United States Patent [19]

Hawkins

[11] **3,765,326**

[45] **Oct. 16, 1973**

[54] **METHOD AND APPARATUS FOR PRINTING ON EMPTY BAGS**

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[73] Assignee: **Filper Corporation,** San Ramon, Calif.

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[52] **U.S. Cl.** **101/44,** 101/11, 101/426, 53/131

[51] **Int. Cl.** **B41f 17/00**

[58] **Field of Search** 101/35, 41, 43, 44, 101/11, 426; 53/131

[56] **References Cited**

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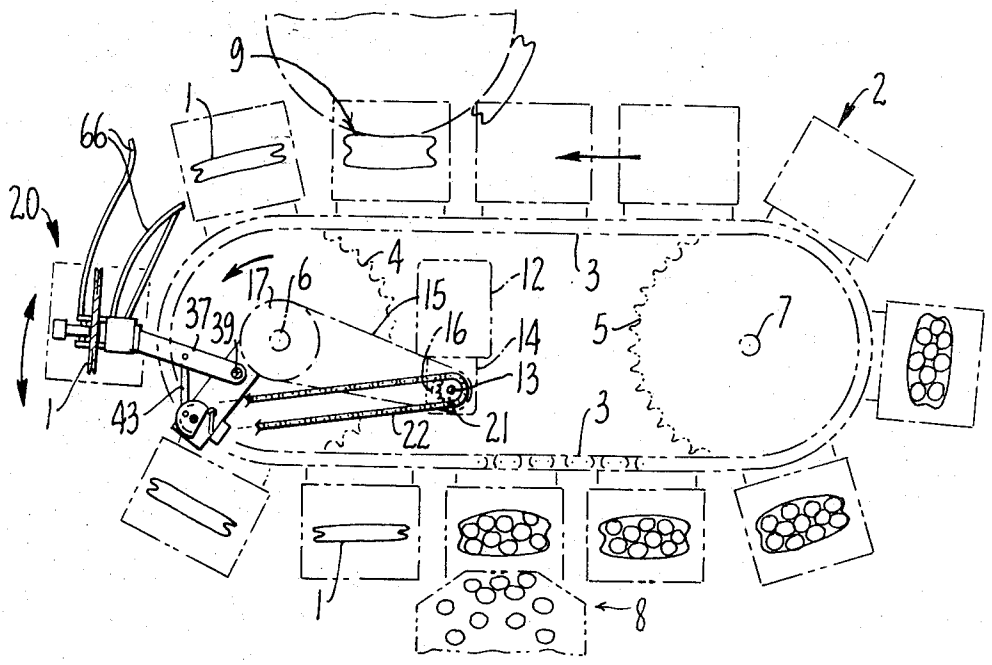
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Primary Examiner—Robert E. Pulfrey
Assistant Examiner—Clifford D. Crowder
Attorney—Mark Mohler et al.

[57] **ABSTRACT**

A printer for printing material on empty bags suspended from their upper ends for filling and for continuous movement to and past a filling station, with the bags in a row and moving in a path extending longitudinally of the row. The printer follows the bag during printing, clamping the empty bag during printing and thereafter releasing the printed bag for filling, and returns to engage and print the next suspended empty bag.

5 Claims, 5 Drawing Figures



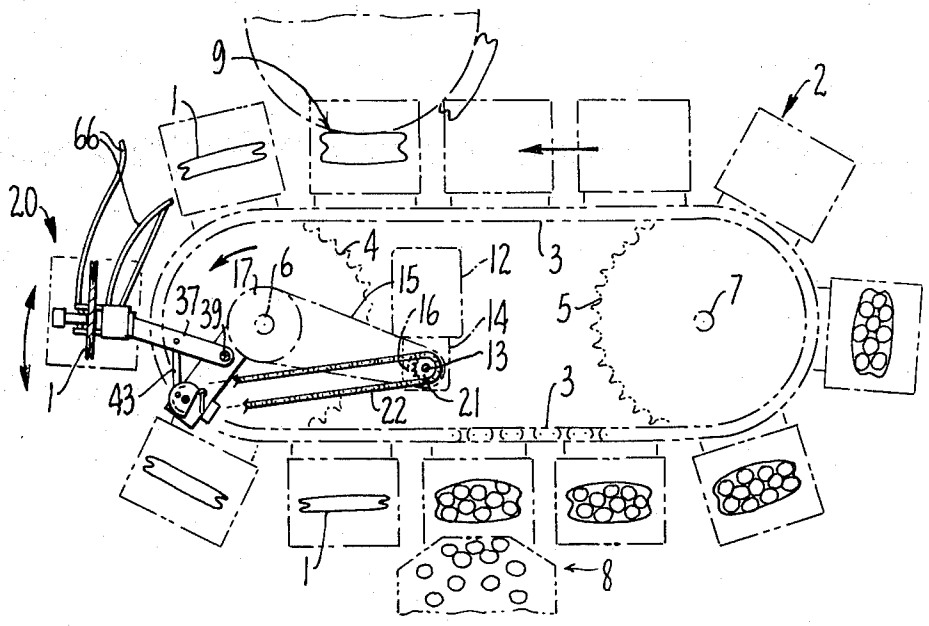

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FIG. 1.

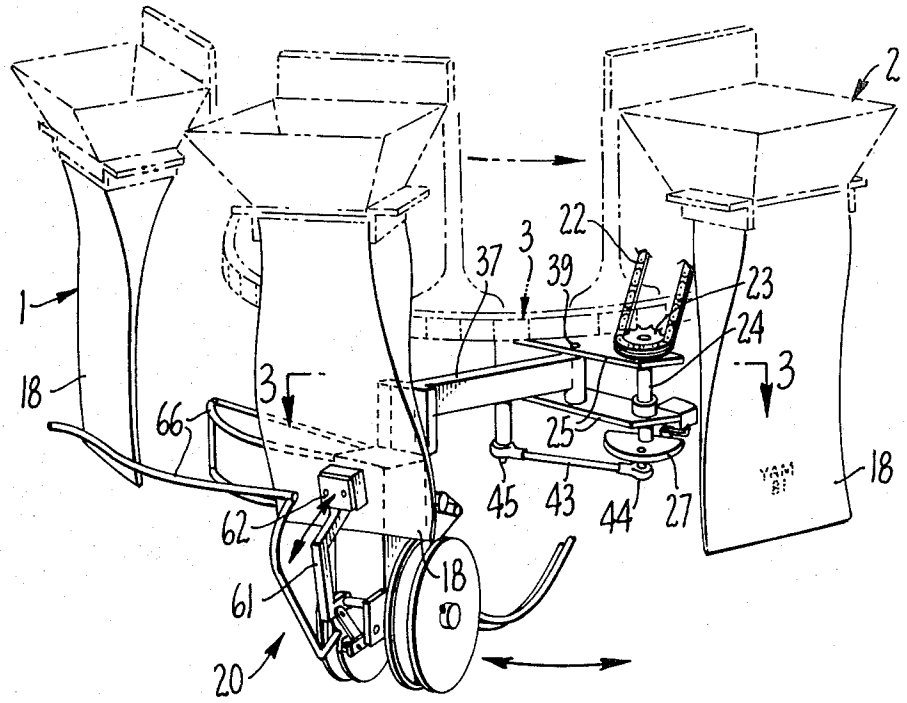

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FIG. 2.

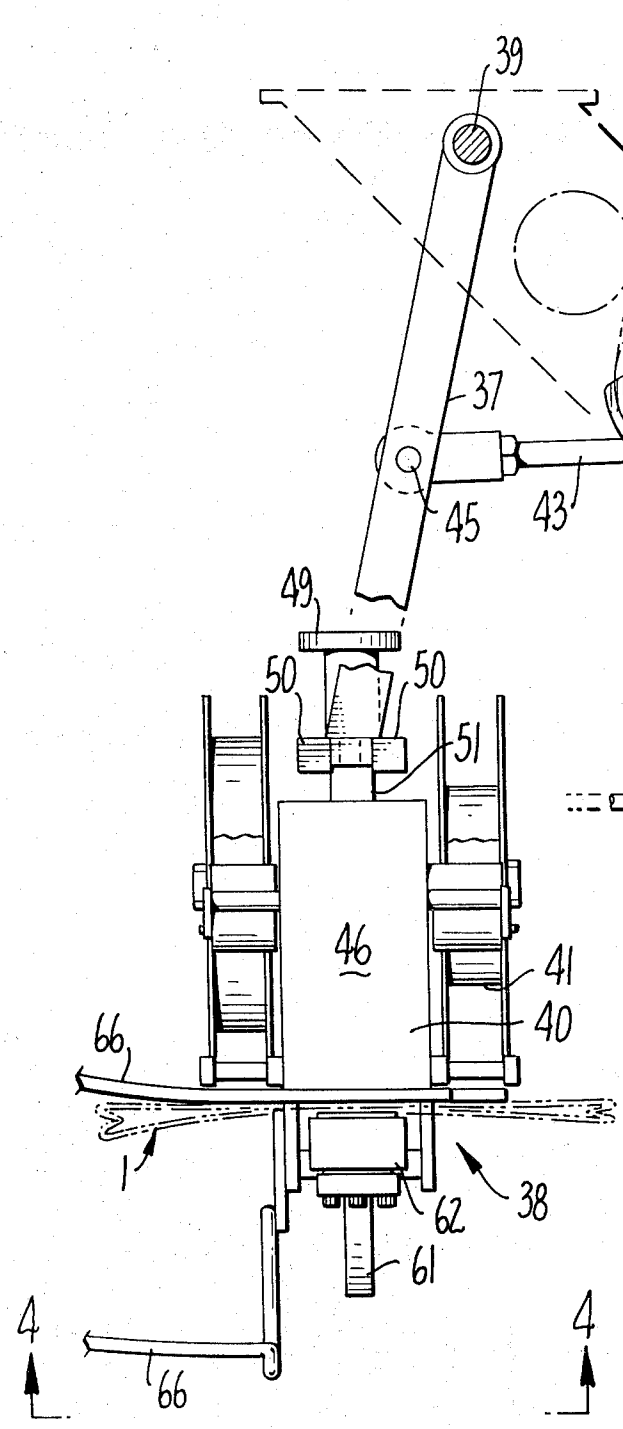

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FIG. 3.

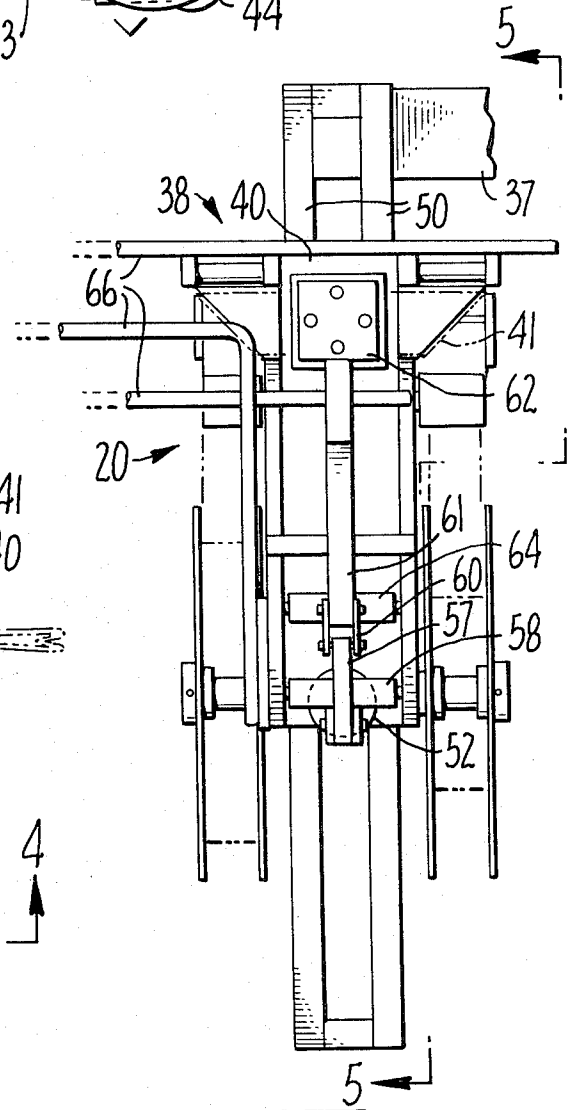

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FIG. 4.

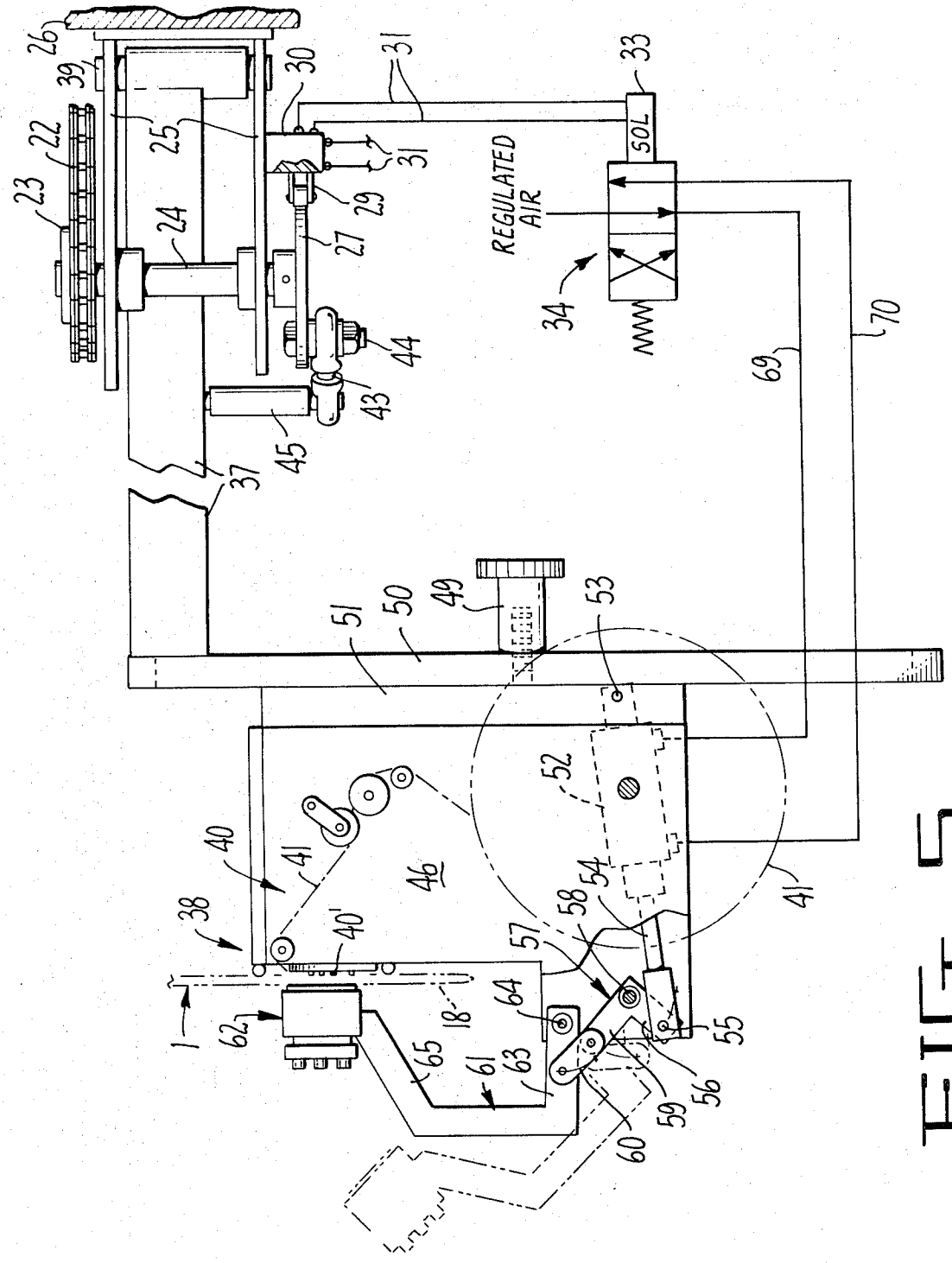

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FIG. 5.

METHOD AND APPARATUS FOR PRINTING ON EMPTY BAGS

SUMMARY

Where the containers are highly flexible bags that are irregularly distorted by the contents, the legible marking of the bags, after filling, is not feasible, and the application of tags and the like is costly and subject to separation of tags during handling of the bags.

Bags, such as bags of polymer material, to be filled with articles such as potatoes, oranges, etc., may be imprinted in a large quantity with the name of the distributor, and the same bags are usable for being filled with any one of many articles, inasmuch as they are transparent and the contents are visible.

The preprinting of weights and certain other indicia of a supply of such bags for each of the different articles would involve a cumbersome, costly and highly fallible system of keeping records as well as storage problems, and the application of dates of filling or terminal shelf dates would involve costly manual labor under present systems.

Development in the bagging industry has brought automatic filling and weighing apparatus in which a horizontally disposed and elongated endless row of bag hangers or clamps is continuously circulated in one direction. Each bag is releasably suspended from one of the hangers of said row at a bag applying station, with the portion of each empty bag freely hanging from the hanger attached to its upper end. From such bag applying station the bags are carried to and past a filling station that is automatically controlled for filling the bags with objects to one of different weights, such as 5 lbs., 10 lbs., etc., according to the setting established by the weighing scale accompanying each hanger.

Such apparatus is shown and described in U.S. Pat. No. 3,057,382, of Oct. 9, 1962, issued to D. B. Baker.

In the present instance, as the empty, suspended bags are continuously carried from the bag attaching station to the filling station where they are automatically filled with articles to a predetermined weight, or to a weight that is within a predetermined permitted range for receiving a uniform weight designation, the flexible, freely hanging lower portion of each empty bag is printed with indicia, such as the date, weight, price, or any one or combination of such designations.

It is accordingly seen that the bags are marked before filling and while on the way to the filling station. There is no slowing or stopping of the movement of the bags, and the imprinting on one of the sides of the freely hanging portion is done along a prolonged length of the path of travel of the bags under gripping pressure applied against opposite sides of each bag during such prolonged length with the freely hanging portion of each bag moving at the same rate of speed during printing, as the hanger from which the bag is suspended.

One of the objects of the present invention is the provision of a bag printer in combination with a conventional article bagging apparatus, of generally the type shown and described in U.S. Pat. No. 3,057,382 of Oct. 9, 1962, for printing any desired data on flexible bags before filling with articles.

Another object of the invention is the provision of a printer for printing one of the sides of flexible-walled receptacles during movement of said receptacles along a predetermined path.

A still further object of the invention is the provision of a bag printer for printing any desired markings, such as the weight, a date, or price on empty, highly flexible bags of a succession while said bags are moving along a path of travel suspended from their upper open ends for later filling with articles to substantially the weight marked, and a predetermined date, such as the date of filling or a terminal sale date.

An additional object is the provision of a method for more efficiently marking bags of flexible material moving on their way to a filling station.

A still further object of the invention is the provision of apparatus and method for more efficiently marking bags of flexible material that is readily distortable by the articles to be deposited therein, in that a large supply of bags suitable for filling with articles of different value and weight and on different days, may be automatically marked with the indicia designating weight, price, date or any indicia peculiar to the articles to be deposited in each of the bags immediately prior to each bag being filled, whereby there is no loss of time, the incurrence of expensive labor costs or waste of bags in the procedure of marking and filling the bags.

Other objects and advantages will appear in the description and drawings.

DESCRIPTION OF DRAWINGS

FIG. 1 is a top plan view showing the bag printer in full line, including bags approaching and leaving the printer, with broken lines showing a bagging machine operatively connected with the printer for actuating the latter.

FIG. 2 is a perspective view of the printer from one side thereof, with parts of the bagging machine in broken lines.

FIG. 3 is an enlarged cross-sectional view taken along line 3—3 of FIG. 2.

FIG. 4 is an enlarged elevational view as seen from line 4—4 of FIG. 3.

FIG. 5 is an elevational view of the printer and the operative connection with a standard bagging machine, with certain parts and elements including a bag shown in broken lines for clarity.

DETAILED DESCRIPTION

The article bagging machine, illustrated in broken lines in FIG. 1 is of the type shown and described in U.S. Pat. No. 3,057,382 of Oct. 9, 1962, issued to D. B. Baker. This machine includes an endless, horizontally disposed row of bag clamps adapted to releasably hold bags suspended therefrom with their upper ends open below the small lower open ends of funnels 2. A horizontally disposed endless chain 3 extends around sprockets 4, 5 secured on vertical shafts 6, 7. A number of the bags are shown in full line in FIG. 1. The bag clamps, funnels 2 and weighing devices respectively associated with the bags are operatively connected with sprockets 4, 5 for circulating them, including bags 1, in the direction of the arrow upon rotation of sprocket 4 as indicated.

Bags 1 are automatically filled to the desired weight at station 8 (FIG. 1) at one side of the endless row, and are carried past a bag discharge station at the opposite side of the row and then to a bag attaching station 9 where a flattened, empty bag 1 is clamped at its upper open end to the bag clamps below each funnel. From

station 9, the suspended, empty bag 1 is carried around sprocket 4.

A motor 12 drives a vertical shaft 13 through an appropriate gear box 14, and a chain 15 connects a sprocket wheel 16 on shaft 13 with a sprocket wheel 17 on shaft 6 for continuously moving the bags 1 in an endless path from the bag attaching station 9 around one end of the path and to and past the filling station and bag discharge station, and back to the bag attaching station.

The bags may be of flexible, polymer material that are normally collapsed to flattened form at a supply or feed magazine at station 9 with their flattened sides parallel to the direction of movement of the bags 1 and funnels 2.

Funnels 2 are preferably elongated in a direction parallel to their direction of movement, and the upwardly opening mouth at the upper open end of each bag may be elongated in the same direction as the funnel thereabove. The lower portions 18 of the bags (FIG. 2) will remain flattened and approximately together during movement from the bag attaching station to the bag filling station, which is characteristic of the flexible, paper-like characteristic of each such bag.

Between the bag attaching station and the bag filling station is a bag printing station 20.

Shaft 13 has a sprocket 21 secured thereon, which sprocket is connected by an endless chain 22 (FIG. 1, 2, 5) with a sprocket 23 on a vertical shaft 24 (FIGS. 2, 3, 5) that is rotatably supported on bearings on a pair of vertically spaced brackets 25 (FIG. 5) secured on a stationary frame member 26.

The lower end of shaft 24 has a plate cam 27 secured thereon, which cam is in engagement with a roller on a switch arm 29 for activating a switch 30 in an electrical power current 31 (FIG. 5). Solenoid 33 in circuit 31 is actuated by the closing of circuit 31 with each revolution of shaft 24 for actuating an air valve 34, as will later be explained.

A horizontally extending arm 37 is swingably supported at its inner end on a vertical pivot 39 that is supported on and extends between arms 25. The opposite outer end of arm 37 carries a printing assembly generally designated 38 (FIG. 5).

The printing assembly is of the type having a printing head 40 carrying the heated type-block 40' which is readily removable and replaceable, and also the tape 41 carrying the printing leaf on one side for transfer of the leaf corresponding to letters, figures or indicia of the type, onto the bag when pressed against the bag for a predetermined period of time.

The leaf carrying tape which may be of cellophane or may be carried on a reel and fed past and across the face of the printing type with each printing operation, and to a take-up reel.

A link 43 (FIGS. 2, 3, 5) is pivotally connected at one end at 44 to cam 27 at a point offset to one side of the axis of rotation of the cam, and the opposite end is pivotally connected at 45 to arm 37. Upon rotation of cam 27 through actuation of endless chain 22, arm 37 will be oscillated to swing the printing assembly 38 in an arcuate path that carries the assembly into and approximately along the path of the bags from a position slightly offset inwardly of the endless path of the latter. The pivot 39 being eccentrically located relative to the axis of shaft 6 about which the bags are carried, it is seen that the arcuate path of travel of the printing assembly is eccentric to the circular path of travel of the bags around the sprocket 6 (FIG. 1)

As seen in FIG. 5, the printing head assembly is on a control box or housing 46 that carries the feed and take-up reels for tape 41 including the guides for the tape and the printing head. Said housing is adjustably secured by a clamping nut 49 to a vertical arm 50 that, in turn, depends from the outer end of arm 37. Arm 50 is vertically slotted for receiving a vertical guide bar 51, which bar 51, in turn, is rigid with the housing 46. A stud bolt projects through the slot in arm 50 for engagement with the clamping nut 49 (FIG. 5). By this arrangement it is seen that the housing 46 may be secured on arm 50 at different positions along the latter.

Within housing 46 in a position spaced below the printing assembly is an air cylinder 52 pivotally connected at one end at 53 (FIG. 5) to the guide bar 51 that is rigid with housing 46, plunger rod 54 projects from the end of cylinder 52 that is opposite pivot 53, and the outer end of rod 54 is pivotally connected at 55 to one end of arm 56 of a right angle crank generally designated 57. A pivot 58 at the juncture between the arms of crank 57 is supported on housing 46 and the other arm 59 of crank 57 is pivotally connected to one end of a link 60. The other end of link 60 is pivotally connected to the lower end of an arm 61, which arm 61 carries a pressure pad 62 at its upper end. The lower end portion 63 of arm 61 extends horizontally outwardly from the housing 46 and is pivotally connected at its inner end at 64 to housing 46. By this structure it is seen that the arm 61 and pressure pad 62 are carried on arm 37 to move with the rest of the printing assembly upon swinging arm 37, with the pressure pad squarely facing the type block 40' when in printing position.

Arm 61 is generally of U-shape with the open side facing the housing 46, and the lower portion 63 of arm 61 provides the lower side of the U. The upper portion 65 of the arm, is the upper side of the U and extends slantingly upwardly over said lower portion. The pressure pad 62 is carried on the upper end of the upper portion 65. This U-form of arm 63 insures a wide clearance for the entry of lower portions of the bags 1 between and below the printing head 40 and the pressure pad 62 free from interference with the pad or arm 61.

A pair of spaced, horizontally extending rods 66 (FIG. 1) extend convergently in the direction of travel of the bags to the entry side of the printing assembly for guiding the lower portion of each bag to a position between the printing block 40' and the pressure pad 62. Said ends are arcuately curved lengthwise to conform to the path of travel of the bags around the sprocket 6.

In FIG. 5, the plunger 54 has been extended to move the pressure pad 62 toward the printing block 40' clamping the lower portion 18 of the bag, indicated in broken lines in FIG. 5, between pad 62 and the printing faces of the type on the block 40'. Thus the portion 18 of a bag which hangs freely from its upper end is gripped between pad 62 and block 40'. Movement of said plunger is effected by actuation of switch 30 by cam 27.

Cam 27 is circular except for a segment that is relieved (FIG. 3). The length of the removed portion, circumferentially of the cam, determines the length of time the switch 30 is actuated for maintaining valve 34 in a position in which the plunger 54 is in its extended position under pressure from air in line 69 and in which

the lower portion of the bag is gripped, under pressure, between the pad **62** and block **40'**. During this period of time, the pad **62** and block **40'** are moved with the bag and at the same rate of speed as the bag in a path substantially coincidental with that of the bag, and at the same time the leaf on the tape **41** is affixed by heat from the block **40'** to the plastic wall of the gripped portion **18** of the bag.

Upon the circular portion of cam **27** actuating switch **30** during rotation of the cam, the plunger **54** will be retracted through application of air from valve **34** through line **70,** and the exhaust of air in the cylinder through line **69,** and the bag will be released and the printing assembly will be swung back to starting position for gripping the next bag and for printing the indicia on the latter. Solenoid **33** is spring urged to return the valve when the circuit to the solenoid is broken.

The movement of the printing head assembly from its starting, non-printing position to printing position, is from a position inside the path of travel of the bags so that the pressure pad will move in an arcuate path with the opposite side of the portion **18** of said bag relative to the printing block **40,** and as seen in FIG. **3** the printing assembly **38** is supported on the outer end of the swinging arm **37** at a slightly angular position relative to said arm. This positions the printing block and pressure pad substantially square to the flat sides of the portion **18** of the bag that is gripped between them, and the prolonged path of travel of the printing block and the pressure pad during the time portion **18** is so gripped is substantially coincidental with the path of travel of the bag, hence no strain is placed on the bag during printing.

The printing block and control housing including the tape and heating of the block, and the use of a pressure plate are conventional elements providing permanently opaque, clean, sharp, smear-proof printing on polymer plastic sheet material or coatings. However, the apparatus has been stationary with intermittent movement of a web or the like past the apparatus. The arrangement for printing on continuously moving bags as shown herein is new, as is the provision of a printer of any kind in association with a bagging machine of the type herein shown and described.

From the foregoing description it is seen that, as a method, the invention may be said to be one in which a row of empty bags of material readily distortable by articles to be placed therein are suspended from their upper open ends for continuous movement in one direction in a path extending longitudinally of the row with the portions below their upper ends hanging freely from their upper ends. The steps of printing on such bags includes gripping the freely hanging portion of each bag between a pressure pad and the type of the indicia to be printed at a printing pressure, and applying such printing pressure to such portion during movement of the bag along a prolonged predetermined length of said path and while said bag is moving at a predetermined rate of speed, thereby printing said indicia on the bag. The bag is then released from the printing pressure and the pressure pad and type returned for imprinting the material on the next pad.

The fact that the indicia may be the price or date or weight or any combination is important in that the bags up to substantially the moment they are filled have no such indicia thereon and the indicia cannot be imprinted on the bags after filling and to imprint it on the bags at any other time would be expensive and involve problems, none of which are encountered by the present method.

The printer described is particularly adapted for use in the type of apparatus as generally disclosed and more specifically disclosed in the patent hereinbefore mentioned.

The bag opening and attaching apparatus may obviously be of the type shown and described in U.S. Pat. No. 3,495,378 of Feb. 17, 1970, issued to R. F. Kipers.

I claim:

1. In combination:

a. a bagging machine having a horizontally extending row of bag supports for supporting a succession of flexible, empty bags having open upper ends suspended vertically from their upper ends for movement of said bags in one direction in a path extending longitudinally of said row from a bag-attaching station to a bag-filling station, with the portions of said bags below said supports hanging freely;

b. a pair of printing means comprising a pressure pad at one side of said path and a printing head in spaced, substantially oppsed relation to said pressure pad at the opposite side of said path, said printing head including indicia at the side facing said pressure pad printable on a side of a bag facing said head upon engagement of said side therewith and application of printing pressure there against;

c. support moving means connected with said supports for continuously moving them and bags suspended therefrom along said path from said bag-attaching station to and past said bag-filling station;

d. means supporting said pair of printing means for movement in said one direction together with said bags along a predetermined prolonged length of said path between said bag-attaching station and said bag-filling station from a first point along said path to a second point, and means for so moving said printing means;

e. means for moving one of said printing means toward the other into gripping relation with each bag of said succession at said printing pressure upon movement of the lower freely hanging portion of each bag between said pair at said first point along said path, and for holding said pair of printing means in said gripping relation at said printing pressure during movement to said second point;

f. said means for moving said printing means into said gripping relation including means for moving one of said pair away from the other at said second point to release said gripping relation and printing pressure, and to return said printing means to said first point for repeating the printing operation on the next bag in said succession.

2. In the combination as defined in claim **1**:

e. said bag supports being in a horizontally elongated endless row providing spaced parallel runs connected at their ends by arcuate runs with said bag-attaching means along one of said parallel runs, and said bag-filling means along the other run parallel therewith and opposite thereto;

f. said pressure pad and said printing head being along one of said arcuate runs; and

g. said supporting means supporting said pad and head for movement in an arcuate path substantially corresponding to the curvature of the arcuate path at one of the ends of said parallel runs.

3. In the combination as defined in claim 1:

e. guide means adjacent said first point engageable with the freely hanging lower portions of said bags for guiding them between said pressure pad and said printing head.

4. In the combination as defined in claim 1:

e. power actuated means including a vertical shaft supporting said bag supports for movement around the vertical axis of said shaft, and said power means being connected with said shaft for rotating it in one direction for moving said supports in said one direction and

f. an arm operatively connected with said power means supporting said pressure pad and said head on one end for oscillatory movement of said pad and head along said path between said first and said second points.

5. The method of printing indicia on the flexible, empty bags of a horizontally extending succession thereof, arranged in spaced relation in a horizontal row, and which bags have open upper ends and are to be moved from a bag-attaching station to a bag-filling station with said indicia to be applied between said stations, said method comprising the steps of:

a. suspending the bags of said succession from their upper open ends at said bag-attaching stations leaving the portion of each bag below its upper end hanging freely for swinging relative to its upper end;

b. continuously moving the bags so suspended in one direction longitudinally of said row from said bag-attaching station to and past said bag-filling station at a uniform rate of speed for marking and filling said bags during their continuous movement in said path;

c. gripping said freely hanging portion of each bag at a first point along said path between a pair of spaced opposed gripping surfaces by moving one surface of said pair toward the other into gripping relation with said portion at a printing pressure, one of which surfaces includes indicia printable onto one side of said portion under said printing pressure;

d. moving said surface together with the portion gripped therebetween at said printing pressure at said uniform rate of speed along a predetermined length of said path to a second point along said path and printing said indicia onto said one side of said freely hanging portion of said bag during said movement along said predetermined length of said path;

e. releasing said gripping surfaces from said lower portion at said second point, by moving one of them away from the other and from said portion and returning said surfaces to said first point for movement into gripping relation with the next bag of said succession, and repeating the foregoing steps with each continuously moving bag of said succession.

* * * * *