

Feb. 16, 1943.

W. A. ROBINSON, SR

2,310,995

SHEET HANDLING MECHANISM

Filed Jan. 13, 1941

Fig. 1.

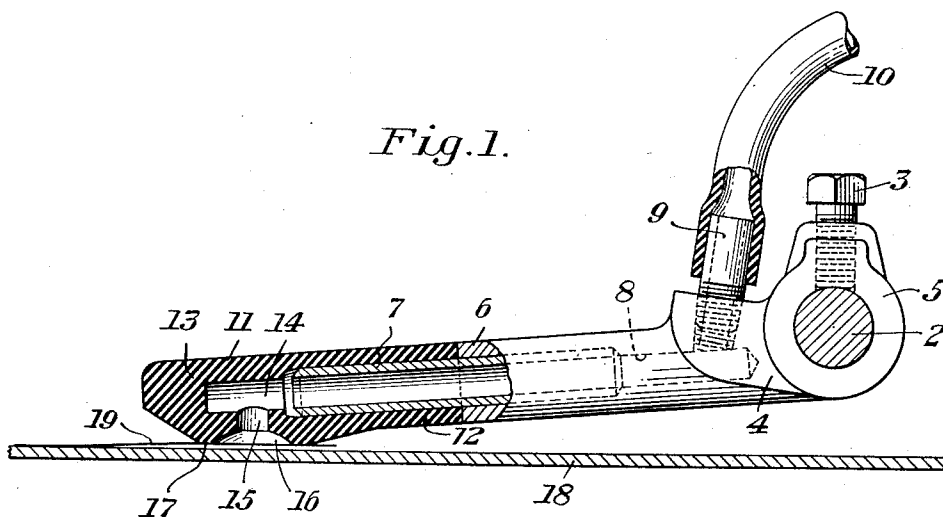


Fig. 2.

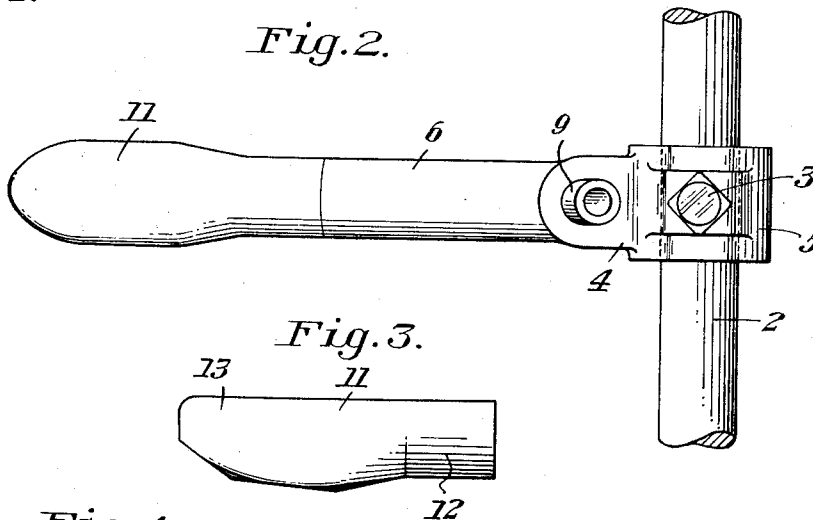


Fig. 3.

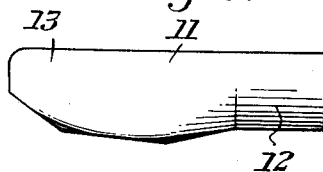


Fig. 4.

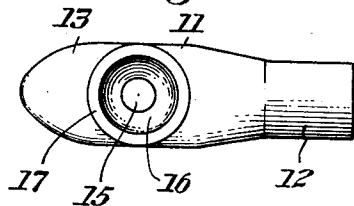
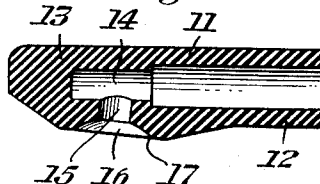


Fig. 5.



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UNITED STATES PATENT OFFICE

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SHEET HANDLING MECHANISM

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Application January 13, 1941, Serial No. 374,276

7 Claims. (Cl. 294—64)

This invention relates to sheet handling mechanism and more particularly to mechanism for automatically and sequentially handling sheets. The invention is primarily intended for use in mechanism for handling sheets in connection with printing upon the sheets and has been successfully embodied in sheet feeders and deliveries.

It is common to employ vacuum or suction in the handling of sheets. Sheet handling devices such as feeders and deliveries for use in connection with printing presses may, for example, employ suckers which are reciprocable to advance sheets sequentially and which are connected with an interruptible source of vacuum. As a sucker or set of suckers moves forward to advance a sheet vacuum is supplied thereto so that the sheet adheres to the sucker or suckers during advance. At the end of the desired advance of the sheet the vacuum is interrupted and the sheet falls free.

Considerable difficulty has been experienced in providing suckers which are satisfactory for various different types of stock. For very thin paper a metal sucker may be satisfactory. For heavy paper and cardboard a metal sucker may not be, and ordinarily is not, satisfactory. It has heretofore been proposed to make a sucker for use in handling heavy paper and cardboard by mounting an apertured rubber foot in a metal body so that the rubber of the foot engages the stock during operation. Such suckers, however, have not always proved reliable and it is found that the rubber foot has to be replaced very frequently due to wear, which is a source of constant annoyance to the operator as well as to the manufacturer of the equipment who is blade for not providing sucker feet with longer lives or something that will eliminate the frequent changing of the rubber sucker feet which heretofore has always been necessary.

I provide sheet handling mechanism which for the first time so far as I am aware solves the problem above referred to and obviates the necessity of frequently changing the rubber sucker feet which have heretofore been provided. I have devised sheet handling mechanism comprising a reciprocable member having a stem and a sucker foot composed entirely of resilient material telescopically connected with the stem. The sucker foot preferably is molded of rubber and is resilient or yieldable as a whole. It preferably extends beyond the supporting stem so that it is resiliently movable in a direction transversely of the axis of the stem. The sucker foot preferably is of such thickness adjacent its head portion where the suction duct terminates as to be comparatively rigid thereat, although flexible as a whole.

I have found in extensive tests that a flexible sucker foot of the type above referred to will outlast a large number of the old sucker feet

which were mounted in metal bodies as above explained. Indeed the wear on my improved sucker foot is virtually negligible. While I cannot be certain as to the reason why this is so, I believe that the long life of my improved sucker foot is contributed to by the fact that it is resilient or flexible as a whole instead of simply being mounted as an insert in or appendage to a metal sucker body. The foot has a desirable amount of yieldability yet is comparatively rigid at the portion where it engages the sheets. When heavy paper or cardboard is being handled the suction draws the stock against the sucker foot with substantial force and I believe that the yieldability of the foot as a whole upon impact by the stock prevents wearing away of the stock engaging surface as fast as with the old type sucker. Also with my improved sucker it is possible to make the material at the portion which engages the stock relatively thick to withstand wear and to allow for very substantial actual wearing away of the material at the surface before the sucker foot has to be replaced. Whereas the old type rubber sucker feet had lives of hours or days my improved sucker feet have lives of months. Not only is the labor of changing the sucker feet largely eliminated but only a very small number of sucker feet need be kept in stock as compared with the large stocks previously needed for replacement purposes. The saving in the cost of sucker feet alone is substantial while the saving in labor is even more important. Also by reason of the elimination of the need of frequently changing the sucker feet there is far less danger of a hurried or careless operator improperly applying a foot which may necessitate stopping of the press and making repairs or adjustments at an inconvenient time.

I also find that my improved sucker feet are more reliable in use than the sucker feet heretofore employed, this apparently being because they are more readily yieldable to bring the face of the sucker foot surrounding the terminus of the suction duct into exact parallelism with the sheet being handled. With the sucker feet heretofore available, if a sheet of cardboard, for example, when drawn toward the sucker should not have its surface next the sucker exactly parallel with the surface of the sucker surrounding the terminus of the suction duct the cardboard might not adhere to the sucker but instead might simply strike one edge of it and tend to wear away the material of the sucker foot.

Other details, objects and advantages of the invention will become apparent as the following description of a present preferred embodiment thereof proceeds.

In the accompanying drawing I have shown a present preferred embodiment of the invention, in which

Figure 1 is a vertical longitudinal cross-section

tional view through a portion of a sheet handling mechanism;

Figure 2 is a top plan view of the mechanism shown in Figure 1;

Figure 3 is an elevational view of a sucker foot;

Figure 4 is a bottom plan view of the sucker foot shown in Figure 3; and

Figure 5 is a central vertical longitudinal cross-sectional view through the sucker foot.

Referring now more particularly to the drawing, the mechanism preferably comprises a reciprocable member which may be in the form of a carriage which is reciprocated by a suitable drive. In Figure 1 there is shown a cross shaft 2 forming a reciprocable member and ordinarily forming a part of a reciprocable carriage. The shaft 2 is reciprocated in the horizontal direction from right to left and vice versa in Figure 1. Fixed to the shaft 2 by a set screw 3 is a sucker body designated generally by reference numeral 4 and which comprises a drilled boss 5 receiving the shaft 2 and through which the set screw 3 passes. The sucker body 4 also comprises a generally horizontal although somewhat downwardly projecting hollow portion 6 within which is inserted a hollow stem 7. The body 4 has therein a suction duct 8 communicating with the stem 7 and into which is threaded a nipple 9 receiving a rubber hose 10. The rubber hose 10 extends to a source of suction which may be a vacuum pump, and means are provided for connecting the source of suction with the hose when desired and cutting off the suction when desired. Such means, which may conveniently comprise a valve forming a portion of the sheet handling mechanism, forms no part of the present invention, so is not described in detail. A plurality of suckers may be applied to the shaft 2 if desired and may operate synchronously, but since the suckers would be duplicates of each other only one is shown.

Applied to the sucker body 4 is a sucker foot 11 which as shown is molded of rubber. It comprises a shank portion 12 and a head portion 13. The stem 7 enters the shank portion 12 and communicates with a suction duct 14 having a lateral branch 15 terminating in an enlargement 16 surrounded by a generally planar surface 17 where the sucker foot engages the stock. Preferably the shank portion 12 of the sucker foot 11 is comparatively thin walled and the head portion 13 is comparatively thick walled. This provides for flexibility of the sucker foot as a whole but imparts to the portion of the sucker foot which engages the stock a desirable rigidity. The branch 15 of the suction duct is offset from, or positioned beyond, the end of the stem 7 so that the head portion of the foot is adapted to yield to a certain extent due to its inherent resiliency when contacted by stock which is drawn thereagainst when the mechanism is in operation. This is believed to result in exceptionally long life of the sucker foot for reasons explained above.

The material at the stock-engaging surface 17 is especially thick so as to withstand the action of the stock thereagainst and to allow for very substantial wearing away of the material before the foot becomes worn to the point where it must be replaced.

Reference numeral 18 indicates a support over which sheets are moved by the sheet handling mechanism and a sheet engaged by the sucker is shown at 19. The sucker or suckers carries the

sheet along the support 18 and when the sheet reaches the delivery point the suction is released and the sheet falls freely upon the support 18. The operation of the sheet handling mechanism as a whole is not materially different from the operation of such mechanisms as have heretofore been employed. The present invention has to do simply with the improved sucker and its application to the mechanism whereby the advantages above pointed out are obtained.

While I have shown and described a present preferred embodiment of the invention it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied within the scope of the following claims.

I claim:

1. A sucker comprising a stem and an elongated rubber sucker foot connected at one end to the stem and having at said end a relatively thin wall and having at its opposite end a head of relatively great wall thickness, the foot having a suction duct therein terminating in said head.

2. A sucker foot comprising an elongated mass of resilient material having a suction duct having a terminus at one end thereof and adapted at said end to be connected with a connecting member, the suction duct having another terminus adjacent the opposite end of the foot non-coaxial with the first mentioned terminus.

3. A sucker foot adapted for connection with a hollow stem, the foot consisting of a mass of resilient material and which as a whole is flexible and which has a suction duct therein adapted at one end to communicate with the stem and at the other end to open outwardly through the foot, the material of the foot being of such thickness adjacent the second mentioned end of the duct as to render the foot substantially rigid at such portion thereof.

4. An elongated sucker foot consisting of a mass of resilient material and which as a whole is flexible and which has a suction duct therein extending from an end of the foot to a lateral opening in the foot, the material of the foot being of such thickness adjacent said opening as to render the foot substantially rigid at such portion thereof.

5. A rubber sucker foot comprising a shank having a suction duct therein and having a relatively thin flexible wall portion and a head connected with the shank and having a suction duct therein communicating with the suction duct in the shank, the head having a relatively thick wall portion surrounding the outer terminus of the suction duct therein.

6. An elongated sucker foot which is transversely flexible having a suction duct having a terminus at one end thereof and adapted at said end to be connected with a connecting member, the suction duct having another terminus adjacent the opposite end of the foot non-coaxial with the first mentioned terminus, the foot being relatively non-resilient adjacent the second mentioned terminus of the suction duct.

7. A sucker comprising a hollow stem and a flexible sucker foot having a suction duct therein connected with the stem, said suction duct having a terminus extending transversely of the stem and disposed beyond the end of the stem, the portion of the foot between the end of the stem and said terminus being resiliently movable transversely of the axis of the stem.

WILLIS ANDREW ROBINSON, Sr.

CERTIFICATE OF CORRECTION.

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Patent No. 2,310,995.

February 16, 1943.

WILLIS ANDREW ROBINSON, SR.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, first column, line 37, for "blade" read --blamed--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 30th day of March, A. D. 1943.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.