United States Patent

[11] **3,607,523**

[72] Inventor **George W. McGirr**
Delran, N.J.

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[73] Assignee **Harris-Intertype Corporation**
Cleveland, Ohio

[54] **DOUBLE FACER HEAT CONTROL METHOD AND APPARATUS**
8 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** **156/210,** 156/292, 156/470
[51] **Int. Cl.** **B31f 1/20**
[50] **Field of Search** 156/210, 292, 60, 470; 101/416, 247

[56] **References Cited**

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Primary Examiner—Benjamin A. Borchelt
Assistant Examiner—G. E. Montone
Attorney—Seidel, Gonda & Goldhammer

ABSTRACT: A double facer machine for making double-faced corrugated paperboard is provided with an automatic control for ballast rolls. The automatic control is responsive to movement of heated platens. As surface contact between the corrugated paperboard and the platens decreases due to movement of the platens away from the paperboard, ballast rolls are caused to move upwardly away from the paperboard.

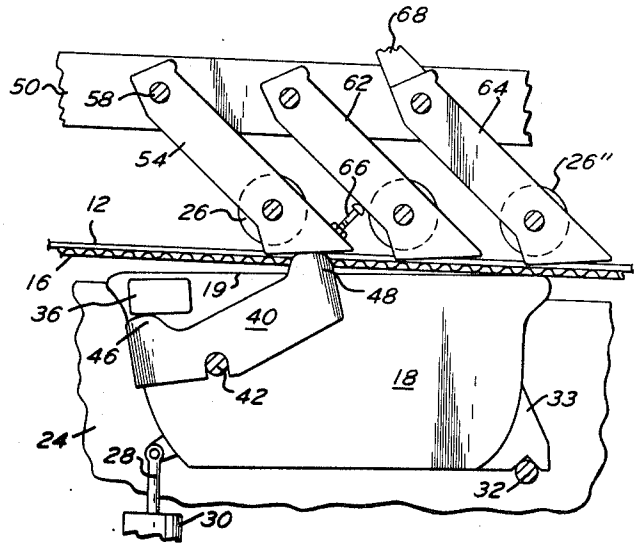
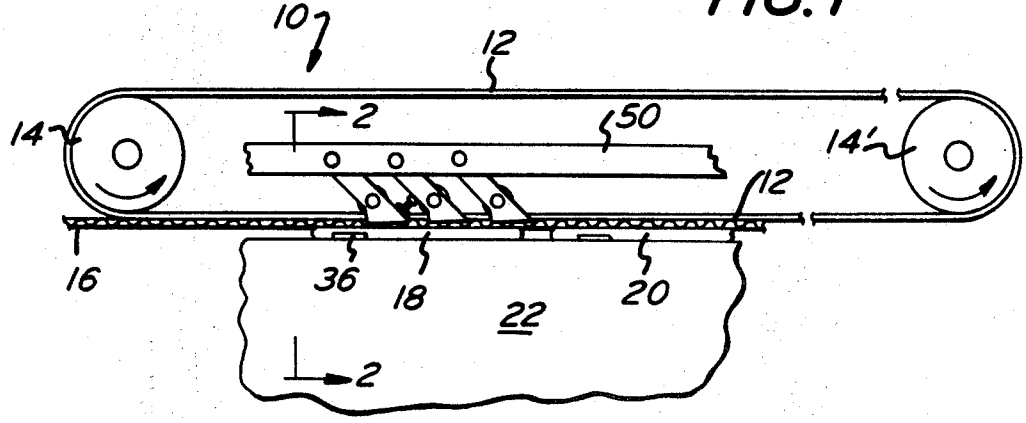


FIG. 1



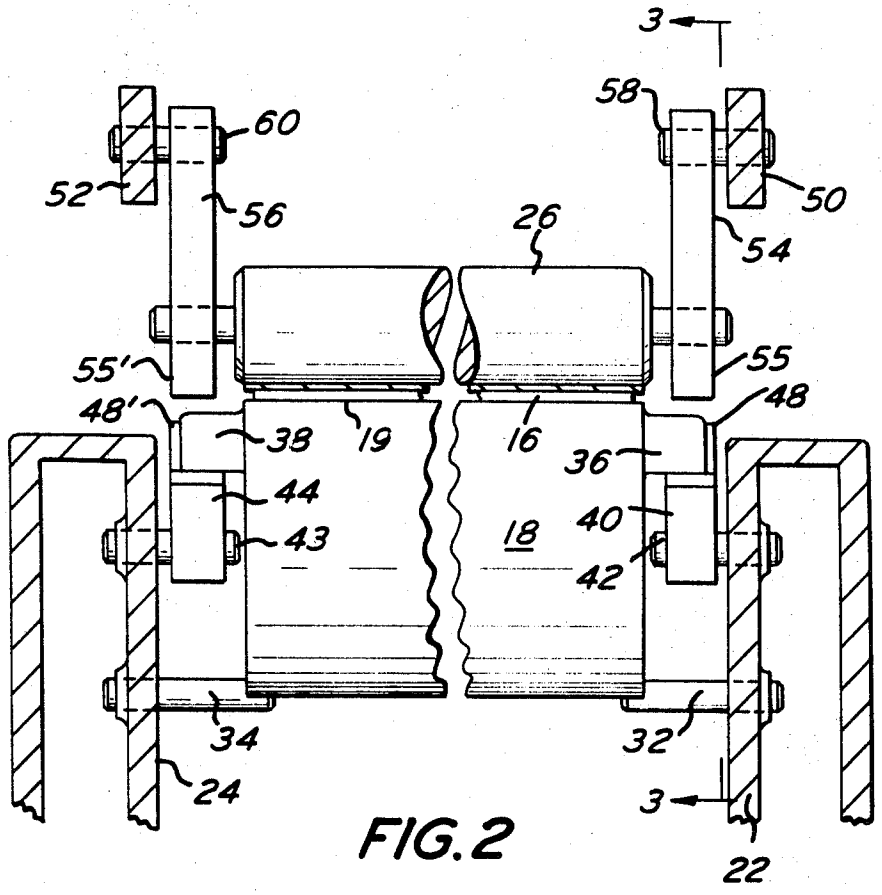


FIG. 2

INVENTOR
GEORGE W. McGIRR
BY
Seidel, Gonda & Goldhammer
ATTORNEYS.

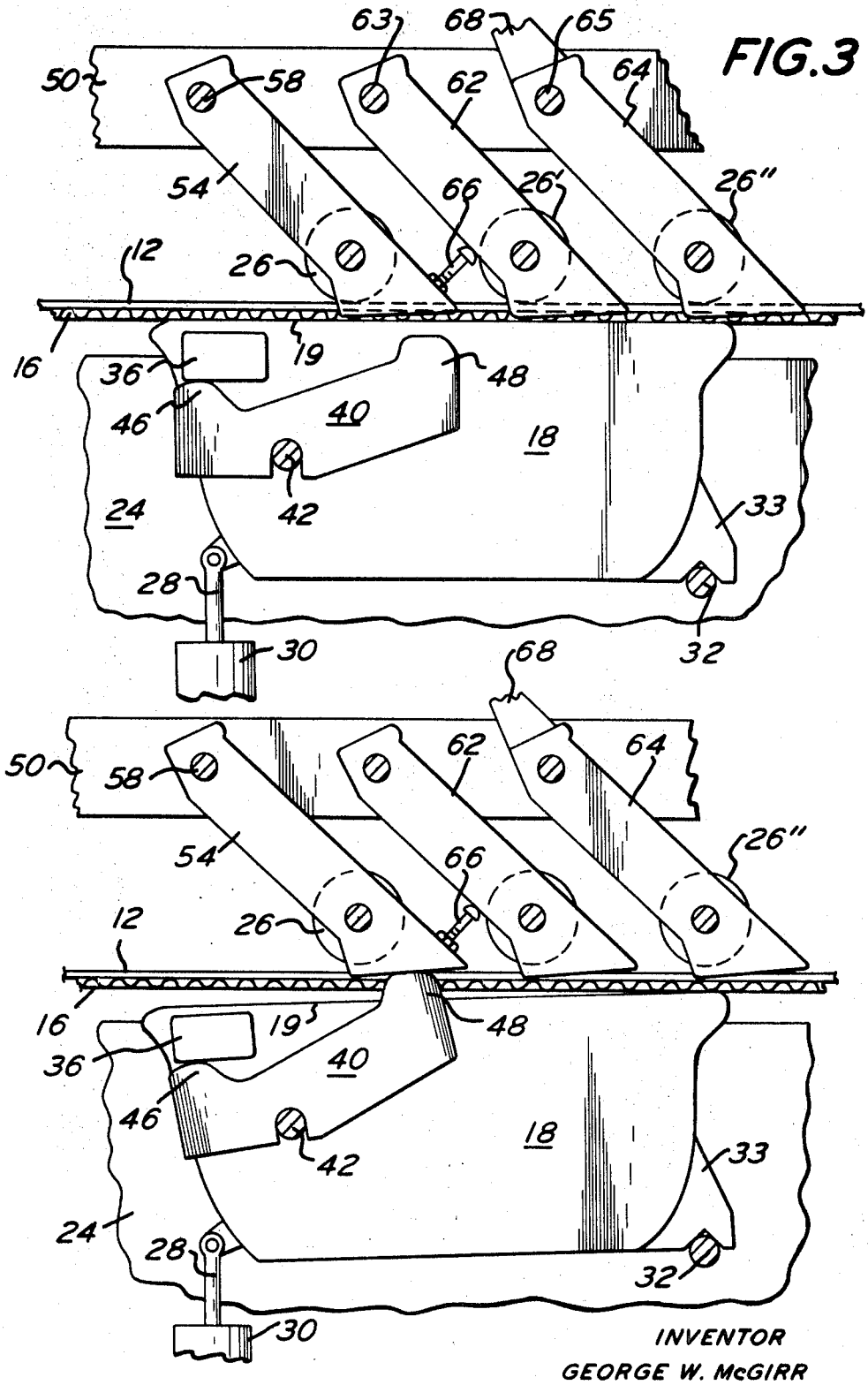


FIG. 3

FIG. 4

INVENTOR
GEORGE W. McGIRR
BY
Seidel, Gonda & Goldhammer
ATTORNEYS

DOUBLE FACER HEAT CONTROL METHOD AND APPARATUS

This invention relates to a double facer machine of the variable heat type. A typical example of a double facer machine of the variable heat type is disclosed in U.S. Pat. No. 2,941,573. The disclosure therein is incorporated herein by reference.

Optimum utilization of the art taught by said patent has resulted in the use of only one ballast roll adjacent the downstream end of each heated platen. As disclosed therein, the heated platens may move downwardly away from the paperboard by pivoting about their downstream end or by reciprocating in an upright direction. I have found that the length of the entire double facer machine may be shortened if additional ballast rolls are applied to provide more uniform pressure between the heated platens and the corrugated board. When such additional ballast rolls are provided, the advantages of a variable heat double facer machine are nullified since the additional ballast rolls maintain the corrugated board in contact with the platens in the upper and lower positions of the platens. In this regard, the platens do not move any substantial distance when moving between their upper and lower positions.

In order that the double facer machine may be shortened and yet still have the advantage of a variable heat double facer machine, I have provided an automatic control for the additional ballast rolls responsive to movement of the heated platens.

As the surface contact between the paperboard and the upper surface of the platens decreases due to movement of the platens away from the paperboard, the automatic control raises the ballast rolls upwardly away from the paperboard. The automatic control is preferably in the form of mechanical levers and links so as to be simple, inexpensive and reliable.

It is an object of the present invention to provide a variable heat double facer machine which may be made shorter by causing ballast rolls to move upwardly away from the paperboard as heated platens move downwardly away from the paperboard.

It is another object of the present invention to provide a variable heat double facer machine having a plurality of ballast rolls whose position is responsive to the position of a heated platen.

It is another object of the present invention to control heating of paperboard in a double facer machine by relieving downward pressure on the paperboard effected by ballast rolls as a direct result of decreasing surface contact between the paper board and heated platens therebelow.

It is another object of the present invention to provide a variable heat double facer machine with an automatic control for ballast roll positions by use of a control which is simple, inexpensive and reliable.

Other objects will appear hereinafter.

For the purpose of illustrating the invention, there is shown in the drawings a form which is presently preferred; it being understood, however, that this invention is not limited to the precise arrangements and instrumentalities shown.

FIG. 1 is a side elevation view of a double facer machine.

FIG. 2 is a sectional view taken along the line 2—2 in FIG. 1.

FIG. 3 is a view taken along the line 3—3 in FIG. 2, with the platen in its uppermost position wherein there is maximum heat transfer.

FIG. 4 is a view similar to FIG. 3 but illustrating the platen in a lowermost position wherein there is minimum heat transfer.

Referring to the drawing in detail, wherein like numerals indicate like elements, there is shown in FIG. 1 a double facer machine designated generally as **10** for making double-faced corrugated paperboard. The machine **10** includes an endless belt **12** extending around rollers **14** and **14'**one of which is driven. The corrugated paperboard is designated as **16**, and is pulled through the machine **10** by means of the belt **12** while in contact with the upper surface of a plurality of variable heat platens **18, 20**, etc.

Since all of the platens are identical, only platen **18** will be described in detail. The platen **18** has an upper surface **19** adapted to be in intimate contact with the paperboard **16** so that heat may be transferred from the platen **18** to the paperboard **16** to effect an adhesive juncture between the liner and the single-faced paperboard. As shown more clearly in FIG. **2**, the machine **10** includes side frames **22** and **24** which support the platen **18**. The platen **18** may reciprocate vertically when moving from a position having maximum surface contact with the paperboard **16** as shown in FIG. **3** to a position having minimum surface contact with the paperboard **16** as shown in FIG. **4**.

The platen **18** is preferably moved from the position shown in FIG. **3** to the position shown in FIG. **4** by a tilting action, whereby the downstream end of the platens will have slightly more than line contact with the paperboard **16** and thereby prevent the web of paperboard **16** from drooping. The tilting or pivoting action is attained by means of a cylinder **30** pivotably supported at its lower end on a suitable brace or bracket. A piston **28** extends from the cylinder **30** and has its free end pivotably connected to the upstream end of the platen **18**. Conduits are provided for introducing a motive fluid such as pressurized air into the cylinder **30** to effect tilting of the platen **18** from the position shown in FIG. **3** to the position shown in FIG. **4** and vice versa.

The downstream end of the platen **18** is provided with a cradle **33** supported by pins **32** and **34** which extend inwardly from the side frames **22** and **24** respectively. See FIGS. **2** and **3**. Adjacent the upper surface **19**, the platen **18** is provided with a lug **36** on one side and a lug **38** on the opposite side. See FIG. **2**. The lugs **36** and **38** extend outwardly and transversely with respect to the platen **18**.

A lever **40** is pivotably supported intermediate its ends by means of a pin **42** supported by the side frame **22**. A lever **44** is supported on the opposite side of platen **18** intermediate its ends by means of a pin **43** on the side frame **24**. The lever **40** is below lug **36** so that lever end **46** may contact lug **36**. Similarly, lever **44** is supported so that one of its ends may contact lug **38**.

As shown more clearly in FIGS. **3** and **4**, the other end of lever **40** which is designated as **48** is disposed above the lever end **46** and adjacent the plane of upper surface **19** on platen **18**. A pair of rails **50** and **52** are supported from the side frames **22** and **24** or any other convenient support structure by means, not shown. The rails **50** and **52** are above the lower run of the belt **12** as will be apparent from the figures of the drawing. Transversely aligned links **54** and **56** have their upper ends pivotably secured to the rails **50** and **52** by pins **58** and **60**, respectively. Intermediate their ends, the links **54** and **56** rotatably support a ballast roll **26**. The axis of rotation of ballast roll **26** is longitudinally offset with respect to the longitudinal axis of pins **58** and **60**. See FIG. **3**.

The lowermost end **55** of link **54** is aligned with the lever end **48**. See FIG. **2**. Similarly, the lowermost end **55'** of link **56** is aligned with the end **48'** on lever **44**.

Downstream from the links **54** and **56**, there is provided a pair of transversely aligned links **62**, only one of which is shown. An adjustable bolt or stud **66** on end **55** of link **54** is in contact with one of the links **62**. The links **62** are pivotably supported by the rails **50** and **52** by means of pins **63** and are parallel to links **54** and **56**. The links **62** rotatably support a ballast roll **26'** which contacts the lower run of belt **12** in the same manner as roll **26**.

Downstream from the links **62**, there is provided a pair of transversely aligned links **64**, only one of which is shown. The links **64** are rotatably supported from the rails **50** and **52** by means of pins **65** and are parallel to links **62**. The links **64** rotatably support a ballast roll **26''** which contacts the lower run of belt **12** adjacent the vertical plane containing pins **32** and **34**. Roll **26''** may be raised by manually actuating extension **68** on link **64**.

The manner in which a double facer machine is utilized is well known to those skilled in the art and need not be

described in detail. The platens may be heated in any conventional manner such as by electrical heating coils or introducing steam into the platens. During normal operation, the elements assume the relationship illustrated in FIG. 3.

When it is desired to minimize heat transfer from the platens to the paperboard **16**, such as when the machine has stopped and scorching is to be avoided, the platens may be moved downwardly away from the paperboard so as to assume the relationship shown in FIG. 4. In FIG. 4, the platen **18** has minimum contact with the paperboard **12** so as to prevent drooping of the same, but little heat transfer take place. Each of the platens is individually operable whereby the number of platens moved from a position as illustrated in FIG. 3 to the position illustrated in FIG. 4 may be selectively arranged as desired.

As the platen **18** moves from the position shown in FIG. 3 to the position shown in FIG. 4, lugs **36** and **38** rotate the levers **40** and **44** in a counterclockwise direction in FIGS. 3 and 4. The upper end **48** on lever **40** engages the lower end **55** on link **54** and raises the same upwardly. Simultaneously, the end **48'** on link **44** engages the lower end **55'** on link **56** and raises the same. Such upward movement of the links **54** and **56** moves the ballast roll **26** upwardly away from contact with the lower run of the belt **12**.

As the links **54** and **56** rotate in a counterclockwise direction about the axis of pins **58** and **60** in FIG. 3, stud **66** engages one of the links **62** an causes the links **62** to rotate in a similar direction about the axis of pins **63**, thereby moving the ballast roll **26'** upwardly away from contact with the lower run of the belt **12**. Links **64** are similarly caused to rotate due to a force imparted by the bolt **68** so as to cause the ballast roll **26''** to move upwardly away from contact with the lower run of belt **12**. Hence, the components assume the relationship shown in FIG. 4 when motive fluid is introduced into cylinder **30** to cause the platen **18** to move downwardly away from the paperboard **16**. The automatic control for the ballast rolls is in the form of mechanical levers and links so as to be simple, inexpensive and reliable.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof.

I claim:

1. A double facer machine comprising a plurality of aligned heated platens each having an upper surface for contact with a web of paperboard, an endless belt above said surfaces for moving the paperboard across said surfaces, at least two ballast rolls supported above the lower run of the belt and in contact with the lower run of the belt, said platens being mounted for downward movement away from the paperboard to decrease heat transfer to the paperboard, and means for automatically moving at least one of the ballast rolls upwardly in response to the downward movement of at least one of the platens which is adjacent said roll.

2. A machine in accordance with claim **1** wherein each ballast roll is supported by a pair of links pivotably supported above the lower run of the belt.

3. A machine in accordance with claim **2** wherein said automatic means includes at least one lever supported to engage a lower end portion of one of said links, and a surface on said one platen for causing movement of said lever to effect upward movement of the ballast roll.

4. A machine in accordance with claim **1** wherein said heated platens are supported for pivotable movement about an axis adjacent the downstream end of the platens.

5. A machine in accordance with claim **1** wherein each ballast roll is supported by a pair of links disposed at an acute angle and pivotably supported above said one platen, and means on one of the links for moving the adjacent link in the same direction at the same time.

6. A double facer machine comprising a plurality of aligned heated platens each having an upper surface for contact with paperboard, an endless belt above said surfaces for moving the paperboard across said surfaces, at least two ballast rolls supported above each of the platens and in contact with the lower run of the belt, said platens being mounted for pivotable movement downwardly away from the plane of the paperboard to decrease heat transfer to the paperboard, and means for automatically moving said ballast rolls upwardly away from contact with the lower run of the belt in response to downward pivotable movement of said platens, said automatic means including lugs on opposite sides of each platen, a separate link pivotably supported by a frame member adjacent each lug, a pivotable link supporting each end of each ballast roll, the links supporting one of the ballast rolls having lower end portions juxtaposed to and aligned with a separate one of said levers.

7. A method of controlling heat transfer to paperboard as the paperboard is processed by a double facer machine comprising the steps of introducing heat into paperboard by causing the paperboard web to contact the upper surfaces of aligned heated platens, moving the paperboard across said surfaces by an endless belt, maintaining the paperboard in intimate contact with said surfaces by means of at least two parallel transversely extending ballast rolls engaging the lower run of the belt, and selectively reducing heat transfer to a substantial extent from said platens to said paperboard by moving selected ones of said platens downwardly away from the paperboard while simultaneously moving the ballast rolls associated with the selected platens upwardly out of contact with the lower run of said belt in response to said downward movement of the platens.

8. A method in accordance with claim **7** wherein said downward movement of the platens is effected by tilting the platens about an axis adjacent the downstream end of the platens, and said moving of the ballast rolls upwardly including pivoting the ballast rolls about an axis above the ballast rolls.