Sept. 20, 1971 R. A. PANNIER 3,605,616

METHOD AND APPARATUS FOR PRINTING SURFACES HAVING LINE DEPRESSIONS

Filed Sept. 8, 1969

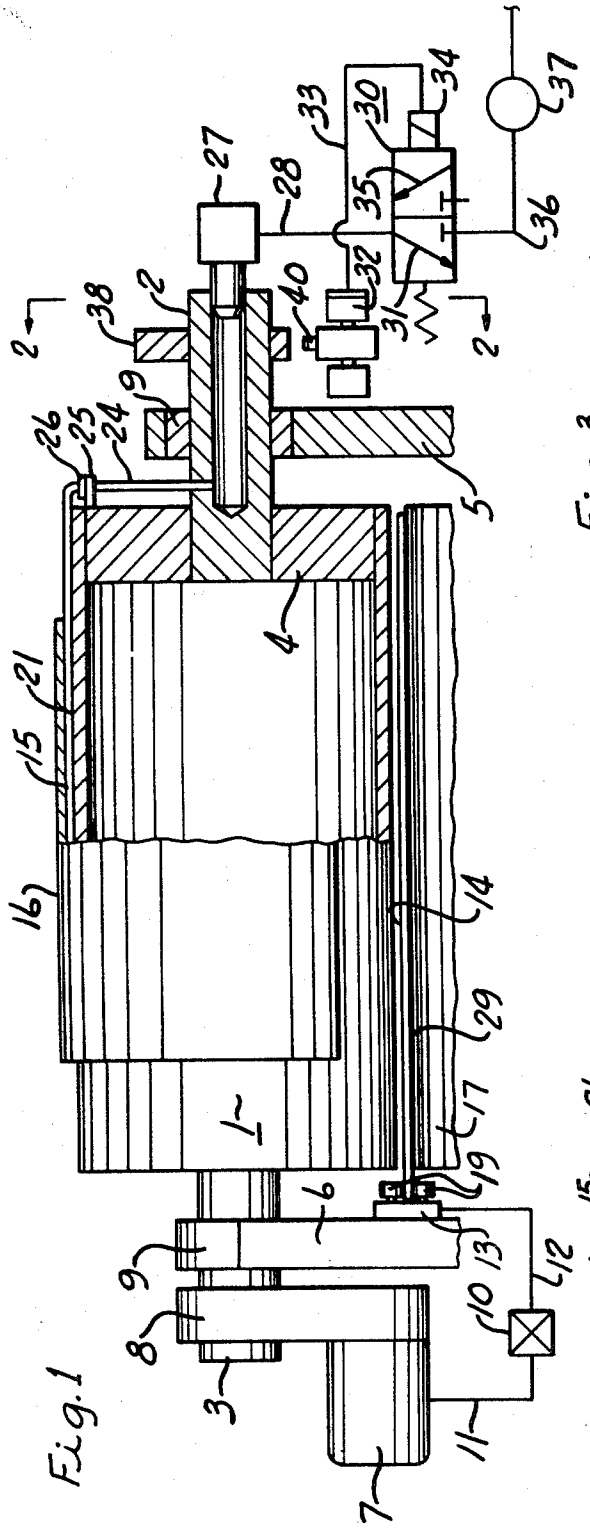


Fig. 1

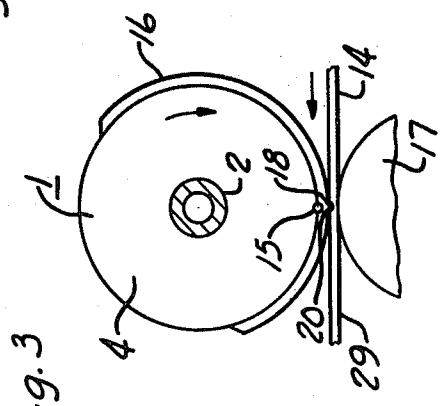


Fig. 3

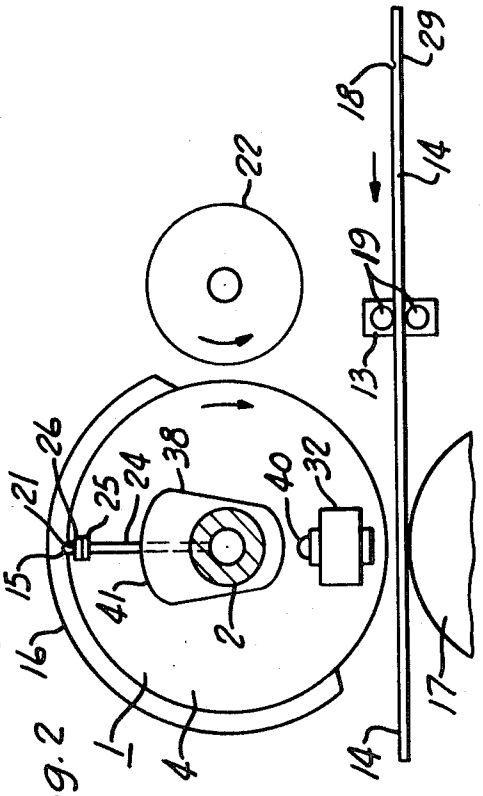


Fig. 2

INVENTOR.
RALPH A. PANNIER
BY
CAROTHERS & CAROTHERS
HIS ATTORNEYS

United States Patent Office 3,605,616
Patented Sept. 20, 1971

3,605,616

METHOD AND APPARATUS FOR PRINTING SURFACES HAVING LINE DEPRESSIONS

Ralph A. Pannier, McCandless Township, Allegheny County, Pa., assignor to The Pannier Corporation

Filed Sept. 8, 1969, Ser. No. 856,106
Int. Cl. B41f 13/10
U.S. Cl. 101—216 10 Claims

ABSTRACT OF THE DISCLOSURE

A heavy paperboard score mark printer for inflation under a flexible printing die to carry the print into and across the score mark or depression then deflate for re-inking the printing die when having a circular surface and synchronizing the inflating and deflating operations with the movement of the score mark under the inflated printer.

BACKGROUND OF INVENTION

Heavy paperboard has score marks for different purposes. Such score marks appear on flat paperboards cut for forming cartons and boxes and advertising folds and the like and normally pass under a printing die without receiving the continuity of the printing in the score mark. This provides an undesirable appearance and visually accentuates the position of the score mark.

SUMMARY OF INVENTION

The principal object of this invention is the method and apparatus for printing into a score mark or depression while printing the desired surface area of previously score marked heavy paperboard.

Another object is the provision of method and apparatus for extending a flexible printing die to print into the score mark of a printing board passing thereunder and retracting the die for inking.

Another object is the provision of a control for timing the operation of the printing die and the movement of a heavy paperboard to synchronize the extension of the printing die with the heavy board score mark to be printed upon.

Another object is the provision of an inflatable score mark member to extend a flexible printing die into a score mark to print in the same.

Another object is the provision of means for varying the time during which inflation and deflation occurs during one cycle of a score mark member under a rotary printing die on a printing roll.

Other objects and advantages appear in the following description and claims.

The accompanying drawings show, for the purpose of exemplification without limiting the invention or the claims thereto, certain practical embodiments illustrating the principles of this invention wherein:

FIG. 1 is a diagrammatic view partly in side elevation and partly in section illustrating a rotary printing drum carrying a flexible printing die and an inflatable score mark printer thereunder.

FIG. 2 is a diagrammatic end view partly in section showing the printing drum carrying a flexible printing die about to engage the ink transfer roll and showing the relative position of the cam and switch.

FIG. 3 is a diagrammatic sectional view showing the inflatable score mark member expanded to print in a score mark in the passing paperboard.

Referring to the drawings the printing drum **1** is supported by the axial shaft members **2** and **3** secured in the ends **4** that enclose the drum and provide rigidity for said shaft members which are supported by stands **5** and **6**. The shafts **2** and **3** are journalled in suitable bearings **9**,

which may be of the sleeve or antifriction type. The printing drum is driven by the variable speed motor **7** connected by a drive means **8** to the shaft **3** to drive the same. The motor **7** is connected to the control mechanism **10** by means of the cable **11** and the control box **10** is also connected to the speed mechanism **13** having rollers **19** associated with paperboard **14**. This speed mechanism may be associated with the drive of the paperboard **14** or merely an electric tachometer or a combination of both; however, it relates to the movement of the board relative to the rotation of the drum to synchronize the positioning of the score mark member **15** longitudinally disposed under the printing die **16**, which is attached to or otherwise stretched taut and connected to the face of the cylindrical drum **1**.

A back-up roll **17** is provided to rotatably support the heavy paperboard as it passes between the printing roll **1** and the back-up roll **17**. As shown at **18** in FIG. 2, the score mark is indented. In the paperboard **14**, it may be slightly bulged toward the underside facing **29**, but when printed, the back roll **17** supports this back facing **29** and, thus, causes the extended portion **20** of the die **16** to print in the score mark **18** by the inflation of the inflatable score mark printing member **15**.

In order to prevent this score mark printing member **15** from bulging the die **16** when deflated, an arcuate trough **21** is provided axially of the cylindrical printing drum **1**. This groove receives the score printing member **15** and it fills the groove when deflated to fully support the die surface **16** when engaging the inking or ink transfer roll **22** rotatably supported and driven to transfer and ink the surface of the die **16** as it comes into engagement therewith before it approaches the printing position at the bottom of the drum, where the die **16** has rolling contact with the hard and scored paperboard **17**.

Any means may be constructed to provide fluid pressure to the score printing member **15**. It may be internally of the drum **1** but the simplest form is the provision of a bore **23** in the shaft **2** connected by the tube **24**, preferably threadably secured laterally into the bore **23**, and fastened adjacent the periphery of the end member **4** by the support **25** which rigidly holds the tube **24** in place.

An attaching means **26** connects the expandable and inflatable score printing member **15** to the end of the tube **24** which may be leak-proof or may permit a sufficient fluid exhaust to require the maintenance of a substantial pressure during the printing time with a leak-off so that when the fluid pressure is reduced materially the score printing will collapse without depending upon the valve discharge.

The fluid pressure is delivered to the bore **23** by the stationary head connection **27** having a sealed rotary connection thereto. The head **27** is connected by the tube **28** to the valve **30** having an exhaust **31** in its spring biased normal position with the supply of fluid pressure blocked off. Valve **30** is energized by the switch **32** through the line **33** which is operatively connected to the valve operating mechanism **34**.

The electric valve operating solenoid **34** moves the valve to the left in FIG. 1 to align the energizing port **35** with the fluid supply line **36** connected to the fluid pressure supply through the regulator **37**.

The shaft **2** is provided with a cam **38** having a properly designed lobe to strike the lever supported wheel **40** on the switch **32** to operate the valve **30** to inflate the rib printing member **15**. As shown in FIG. 2, the lobe **41** for actuating the switch **32** is shown substantially 180° out of phase with its operating position but the intermediate portion of the lobe **41** will be operating the switch **32** before and after the synchronous position for printing through the score mark **18** on the board **17**, the center of which is shown in FIG. 3. Generally, flexible printing

dies, such as indicated at **16**, are backed with a fabric to resist stretch or elongation by tension. In the preferred embodiment, a slot is removed from this fabric for the insertion of member **15** which in this instance might be a flexible and expandable tube which is pretensioned or prestretched in its longitudinal direction such that it will only expand laterally thereby preventing printing distortion in its longitudinal direction along the die printing surface.

I claim:

1. The method of printing in a depressed score mark while printing a heavy paperboard which comprises the steps of inserting and retaining an expandable score mark inflatable member under a flexible printing die on a rotary printing roll, adjusting the rotary die to position the inflatable score mark member to coincide with the score mark in the paperboard as it passes under the rotating die for printing, inflating the inflatable member for a timed period to expand the flexible printing die into the score mark to carry the print on the printing die into the score mark of the paperboard.

2. The method of claim **1** characterized by confining the location of the inflatable score mark member and causing that portion of the die to be effective in the score mark of the paperboard.

3. The method of claim **1** characterized by the step of timing the inflation pressure period of the inflatable score mark member for a limited arcuate period of the cycle of rotation of the die to engage in the score mark, and releasing the inflation pressure for the remainder of the cycle of rotation to flatten that portion of the die to cylindrical shape.

4. The method of claim **3** characterized by the step of inking the die while in its cylindrical shape and said inflatable score mark member is deflated.

5. The method of claim **1** characterized by the step of timing the inflation period includes the step of setting a cam on the rotary printing roll, positioning a switch to be engaged by the cam, and connecting the switch for controlling a valve to admit fluid under pressure to inflate the inflatable score mark member for the proper duration of printing in score mark of the paperboard.

6. A heavy papeboard score mark printer comprising a driven printer drum rotatably supported on axial shaft means and carrying a flexible printing die characterized by an axially disposed inflatable score mark member extending between said flexible printing die and said drum, inflation of said score mark member causing an outward displacement of a portion of said printing die, and timing means to expand said inflatable score mark member in tuned relation to synchronize with the passing of a score mark in said heavy paperboard passing in printing engagement therewith.

7. The score mark printer of claim **6** characterized by groove means in said printer drum to receive said deflated score mark member to prevent expansion of said flexible printing die.

8. The score mark printer of claim **6** characterized by a cam on said shaft means, a switch means mounted to be engaged by said cam means to inflate and expand said inflatable score mark member and cause said flexible die to print in the score mark in said heavy paperboard.

9. The score mark printer of claim **8** characterized by an electrically operated fluid valve means connected to a source of fluid pressure and when energized by said switch means to energize said valve and supply fluid under pressure to said inflatable score mark member and when said switch means is de-energized to discharge the fluid therefrom.

10. The score mark printer of claim **9** characterized by an inking roller rotatably supported to engage and transfer ink onto said printing die when rotating in engagement therewith and when said score mark member is deflated.

References Cited

UNITED STATES PATENTS

2,166,138	7/1939	Gundlach	101—376X
2,475,524	7/1949	Scott et al.	101—376
3,106,891	10/1963	James	101—376
3,129,662	4/1964	Pinkerton	101—375X
3,269,421	8/1966	Telford et al.	118—205X

ROBERT E. PULFREY, Primary Examiner

A. E. KOPECKI, Assistant Examiner

U.S. Cl. X.R.

101—376, 426; 118—205