March 24, 1964 R. D. HAYES ET AL 3,125,916

BAG STACKING APPARATUS

Original Filed June 25, 1957 5 Sheets-Sheet 1

Fig. 1

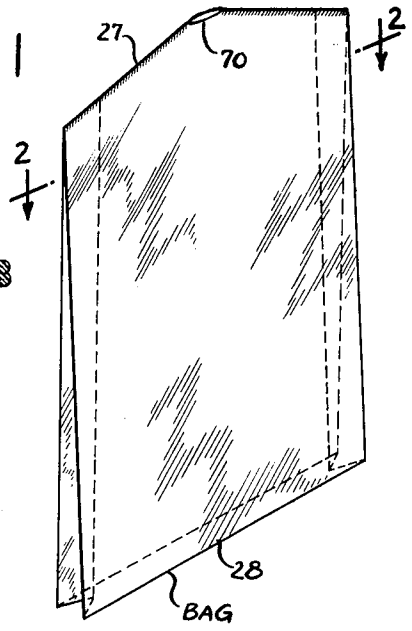


Fig. 2

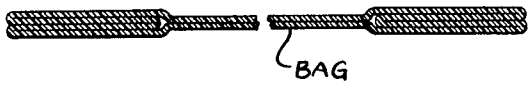
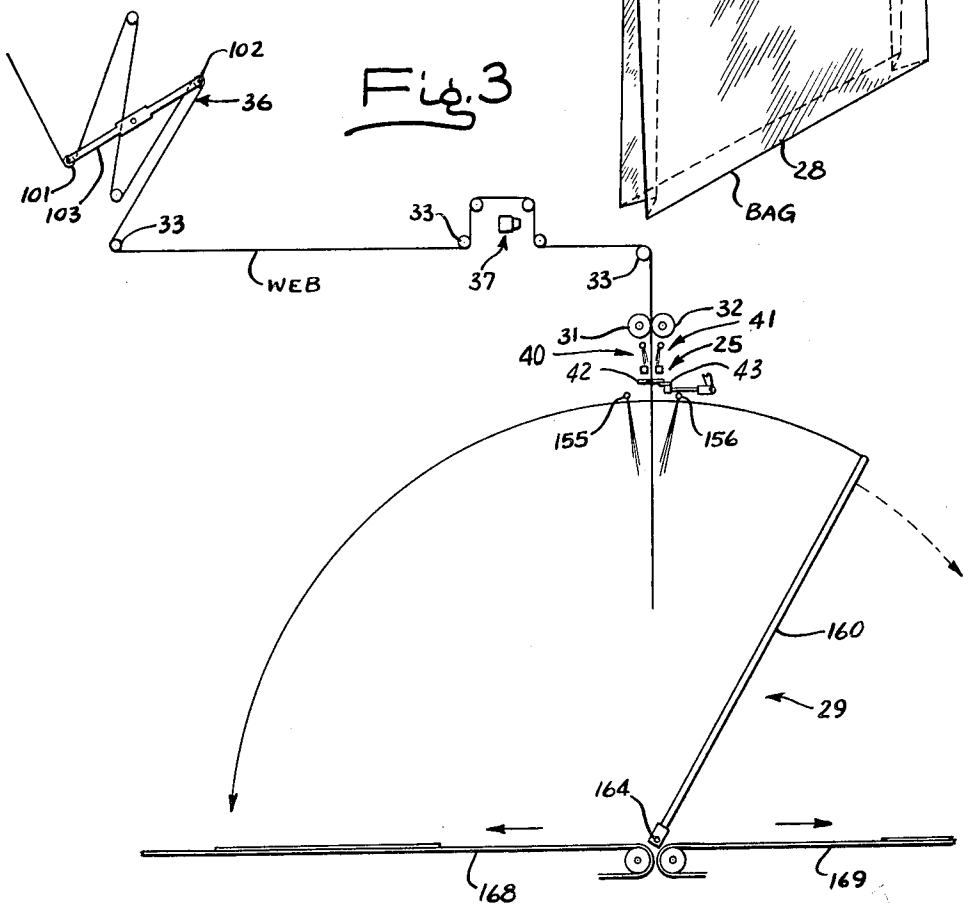


Fig. 3



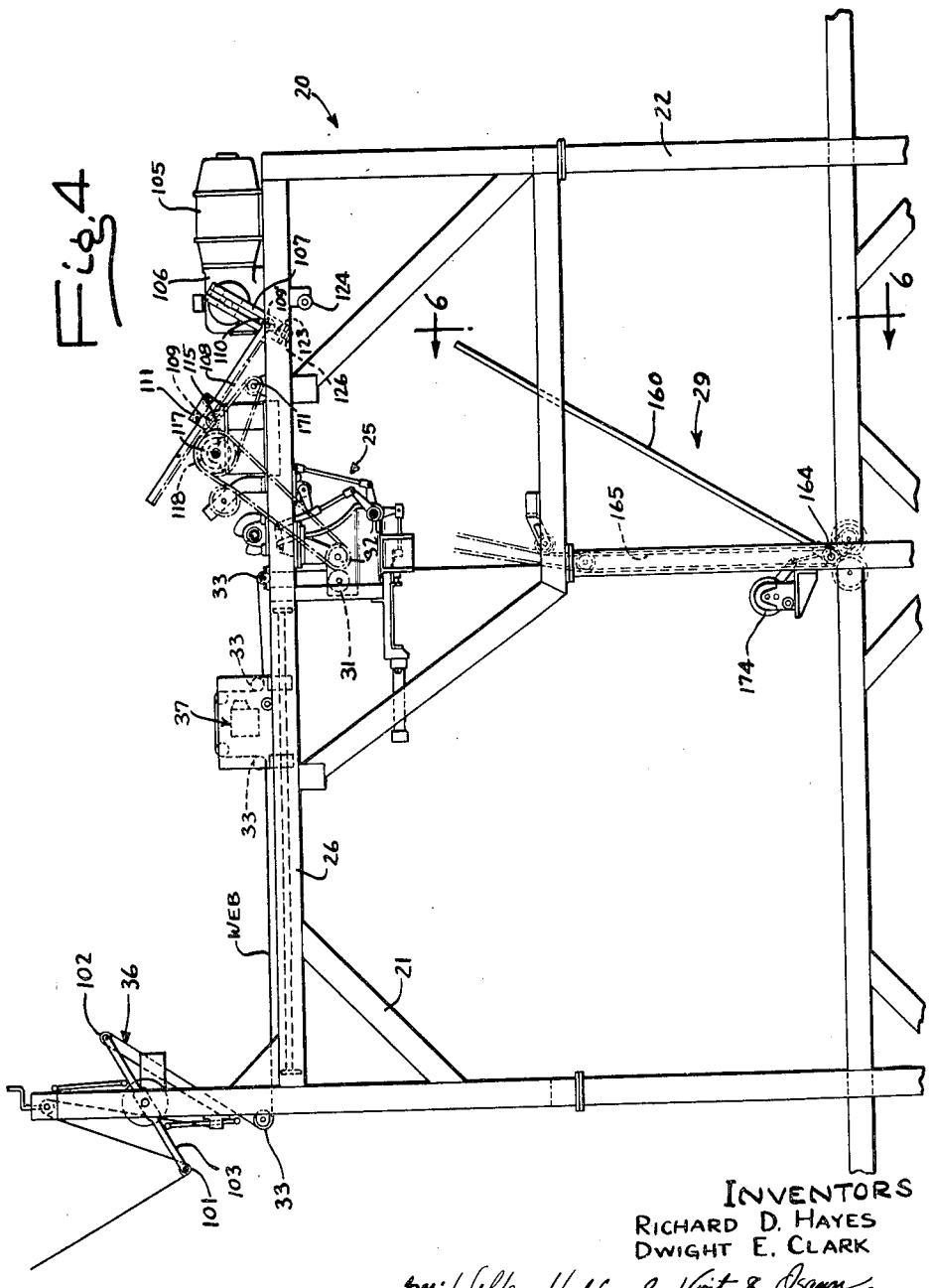
INVENTORS
RICHARD D. HAYES
DWIGHT E. CLARK
by: Wolfe, Hubbard, Voit & Osann
ATTYS.

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BAG STACKING APPARATUS

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Fig. 4



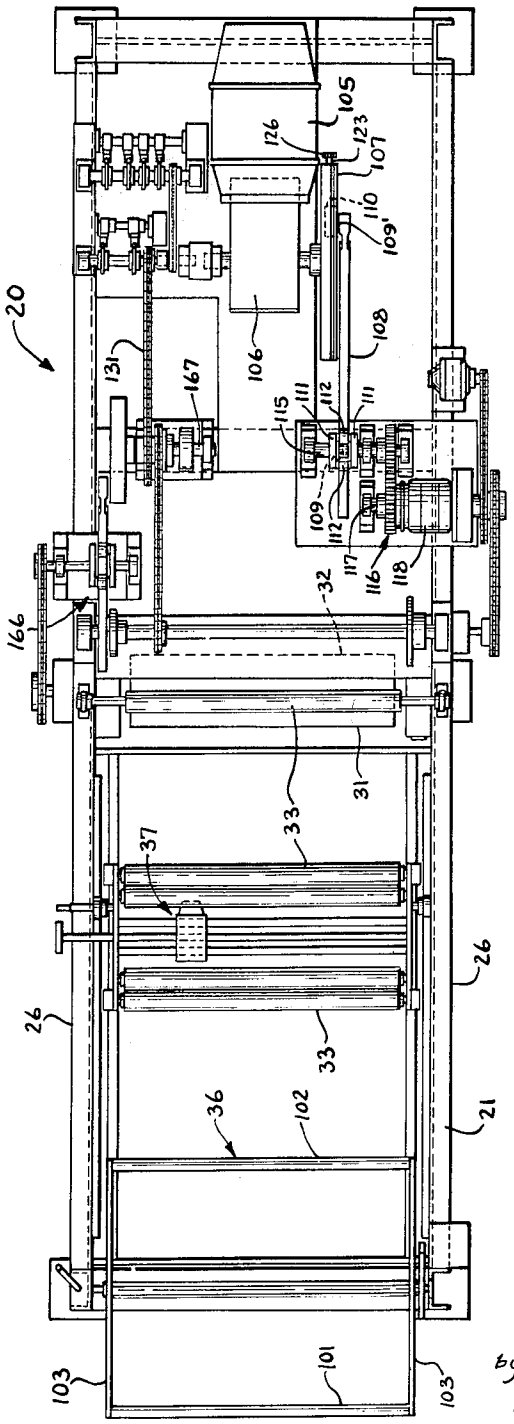
INVENTORS
RICHARD D. HAYES
DWIGHT E. CLARK
by: Wolfe, Hubbard, Voit & Osann ATTYS.

March 24, 1964 R. D. HAYES ET AL 3,125,916

BAG STACKING APPARATUS

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Fig. 5



INVENTORS
RICHARD D. HAYES
DWIGHT E. CLARK
by: Wolfe, Hubbard, Voit & Osann ATTYS

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Fig. 8

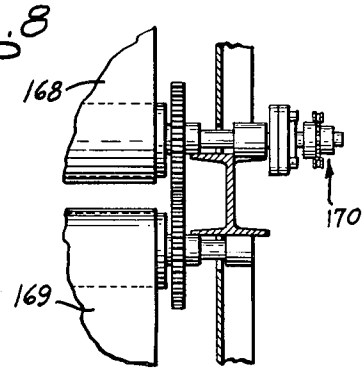
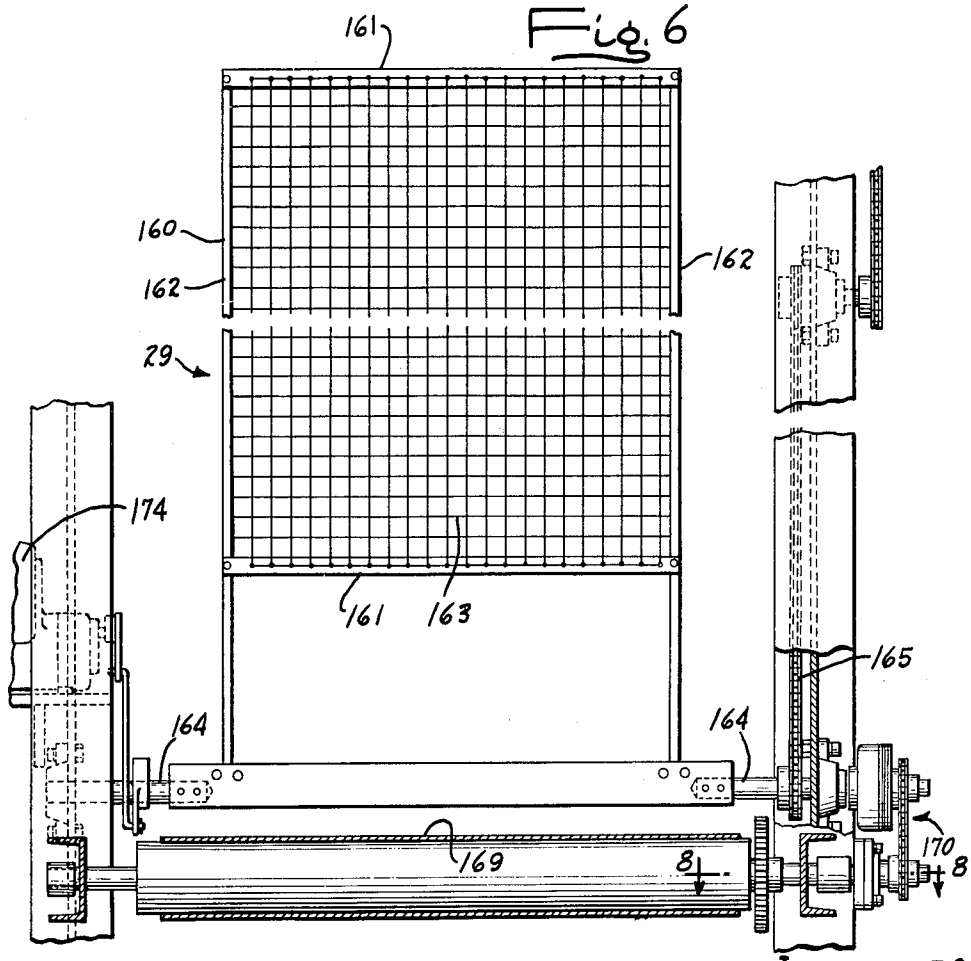


Fig. 6



INVENTORS
RICHARD D. HAYES
DWIGHT E. CLARK

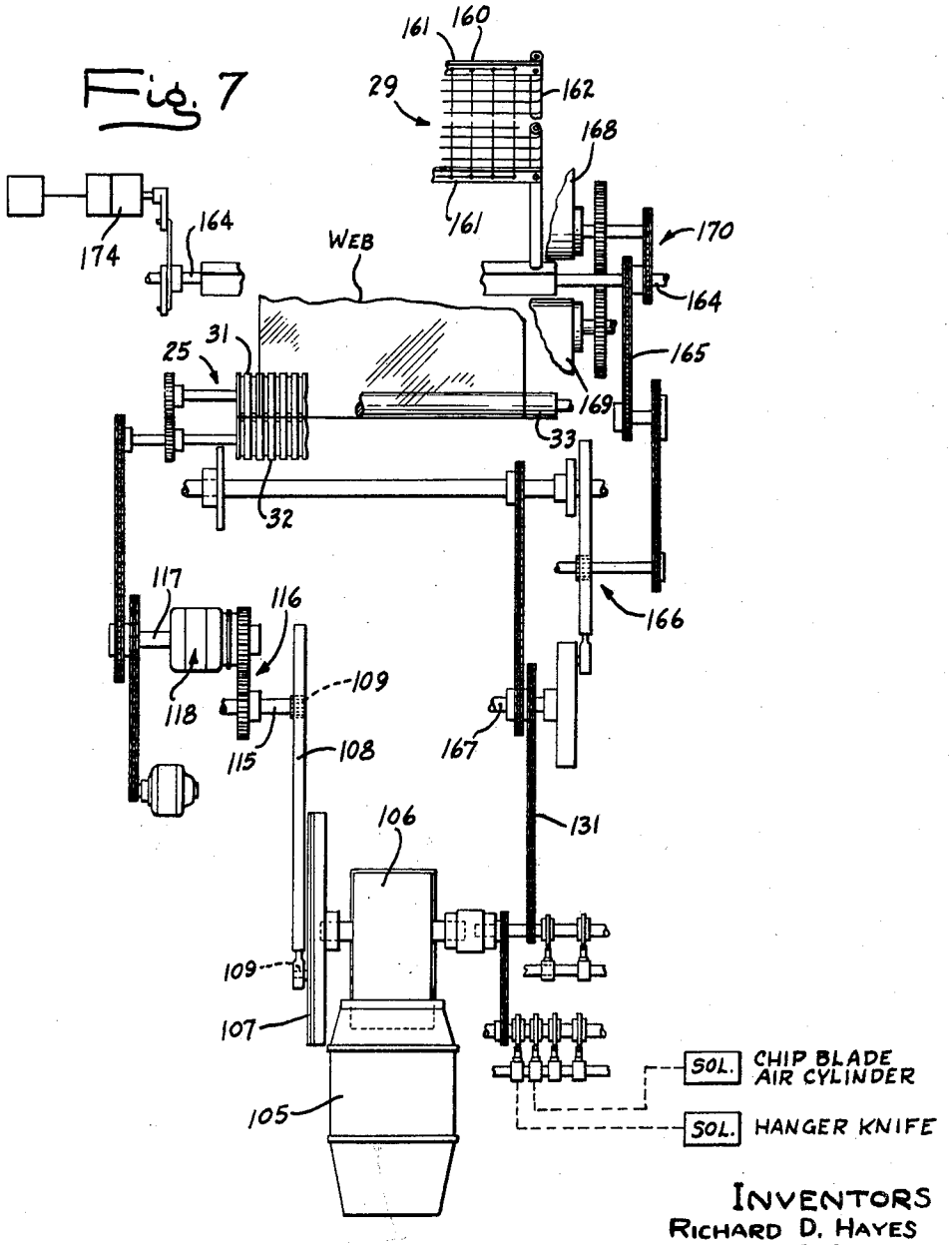
by: Wolfe, Hubbard, Voit & Osann ATTYS.

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Fig. 7



INVENTORS
RICHARD D. HAYES
DWIGHT E. CLARK

by: Wolfe, Hubbard, Voit & Osann ATTYS.

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3,125,916

BAG STACKING APPARATUS

Richard D. Hayes, Pittsford, and Dwight E. Clark, Canandaigua, N.Y., assignors, by mesne assignments, to National Distillers and Chemical Corporation, a corporation of Virginia

Original application June 25, 1957, Ser. No. 667,771, now Patent No. 3,008,865, dated Nov. 14, 1961. Divided and this application Feb. 20, 1961, Ser. No. 92,435

4 Claims. (Cl. 83—96)

This application is a division of my copending application Serial No. 667,771, filed June 25, 1957, Patent No. 3,008,865.

This invention relates to bag making, and more particularly to a method and a machine for making contour or slope-shouldered garment bags from relatively flexible heat-sealable material such as polyethylene film.

Such bags are used by retail cleaning establishments and laundries and are commonly called "pull-over" garment bags due to the manner in which they are pulled down over a garment to place the garment in the bag.

It is a general aim of this invention to provide a method of making a garment bag of this type whereby the bags are manufactured at a very high production rate. It is a related aim of this invention to provide an improved bag making machine in which this method may be carried out.

Heretofore, exclusively mechanical systems for guiding and feeding a web of bag stock through the mechanisms of a bag making machine, and particularly in arrangements where the bag is made while the web is moving horizontally, have had inherent disadvantages. Difficulties arise due to many causes, among these being the difficulty in grasping a web of relatively thin material for moving it in a precise manner; friction resisting rapid passage of the web through the mechanisms; lack of tautness in the web resulting from the inadequate support for the web during the bag making operations; and interference with the flow of the web following severing or heat sealing operations due to the web sticking to the mechanisms or catching in parts of the machine.

Therefore, it is an object of this invention to overcome such disadvantages by carrying out the bag making operations in the machine while the web is guided and supported in a vertical path. By using the feed system of this invention it is possible to maintain a higher production rate of finished bags for longer maintenance-free periods. The reduction in down time and uniformity of product results in reduced production costs.

A further object is to provide apparatus for stacking bags as they are made in the machine which is effective to stack the output of the machine in an orderly, efficient manner.

Further objects will appear from the following description taken in connection with the accompanying drawings, wherein:

FIGURE 1 is a perspective view of a finished gusseted garment bag constructed by use of the machine and in accordance with the method of this invention;

FIG. 2 is a horizontal sectional view of the bag taken in the plane of lines 2—2 of FIGURE 1;

FIG. 3 is a diagrammatic view showing the path of the material through the machine in making bags;

FIG. 4 is a view in side elevation of the bag making machine;

FIG. 5 is a top plan view of the bag making machine;

FIG. 6 is a transverse vertical sectional view showing the fly stacker apparatus taken substantially in the plane of lines 15—15 of FIG. 4;

FIG. 7 is a schematic view of the machine drive; and

FIG. 8 is a fragmentary horizontal sectional view showing the drive for the conveyors.

While the invention is susceptible of various modifications and alternative constructions, a preferred embodiment thereof has been shown in the drawings and will be described below in detail. It should be understood, however, that there is no intention to limit the invention to the specific form disclosed, but, on the contrary, the intention is to cover all modifications, alternative constructions and equivalents falling within the spirit and scope of the invention as expressed in the appended claims.

General Machine Organization

Turning now to the drawings, and particularly to FIGURES 1–4, the bag making machine 20 includes a framing structure divided into an upper section 21 and a lower section 22. A web of bag stock (FIGS. 2, 3) is drawn continuously into the machine from a supply roll or directly from an extruder and enters the machine at the upper left-hand side of the machine as viewed in FIG. 4, at the forward end of the machine.

In accordance with the invention, the web is drawn over a series of rollers into a vertical path and fed downwardly into a machine head having heat sealing and material severing elements for forming downwardly converging seams defining the neck of the bags and for cutting the material into finished bags. In the exemplary form of the invention illustrated, referring particularly to FIGS. 3 and 4, the machine head 25 is positioned substantially centrally of the machine and just beneath the upper horizontal rails 26 of the machine frame structure. The bags emerge from the head inverted, with the contour sealed end or neck 27 (FIG. 1) of the bag hanging down. The finished bag is then severed from the web leaving the bottom 28 of the bag open. At the instant of delivery, in keeping with the invention, a fly stacker 29 takes the bag and lays it flat on a receiving platform.

The web moves intermittently through the machine head so that the heat sealing and severing operations may be carried out while the web is stopped. For moving the web through the machine, draw rolls 31, 32 are used which are positioned above the machine head and deliver the web to it. Referring to FIGS. 3–5, it will be seen that the horizontal top rails 26 of the upper section 21 of the machine support guide rollers 33 over which the web is trained as it is led from a dancer roll assembly 36 at the receiving end of the machine to the draw rolls. The web during this period of travel also passes over an elestric eye scanner 37 which through a control to be later described, synchronizes the operation of the machine head 25 with printed matter which has been previously placed on the web.

Material Feeding Apparatus

In accordance with the present invention, the web of bag stock is positively drawn into the machine by mechanical means, and is moved through the machine to the stacking apparatus for the finished bags, and supported during the bag making operations by an air feed system.

Due to the fragility and limpness characterizing certain types of plastic film which may be made into bags by this machine, for example polyethylene film of a thickness approximating 0.5 mil, substantial problems are encountered in supporting the film for the heat sealing and severing operations and in guiding and feeding the film through the various mechanisms. In the machine illustrated, at a production rate of up to 200 finished bags per minute, the film is maintained in alinement during processing, and the finished bags are taken as they emerge from the machine and stacked in an orderly, efficient manner.

As depicted diagrammatically in FIG. 3, the web is drawn into the machine passing over a dancer roll as-

sembly 36 at the forward end of the machine and over the scanner assembly 37.

Introduction of Web to Machine Head

For drawing the web into the machine and up to the point of entrance into the machine head 25, grooved draw rolls 31, 32 of resilient material such as rubber are used (FIG. 3), the peripheral contact between the rolls caused by compression springs providing means for applying proper tension to feed the web evenly through the machine at the required speed. These draw rolls 31, 32 are supported in bearings mounted by means of the spaced end brackets bolted to the framing members of the upper frame section 21. The dancer assembly 36 is composed of two idler rolls 101, 102 (FIG. 4) mounted at the ends of parallel, pivotally supported arms 103. The motion of the web through the machine head 25 is intermittent in order that the heat sealing and cut-off operations may be carried out in the machine head on the web while the web is stopped. The web from a continuous, even supply as it is received, is taken up and fed out in an intermittent movement by the dancer roll assembly 36. For driving the grooved draw rolls 31, 32 intermittently in a direction to draw the web into the machine, a drive is employed (FIGS. 4, 5) including a variable speed motor 105 and gear reducer 106, a crank 107, and a rack 108 and pinion 109 driven from the crank 107 whereby reciprocatory motion is imparted to the pinion 109. The rack 108 is mounted at the drive end on a fulcrum pin 109' fastened to a block 110 slidably mounted in the crank arm casting. At the pinion, the rack is slidably mounted between brackets 111 which support rollers 112 which engage the rack and apply pressure to maintain the rack and pinion teeth in driving engagement with load conditions.

Reciprocatory motion of the pinion shaft 115 is transmitted through gears 116 to an intermediate shaft 117 on which means are mounted for translating the reciprocatory motion to intermittent uni-directional motion. In the present exemplary illustration of the invention, this means comprises an electric clutch and brake 118, for example, a Warner clutch brake size 500, actuated through the use of the scanner assembly 37 and appropriate microswitches and cams. It will be understood by a man skilled in the art that equivalent arrangements such as an ordinary over-running clutch may be substituted to obtain this same result. Herein by means of such control instrumentalities the clutch is engaged during a forward stroke of the rack and the brake engaged during the return stroke. This causes the intermediate shaft 117 to rotate in one direction as the rack 108 moves forward, and to remain stationary as the rack returns. It will be understood that during the periods that the intermediate shaft 117 remains stationary, the mechanisms of the machine head 25 operate to seal the bag and sever the material so that the finished bag is cut off and delivered to the stacking apparatus. For transmitting the intermittent uni-directional motion to the web, a sprocket drive 120 is employed for connecting the intermediate drive shaft 117 and the draw rolls 31, 32. By means of the scanner assembly 37 which registers upon an eye mark on the film, and a brake and clutch control (not shown) as connected to the scanner, the operation of the brake-clutch 118 is synchronized with the print location on the film. Thusly, printed matter previously placed on the continuous web of bag stock appears properly located on the finished bags.

For adjusting the length of bags made on the machine, means are provided for controlling the number of revolutions of the draw rolls 31, 32 per cycle of the intermittent motion deriving mechanism, and thus the length of the film drawn by the rolls per cycle. As shown in FIG. 4, for this purpose means are provided for varying the stroke of the crank 107 by an adjustable screw 123 which moves the block 110 slidably mounted in the crank arm casting.

This block 110 supports the fulcrum pin 109' on which the drive end of the rack 108 is pivoted. For adjusting the stroke of the crank 107 while the machine is operating, a control rod terminating in a readily accessible knob 124 is provided for manipulating the adjustable screw as by moving a pin carried by the control rod into position to be contacted by a toothed wheel 126 on the screw as the crank arm rotates.

For a disclosure and description of the details of the machine head 25, reference may be made to copending application 667,771 of which this application is a division.

Mechanical and Air Feeding of Web

In keeping with the present invention, a combined mechanical and air feed is used for guiding the web into the machine head 25, conveying the web through the head which involves stripping the bag stock from the heat-sealing bars, and moving the limp, flimsy material vertically downwardly so that it is suspended evenly from the machine to be taken by the stacking mechanism.

After the completion of a heat-sealing operation, the platens 40, 41 open to allow the sealed neck of the partially made bag to be fed vertically downwardly so that the continuous web may be severed by the shear blades 42, 43 into bag lengths to form the finished bags. In order to deliver the web downwardly into the free, open space below the head 25, air manifolds 155, 156 mounted on the opposite sides of the path of the web are used for directing currents defining an air gate directly below the machine head 25. The currents of air from the manifolds merge below the head allowing the web to remain flat as it moves vertically downwardly and to hang suspended during the period of operation of the machine head. Considerable air turbulence is created in the lower section of the machine frame below the head during the operation of the machine, and in the present case particularly by reason of the construction of the fly stacker which will be described hereinafter. This air turbulence is counteracted by the currents of air directed from the air manifolds forming this air gate, so that the web flows evenly and smoothly to the stacker. Furthermore, because the sealed end of the web is down, air is not picked up to balloon the tube.

Referring to FIG. 3, as shown the air manifolds 155, 156 comprise parallel tubes mounted by means of brackets to the platens below the machine head on each side of the path of the web. Spaced openings directing air downwardly and angled so that the currents of air merge serve to control the air flow in the manner desired. Air under pressure is supplied to the manifolds by service lines.

Fly Stacker

For receiving the finished bags as they emerge from the machine head 25 in a flat condition and lying substantially in a vertical plane, in carrying out the invention an oscillatable fly stacker 29 is provided which is operated in time with the delivery of the bags so that the stacker takes the bags in the vertical position and lays them flat alternately upon opposite horizontal platforms. The bag hangs poised after being severed, and is supported flat and on an even keel by the air feed system, and is then taken by the fly stacker.

Referring peraticularly to FIGS. 3, 4, and 6, the fly stacker 29 as there shown includes an open, substantially rectangular screen 160 made up of parallel bars 161 of light but strong material, for example, aluminum, with end members 162 securing the bars together preferably made of fiberglas tubing. The open framing making up the screen is covered by a large mesh netting 163 like tennis netting. For mounting and drive purposes, the screen 160 is supported by a shaft 164 which is carried in suitably positioned bearings in the machine frame. This shaft is positioned substantially in the plane of delivery of the bags. A drive 165 connected to this mount-

ing shaft supplies oscillatory motion to drive the shaft in a manner that causes the stacker screen **160** to move between opposite horizontal positions (FIG. 3) through a vertical position where the finished bag is taken upon delivery against the screen on both forward and return strokes. Oscillatory motion for driving the fly stacker screen is obtained from a rack and pinion reciprocatory motion deriving mechanism **166** (FIG. 5) located on the upper frame section **21**, and driven in synchronism with the elements of the machine head **25**, from the main drive motor **105** through the output shaft **133** of the gear reducer **106**, the first sprocket drive **131**, and the secondary drive shaft **167**. This reciprocatory motion deriving mechanism **166** is like the similar mechanism including the rack **108** and pinion **109** used in the drive for the draw rolls **31, 32**. While different receiving arrangements for the finished bags may be employed, in the present instance, horizontal platforms are provided by conveyors **168, 169** which are operated in timed sequence with the stacker screen **160** by means of a sprocket drive **170** which connects the mounting shaft **164** of the screen and the conveyor shafts, respectively.

Summary of Operation

While the operation of the machine in making finished bags will be evident from the preceding description, referring to the schematic view, FIG. 3, showing the path of the web through the machine, and FIG. 7 showing the drive, a complete cycle of operation will be described.

To start up the machine, the machine control (not shown) is energized causing the heat-seal elements to heat up (connections not shown) and air to be supplied to the air manifolds of the air feed system. The bag stock, for example, polyethylene film, is then manually threaded through the dancer roll assembly **36** and into the draw rolls **31, 32**. The machine is preferably started with the stacker screen **160** in the down position, and thus with the machine head platens **40, 41** and cut-off knives **42, 43** open. By the use of an auxiliary air motor **171**, the draw rolls **31, 32** are operated without the platens **40, 41** being operated so that the web is drawn freely through the machine head **25**. For satisfactory operation the web should be wrinkle free and with a slight tension existing between the dancer roll assembly **36** and the draw rolls **31, 32**. Once adjustments have been made to obtain proper web flow, then the main drive may be started, to operate the machine head **25** and stacking apparatus **29**.

A full cycle of operation begins with the draw rolls **31, 32** stopping and the platens **40, 41** of the machine head **25** closing together to clamp the web and form the downwardly converging seams defining the neck of the bag (FIG. 1). During this period the dancer roll assembly **36** takes up the momentary slack and maintains tension in the web as it is fed continuously from the extruder or supply roll. As the platens **40, 41** come together, the hanger slot blade is actuated to form the slot **70** for the clothes hanger. During this operation the heat seal bars ond pad carried by the forward and rear platens **40, 47** respectively, give added support for the web so that the hanger slot blade upon actuating forms a clean cut in the film.

Likewise, as the platens **40, 41** come together, the cut-off knives **42, 43** for severing the web are operated. Due to the angular relation of the shearing edges the severing begins at one side of the web and moves across the width of the web. With proper timing these cut-off knives **42, 43** commence to cut just prior to the instant the hanger slot knife is actuated. This action whereby the cut-off knives shear the web, also lends support to the material so that the hanger slot knife can pierce and form a clean cut.

The heat sealing elements borne by the platens operate to form the required seams and also as a hot knife cut-off, to sever the web along the edges of the seams. The chip which remains between the converging seams and the square cut-off is cleared from the machine head **25** by the chip ejector blade. This blade is operated when the cut-off knives **42, 43** have completed the severing operation. Moreover, to the completion of the cut-off operation, the platens **40, 41** of the machine head **25** open to release the web and the draw rolls **31, 32** begin again to feed.

The severing operation performed by the cut-off knives **42, 43** separates the finished bags from the continuous web. These finished bags are taken at the instant the material is severed, by the fly stacker screen **160**, and placed on platforms formed by conveyors **168, 169** positioned for that purpse. The operation of the fly stacker **29** is such that the finished bags are received on both the forward and return strokes, and a counter **174** operated from the mounting shaft **164** for the stacker screen **160** is effective to count out the finished bags.

We claim:

1. A stacking apparatus for bags of flexible, limp, film material, said bags being delivered to the stacking apparatus in a flat condition and lying in a substantially vertical plane, horizontal bag stack receiving platforms on each side of the plane of delivery of the bags, a fly stacker including a large mesh screen mounted between said platform, and means for oscillating said fly stacker to take said bags in the vertical position upon delivery and lay them flat alternately on said platforms, said screen being movable through the vertical plane of delivery of the bags to substantially horizontal position in engagement with the top of a stack of bags on one of said platforms.

2. A stacking apparatus for bags of flexible, limp, film material, said bags being delivered to the stacking apparatus in a flat condition and lying in a substantially vertical plane, comprising, in combination, horizontal bag stack receiving platforms on each side of the plane of delivery of the bags, a fly stacker including a frame and an open mesh screen on said frame mounted between said platforms, means mounting said screen for oscillatory movement to pass through the vertical plane of delivery of the bags to a substantially horizontal position in engagement with the top of a stack of bags on one of said platforms, and means for timing the oscillation of said fly stacker screen with the delivery of bags so that said fly stacker takes said bags in the vertical position upon delivery and lays them flat alternately on said platforms.

3. A stacking apparatus for bags of flexible, limp, film material, said bags being delivered to the stacking apparatus in a flat condition and lying in a substantially vertical plane, movable horizontal bag stack receiving platforms on each side of the plane of delivery of the bags, a fly stacker between said platforms, said fly stacker including a frame and an open mesh screen on said frame mounted for oscillation between a substantial horizontal position in engagement with the top of a stack of bags on one of said platforms and arranged to pass through the vertical plane of delivery of the bags, and means for timing the oscillation of said fly stacker with the delivery of bags so that said fly stacker takes said bags in the vertical position upon delivery and lays them flat alternately on said platforms, said bags being retained by air pressure against said screen.

4. In apparatus for stacking bags cut from a web of relatively flexible film material, means for feeding the material web into a vertical plane, substantially horizontal bag receiving means on each side of said plane, an oscillatable fly stacker mounted between said bag receiving means including an open mesh screen movable in the course of forward and return strokes through an upright position in said vertical plane, said screen being movable to a substantially horizontal position in engagement with the top of a stack of bags on one of said platforms, and means immediately above said fly stacker screen in the upright position of the latter for cutting the material web transversely into bags in time with the oscillation of said screen so that said screen takes a bag when in the

upright position and delivers the same to one of said bag receiving means upon each stroke.

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