel axis revolvable fluted rolls normally disposed to intermesh the crowns and valleys of the two rolls, one of said rolls operating on an axis shiftable with respect to the axis of the other roll, a pair of spaced levers, fixed pivot means for one end of each of said levers, said shiftable roll being journaled in said levers and spaced from said pivot means of each lever, a fluid chamber and a fluid operated piston therein operatively connected to each said lever adjacent its free end, and supports for said chambers and pistons located on the side of the shiftable roll opposite the other roll, adjusting means common to said fluid chambers to shift the shiftable roll to or from the other roll and apply pressure to said shiftable roll toward the other roll, through said levers simultaneously to intermesh their respective crowns and valleys.

4. A machine for making single faced corrugated board comprising a pair of parallel axis fluted rolls normally disposed to intermesh the crowns and valleys of the two rolls, one of said rolls operating on an axis shiftable with respect to the axis of the other roll, a pair of spaced adjustable pressure applying elements for said shiftable axis roll, to adjust the extent of the intermeshing of the crowns and valleys of the two rolls, each of said adjusting elements including a fluid chamber and a fluid operated piston therein operatively connected to shift the shiftable axis roll said last named roll tending to be vibrated by the spaced crowns of the rolls engaging board passing between the rolls, the fluid pressure dampening the vibration, means connected in common to said chambers to adjust the

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adjusting elements simultaneously, means in said common connected means to vary the pressure to the separate chambers selectively and means independent of the surfaces of the rolls to selectively limit the movement of the shiftable axis roll under the influence of the pressure applying elements.

5. A machine for making single faced corrugated board comprising a pair of parallel axis fluted rolls normally disposed to intermesh the crowns and valleys of the two rolls, one of said rolls operating on an axis shiftable with respect to the axis of the other roll, a pair of spaced adjustable pressure applying elements for said shiftable axis roll, to adjust the extent of the intermeshing of the crowns and valleys of the two rolls, each of said adjusting elements including a fluid chamber and a fluid operated piston therein operatively connected to shift the shiftable axis roll said last named roll tending to be vibrated by the spaced crowns of the rolls engaging board passing between the rolls, the fluid pressure dampening the vibration, means connected in common to said chambers to adjust the adjusting elements simultaneously, means independent of the surfaces of the rolls to selectively limit the movement of the shiftable axis roll under the influence of the pressure applying elements and means to oppositely operate said pressure applying elements to separate the rolls.

6. A machine for making single faced corrugated board comprising a frame, a pair of meshing corrugating rolls mounted in the frame, a pair of levers each having one end pivotally mounted in the frame and forming the support in the frame for one of said rolls, the lever mounted roll being journaled in the levers intermediate the ends thereof, chambers mounted on the frame having fluid operated pistons therein attached to the free ends of the levers and means common to the chambers to admit fluid pressure to the chambers simultaneously to force the rolls together to intermesh their respective crowns and valleys.

7. A machine for making single faced corrugated board comprising a frame, a pair of meshing corrugating rolls mounted in the frame, a pair of levers each having one end pivotally mounted in the frame and forming the support in the frame for one of said rolls, the lever mounted roll being journaled in the levers intermediate the ends thereof, chambers mounted on the frame having fluid operated pistons therein attached to the free ends of the levers and means common to the chambers to admit fluid pressure to the chambers simultaneously to force the rolls together to intermesh their respective crowns and valleys, and adjustable means in one of said levers to adjust one end of the lever mounted roll to align the flutes of the two rolls with respect to each other.

8. A machine for making single faced corrugated board comprising a frame, a pair of meshing corrugating rolls mounted in the frame, a pair of levers each having one end pivotally mounted in the frame and forming the support in the frame for one of said rolls, the lever mounted roll being journaled in the levers intermediate the ends thereof, chambers mounted on the frame having fluid operated pistons therein attached to the free ends of the levers and means common to the chambers to admit fluid pressure to the chambers simultaneously to force the rolls together to intermesh their respective crowns and valleys, and adjustable stops on the frame

opposite the pistons to limit the movement of the levers by the thrust of the pistons against the levers.

9. A machine for making single faced corrugated board, comprising a frame, a corrugating roll mounted in fixed position in the frame, spaced levers each pivoted at one end in the frame, a second corrugating roll mounted above the first roll and journaled in said levers intermediate their ends, chambers connected to said frame and fluid operated pistons in said chambers connected to the free ends of said levers, and means

to admit fluid pressure equally to each said cham-

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
5 1,642,782	Langston	Sept. 20, 1927
1,748,374	Winger	Feb. 25, 1930
1,765,922	Kleinewefers	June 24, 1930
1,912,709	Kane	June 6, 1933
2,138,397	Cannity	Nov. 29, 1938
10 2,479,759	Merchant	Aug. 23, 1949
2,545,921	Goodwillie et al.	Mar. 20, 1951

FOREIGN PATENTS

Date

Country

Date

Country

Date

Date

Country

Date