Oct. 31, 1961 M. RAWE 3,006,256

DEVICE FOR OPENING ONE END OF BAG TUBES TO FORM THE BAG BOTTOMS IN PAPER BAG MANUFACTURING MACHINES

Filed April 4, 1957

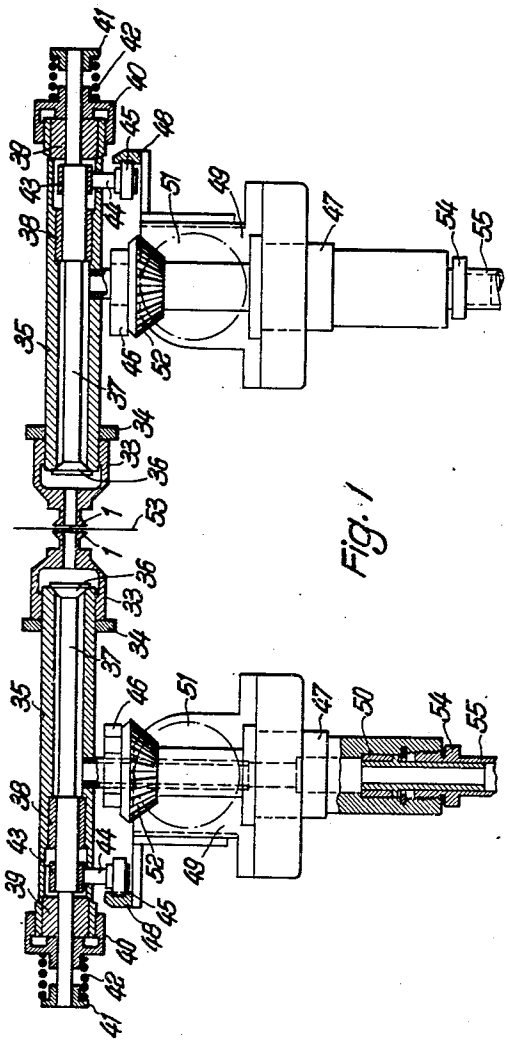


Fig. 1

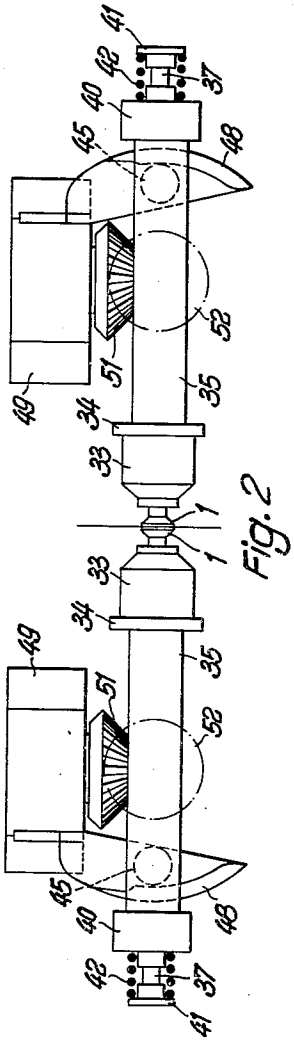


Fig. 2

United States Patent Office 3,006,256
Patented Oct. 31, 1961

3,006,256

DEVICE FOR OPENING ONE END OF BAG TUBES TO FORM THE BAG BOTTOMS IN PAPER BAG MANUFACTURING MACHINES

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Filed Apr. 4, 1957, Ser. No. 650,796
Claims priority, application Germany Apr. 5, 1956
3 Claims. (Cl. 93—28)

The present invention relates to a device for opening one end of a bag tube during the traveling of the bag tube in a path plane in paper bag manufacturing machines, by means of at least two suction tubes on opposite sides of said bag tube path plane, a sucker on each of said tubes and respective suction tubes rotatably mounted on suction line drive shafts.

With the fast running high capacity paper bag machines in present use it has been very difficult to create a satisfactory vacuum in the extremely short time available for the opening of the bag tubes by the suckers to insure that the bag tube will be drawn open sufficiently and with absolute surety. Tests made with suction air controls in the main suction line ahead of the suction stations have not resulted in a sufficient increase of the active vacuum during the opening operation.

It is the object of the invention to overcome these drawbacks. This is obtained by the device here described which generally comprises at least two suction tubes positioned on opposited sides of said bag path plane and a sucker on each of said tubes. Each of these tubes is perpendicularly attached to a rotatable drive shaft which is arranged in a plane to said bag tube path plane. A spring-urged valve is disposed within each of said suction tubes in substantial axial alignment therewith, said valve is disposed between the sucker end of said suction tube and the point of connection of said tubes with said drive shafts. Vacuum lines extend from said suckers through said suction tubes and through an opening provided longitudinal of said rotatable drive shafts. These vacuum lines are continuously maintained under vacuum influence. Axially reciprocable spring-urged tappet shafts are connected to said valves for opening and closing said valves in each of said suction tubes, said tappet shafts holding said valve in yieldable closed position. Control means effecting simultaneous opening of said valves at the instant when the suckers are engageable with a paper tube in the path plane are provided for acting upon said tappet shafts to operate said valves at the proper instant.

Each of said control means for actuating said valves includes a movement transferring element rigidly connected to said tappet shaft, and a cooperating cam member secured to a stationary portion of said device for influencing said movement transferring element to reciprocate said tappet valve shaft. Further details of the invention are explained in the following description, reference being made on the accompanying drawings.

In the drawings two embodiments of the object of the invention are shown diagrammatically.

FIG. 1 is a side elevation, partly in section of an embodiment of the arrangement of the suckers with vacuum control means for the suckers,

FIG. 2 is a top plane view of the same device as in FIG. 1.

Referring to the drawings, each sucker 1, with its pot-shaped support 33 disposed on opposite sides of the paper bag path plane of a paper bag manufacturing machine, is fixed to a suction tube 35 by means of a thread and a counter nut 34. The suction tube 35 houses a valve in the form of a disc stop valve 36 located in close proximity with each suckers 1. The valve 36 is carried by a

valve stem 37 supported for axial movement by bushes 38, 39 spaced from the valve 36, and a nut 40 which is screwed on to outer end of the tube 35. The outer end of stem 37 is provided with a counter pressure flange 41, and a pressure spring 42 is disposed between said flange 41 and said nut 40 to yieldably retain the valve 36 in closed position thereof. A stud 44 supports a roller or ball bearing 45, and is carried in perpendicular position with respect to the valve stem 37 by a bush 43 secured to the valve stem 37 by a bush 43 secured to the valve stem 37. The stud 44 extends outwardly from the vacuum portion of the suction tube 25 between the bush 38 and the valve 36.

The suction tube 35 is rigidly and gas-tightly connected at its vacuum portion between the bush 38 and the valve 36 to a transverse hollow suction shaft 47, the tube 35 being at right-angles to the shaft 47 and locked in this position by a ring 46. A control cam 48 cooperating with the roller 45 of the valve stem 37 is located on the housing 49 of the apparatus. The hollow suction shaft 47 is rotatable about a stationary hollow shaft 50 and is driven, as shown in FIG. 2, by bevel gears 51, 52. The hollow suction shaft 47 is guided and sealed by a packing box 54 to which a suction line 55 is connected.

The manner of operation of the apparatus is the following:

The suction shafts 47 and the vacuum portions of the suction tubes 35 are always under vacuum up to the plate-like valve 36, and the timing of the apparatus is such that, during rotation of the shaft 47 and suckers 1 about shaft 50, at the instant the suckers 1 contact the flattened bag tube 53, each valve 36 is moved from its seat and is held in open condition thereof by engagement of the roller 45 of the valve stem 37 with the control cam 48. As just mentioned, opening of the valves 36 is effected at the instant of contact of the suckers 1 with the bag tube 53. If the opening of the valves 36 is effected before the suckers 1 contact the bag tube 53, the vacuum is without any effect, whereas, if it is effected later the opening device is at first without effect. For this reason the control cams 48 are adjustably mounted on the housings 49. After the control cams 48 has been adjusted to insure correct opening of the valves 36, the cams 48 are locked in this adjusted position. Before the suckers 1 leave the bag tube 53, the rollers 45 of the valve stems 37 disengage the control cam 48, the valve stems 37 are moved by their springs 42 and restore the valves 36 to the closed position thereof, so that the vacuum portions of the suction tubes 35 are sealed again by the valves 36 from the suckers 1.

If desired, operation of the valve stems 37 to effect opening of the valves 36 may be controlled by electromagnets, which are not shown, and which operate directly on the stem 37 and are operated by electric contact mechanism operable in timed relation with the movements of the suckers, for example the contact mechanism may be operated by the rotating shafts 47 in such a manner that at the instant when the suckers 1 contact the bag tube 53 the contacts of the contact mechanism are closed by the rotating shaft 47 and opened again as soon as the contact between the suckers 1 and the bag tube 53 is interrupted.

While the invention has been described in connection with different embodiments thereof, it will be understood that it is capable of further modification, and this application is intended to cover any variations, uses, or adaptations of the invention following, in general the principles of the invention and including such departures from the present disclosure as come within knowing, or customary practice in the art to which the invention pertains and as may be applied to the essential features herein before

set forth and fall within the scope of the invention or the appended claims.

What I claim is:

1. A device for opening one end of a bag tube during the travelling of the bag tube in a path plane in paper bag manufacturing machines comprising at least two suction tubes on opposite sides of said bag tube path plane, a sucker on each of said tubes, at least two rotatable drive shafts arranged parallel to said bag tube path plane, and perpendicular to the direction of movement of said bag tube through said machine and disposed on opposite sides thereof, said suction tubes fixed on said rotatable drive shafts, a spring-urged valve disposed within each of said suction tubes in substantial axial alignment therewith, said valve disposed between the sucker end of said suction tube and the point of connection of said tubes with said drive shafts, said vacuum line extending from said suckers through said suction tubes and through an opening provided longitudinal of said rotatable drive shafts, said vacuum line continuously under vacuum influence, axially reciprocable spring-urged tappet shafts connected to said valve for opening and closing said valve in each of said suction tubes, said tappet shafts holding said valve in yieldable closed position, control means effecting simultaneous opening of said valves at the instant when the suckers are engageable with a paper tube in the path plane, said control means acting upon said tappet shafts to open said valves at said instant.

2. A device as in claim 1 wherein each of said control means for actuating said valves includes a movement transferring element rigidly connected to said tappet shaft, and a cooperating cam member secured to a stationary portion of said device for influencing said movement transferring element to reciprocate said tappet valve shaft.

3. A device as in claim 1 wherein said control means for each of said valve includes a tappet stud integrally and perpendicularly connected to said tappet valve shaft, a roller pivotally mounted on the free end of said stud, and a tappet operating cam rigidly connected with a stationary part of said device, and said cam contacting said roller to actuate said stud and said tappet valve shaft.

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