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SUCTION FEEDING OF SHEETS, CARDS, COLLAPSED CARTONS, AND THE LIKE

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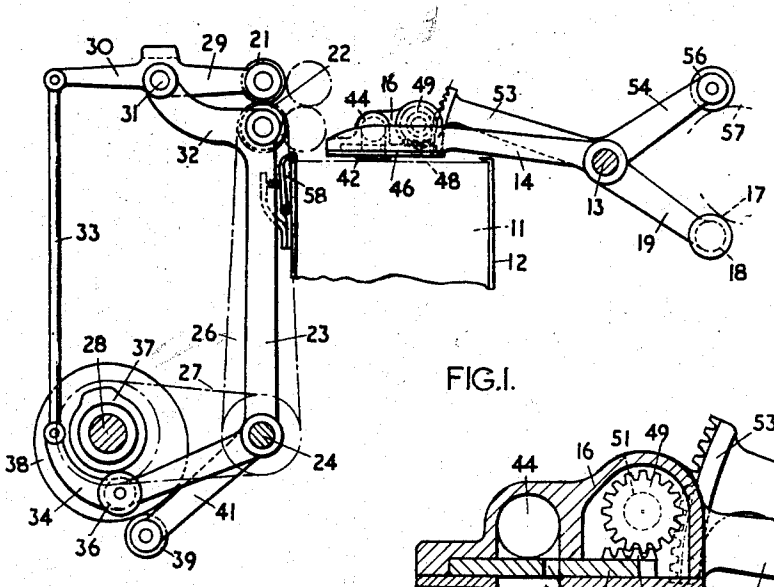


FIG.1.

FIG.3.

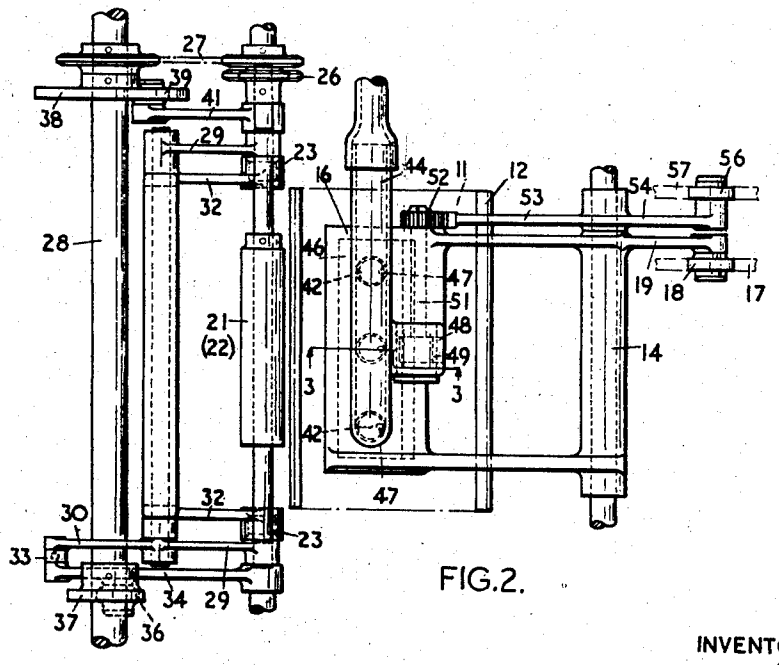


FIG.2.

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SUCTION FEEDING OF SHEETS, CARDS, COLLAPSED CARTONS, AND THE LIKE

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3 Claims. (Cl. 271—26)

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This invention relates to the suction feeding of sheets, cards, cartons and the like (hereinafter referred to as "cartons") from a stack or pack. While the invention is applicable to the feeding of sheets generally, it is especially concerned with the feeding of cartons in collapsed form.

In the feeding of sheets by suction, it has generally been found convenient to place the suction pump at a substantial distance from the suction head with the result that at each operation of the suction head a substantial length of suction line has had to be evacuated before the suction feed could take place. It has now been found that when operating such a feed at rates of feed of the order of upwards of 200 per minute, the time required for the evacuation of the suction line is too great to allow of efficient feed, and an object of the invention is to overcome this difficulty.

According to the invention, there is provided a suction feed for cartons, comprising a suction head between which and the carton to be fed there is a relative movement to bring the head into close proximity to the carton so that the carton is seized by the suction applied to the head, a valve arranged in the suction head close to the suction surface thereof, and means for opening the valve as the suction head and the carton meet. By these means, the suction line is evacuated against the closed valve before the seizing action takes place with the result that substantially the full suction force is available as soon as the valve is operated, there being only the relatively small volume of the suction head itself to be evacuated after operation of the valve.

According to a feature of the invention, the suction head is formed with one or more nozzles of substantial diameter, e. g., a diameter of one inch or more, and the nozzles are metal faced. It is found that this construction renders unnecessary the customary use of rubber faced nozzles, the flexibility of the carton over the substantial area of the nozzle providing the necessary sealing action.

The invention has been found very useful as applied to the feeding of collapsed cartons from a magazine to an apparatus for setting-up the cartons prior to feeding them to a carton-filling and closing machine.

Such an application will now be described in greater detail, with reference to the accompanying drawings, in which,

Figure 1 is a diagram of the carton feeding mechanism,

Figure 2 is a plan of the apparatus shown in Figure 1, and

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Figure 3 is a cross-section of a detail of Figures 1 and 2, taken on the line 3—3 of Figure 2, and drawn to a larger scale.

Referring to the drawings, the cartons 11 are arranged in a pack in a magazine 12 and are urged towards the mouth of the magazine in well known manner. Pivotally mounted at 13 is a suction arm 14 which terminates in a suction head 16 arranged to be oscillated from the suction position (shown in Figure 1) to a delivery station by the action of a rotatable cam 17 arranged to bear against a cam roller 18 mounted on an extension 19 from the suction arm 14.

The cartons 11 are moved in succession to a delivery station at which they are seized from the suction head 16 by a pair of rollers 21 and 22. The roller 22 is rotatably mounted in a pair of arms 23 pivoted at 24 and is driven by chain gearing 26, 27 from a cam shaft 28. The roller 21 is rotatably mounted in a forked arm 29 of a two-armed lever 29, 30, pivoted at 31 in extensions 32 from the arms 23, the other arm 30 being connected by a link 33 to an operating arm 34 pivoted at 24 and carrying a cam roller 36 arranged to bear against the face of a rotatable cam 37 secured to the cam shaft 28. The rollers 21 and 22 are together oscillated by means of a rotatable cam 38 secured to the cam shaft 28 and arranged to bear against a cam roller 39 carried by an extension 41 from one of the arms 23. The cams 17, 37 and 38 are operated in timed relationship so that, as a carton 11 is delivered by the suction head 16, it is seized by the rollers 21, 22 (which are opened and closed by the action of the cam 37) and carried to a position from which it is fed to a carton setting up apparatus (not shown).

The suction head 16 is formed with three nozzles 42 of about one inch diameter and leading to a shallow suction chamber 43 (see Figure 3) which communicates with a suction conduit 44. Slidably mounted in the head 16 at a position close to the suction face is a slide valve 46 formed with a port 47 for cutting off the suction to the chamber 43. The valve 46 is formed with rack teeth 48 arranged in engagement with a pinion 49 secured to a shaft 51 rotatably mounted in the head 16, the shaft 51 carrying a further pinion 52 arranged in engagement with an arcuate rack 53 pivoted at 13 and formed with an extension 54 carrying a cam roller 56 arranged to bear against the face of a rotatable quick lift cam 57 which is driven in timed relationship with the cams 17 and 38 so as to open and close the valve 46 as required at the suction and delivery positions.

The arm 14 is first pivoted to the suction position at which the valve 46 is quickly operated by the cam 57 so as to open the suction chamber 43 to the conduit 44 and allow the head 16 to seize a carton 11. The arm 14 then moves to withdraw the carton from the magazine 12, against the action of a spring-loaded retaining member 58, and carry it to the delivery station where the valve 46 is closed to allow the rollers 21, 22 to seize the carton and carry it forward, the rollers having moved in the meantime into the position shown in chain-dotted lines in Figure 1. The arm 14 then returns to the suction position to seize the next succeeding carton.

We claim:

1. A suction feed for cartons, of the type comprising a suction head between which and the carton to be fed there is a relative movement to bring the head into close proximity to the carton so that the carton is seized by the suction applied to the head, characterised by the provision of a suction head including a casing to which suction is applied, a closure plate for the casing containing a suction nozzle, a slide valve arranged within the casing in close proximity to the closure plate so as to limit to a small amount the volume to be evacuated between the valve and the mouth of the nozzle upon opening of the valve, rack teeth on the slide valve, a shaft rotatably mounted in the suction head, a first pinion secured to the shaft and arranged in engagement with the rack teeth, a second pinion secured to the shaft, an arcuate rack in engagement with the second pinion, and means operating in timed relationship with the movement of the suction head for operating the arcuate rack to open the valve as the suction head and the carton meet.

2. A suction feed for cartons, of the type comprising a suction head between which and the carton to be fed there is a relative movement to bring the head into close proximity to the carton so that the carton is seized by the suction applied to the head, characterized by the provision of a suction head including a casing to which suction is applied, a pivoted arm on which the suction head is mounted, a thin walled closure plate for the casing containing a rigid suction nozzle, cam means for pivoting the arm to carry the suction head firstly to the suction position and then, with the carton, to a delivery position, a slide valve arranged within the casing in close proximity to the inner wall of the plate so as to limit to a small amount the volume to be evacuated between the valve and the mouth of the nozzle upon opening of the valve, rack teeth on the slide valve, a pinion secured to a shaft rotatably mounted in the suction head and arranged in engagement with the rack teeth, a second pinion secured to the shaft, an arcuate rack in engagement with the second pinion for operating the valve, and means operating in timed relationship with the movement of the suction head for operating the arcuate rack to open the valve as the suction head and the carton meet.

3. A suction feed for cartons, of the type comprising a suction head between which and the carton to be fed there is a relative movement to bring the head into close proximity to the carton so that the carton is seized by the suction applied to the head, characterized by the provision of a suction head including a casing to which suction is applied, a thin wall closure plate for the casing containing a rigid suction nozzle, a slide valve arranged within the casing in close proximity to the inner wall of the plate so as to limit to a small amount the volume to be evacuated between the valve and the mouth of the nozzle upon opening of the valve, rack teeth on the slide valve, a pinion secured to a shaft rotatably mounted in the suction head and arranged in engagement with the rack teeth, a second pinion secured to the shaft, an arcuate rack in engagement with the second pinion for operating the valve, and means operating in timed relationship with the movement of the suction head for operating the arcuate rack to open the valve as the suction head and the carton meet.

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