Aug. 14, 1945. P. E. ECKMAN 2,382,405

SUCTION CUP

Filed Feb. 8, 1944

Fig 1

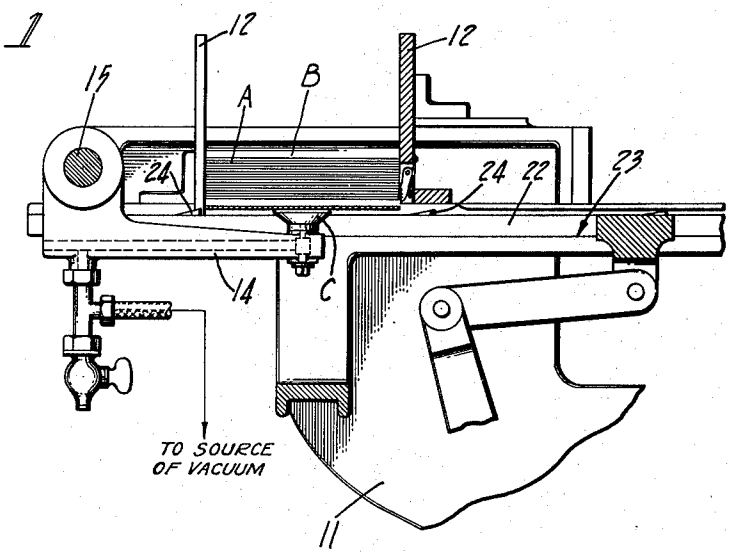
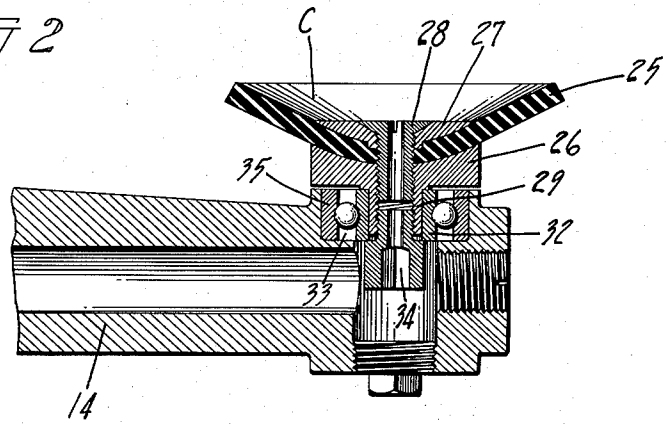


Fig 2



INVENTOR.
Philip E. Eckman
BY Ivan D. Thornburgh
Charles H. Esse
ATTORNEYS

Patented Aug. 14, 1945

2,382,405

UNITED STATES PATENT OFFICE

2,382,405

SUCTION CUP

Philip E. Eckman, Seattle, Wash., assignor to American Can Company, New York, N. Y., a corporation of New Jersey

Application February 8, 1944, Serial No. 521,592

3 Claims. (Cl. 294—64)

This invention relates to rubber suction cups used for separating sheets as in container manufacture and has particular reference to a suction cup rotatably carried on a moving arm for equalizing the wear of the cup engaging surface.

In the feeding of sheets or blanks from a supply magazine into a can making machine, as one example where the present invention is applicable, the sheets are separated by a suction cup which engages one surface of the outermost sheet in the stack and draws it away from the sheets remaining in the stack, following which the separated sheet is stripped from the suction cup during feeding of the sheet along a predetermined path of travel. During this stripping operation the edges of the moving sheets and particularly cut or burred edges cause uneven wearing of the suction cup engaging surfaces.

The instant invention contemplates overcoming such difficulties by providing a swivel or rotatable mounting between the suction cup and the carrying arm so that a continuous change of cup position takes place during feeding of successive sheets.

An object of the invention is the provision of a rotatable suction cup for separating a sheet or blank from a stack of sheets or blanks.

Another object is the provision of such a rotatable suction cup which is mounted to rotate on an axis substantially normal to the sheet surface.

Still another object of the invention is the provision of a suction cup rotatably mounted in a frictionless bearing, such as a ball bearing, which is carried in a movable arm, the suction cup being balanced for free turning movement so that vibration of the working parts partially rotates the cup when freed from the sheet and changes the cup engaging surface incident to the cup coming into engagement with the next successive sheet.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawing, discloses a preferred embodiment thereof.

Referring to the drawing:

Figure 1 is a fragmentary longitudinal vertical section of the blank feed end of a can body making machine embodying the present invention; and

Fig. 2 is an enlarged sectional detail of the improved suction cup.

As a preferred embodiment of the invention there is shown in Fig. 1 of the drawing a portion of a can body making machine in which the present invention is applied. Such a machine is fully illustrated and described in the John F. Peters United States Patent 1,625,091, issued April 19, 1927.

Sheets or blanks prior to being separated are confined in stacked form within a magazine B. Such a magazine is mounted on a bed or main frame 11 of the can body making machine previously referred to. The magazine comprises a plurality of vertical, spaced bars or stack holders 12 which are secured in any suitable manner to the top of the frame 11.

Individual sheets or blanks A are separated from the bottom of the magazine B by a withdrawal of the lowermost sheet from the stack of sheets. This separation or withdrawal is performed in the usual manner as by means of a suction cup C.

The suction cup C is rotatably carried by a swinging arm 14 which is secured at one end to a rocker shaft 15 carried in the main frame. The arm 14 is operated by oscillation of the shaft 15 in any suitable manner in time with other moving parts of the machine.

The separated sheet A is fed along a predetermined path of travel by a reciprocating blank feed bar 22. Bar 22 operates in a slideway 23 in the main frame. This bar 22 carries a plurality of spaced spring actuated feed dogs 24 as is usual in this type of feed.

The suction cup C (Fig. 2) embodies a conventional conical shaped rubber member 25 which is mounted on a tapered seat in the upper surface of a spindle 26. An angularly shaped plug 27 rests against the rubber and together with a hollow screw 28 retains the rubber in place in the tapered seat of the spindle.

The spindle 26 of the cup unit extends down in a reduced stud section 29. The stud section is carried in an inner race ring 32 of a ball bearing 33 or similar frictionless bearing. The spindle is secured in the ring 32 by a hollow screw 34. An outer race ring 35 is mounted in the end of the arm 14 and with the free turning balls completes the bearing. It is through the hollow screws 28, 34 and through a channel in the arm 14 that proper suction is made effective on the suction cup by connection with a suitable source of vacuum.

With conventional suction cups, cut and burred edges of the sheets cause rapid, uneven wear as the sheets are dragged over the cup particularly during the time the sheet is stripped from the cup. This soon prevents the proper suction hold on the sheet. With the free, unrestricted mounting of the improved cup there is slight rotation

within the bearing cup following disengagement of the cup from the sheet. Therefore the wearing surface remains even and the suction action of the cup continues to be effective.

The vibration set up during the action of the swinging arm 14 in moving the cup C up and down is found sufficient to cause rotatable movement of the cup. This causes a constant changing of position of the cup engaging surface, thus presenting a different engaging surface for each successive sheet. This ever changing position of the cup surface thus greatly prolongs the life of the cup.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. A rubber suction cup for separating sheets from a stack having means for preventing uneven wearing of the engaging cup surface, comprising an arm having movement into position adjacent the stack, a suction cup carried by said arm for engagement with a sheet for separating individual sheets from the stack when the arm comes adjacent the stack, said cup being freely rotatable in a ball bearing mounted on said arm so as to be adaptable upon movement of said arm to constantly change the position of the cup surface relative to each successive sheet to prevent uneven wearing of the cup surface.

2. A rubber suction cup for separating sheets from a stack having means for preventing uneven wearing of the engaging cup surfaces, comprising an arm having movement into position adjacent the stack, a suction cup carried by said arm for engagement with a said sheet for separating individual sheets from the stack when the arm comes adjacent the stack, and a ball bearing connection between said arm and said cup to permit unrestricted turning of the cup by means of the vibration of the moving arm when the cup is free of the sheet so as to constantly change the position of the cup surface relative to each successive sheet to prevent uneven wearing of the cup surface.

3. A rubber suction cup for separating sheets from a stack having means for preventing uneven wearing of the engaging cup surfaces, comprising an arm having movement into position adjacent the stack, a suction cup carried by said arm and rotatable on an axis substantially normal to the sheet surface for engagement with a said sheet for separating individual sheets from the stack when the arm comes adjacent the stack, and a ball bearing connection between said arm and said cup to permit unrestricted partial rotation of the cup by virtue of the movement of said arm when the cup is free of the sheet so as to constantly change the position of the cup surface relative to each successive sheet to prevent uneven wearing of the cup surface.

PHILIP E. ECKMAN.