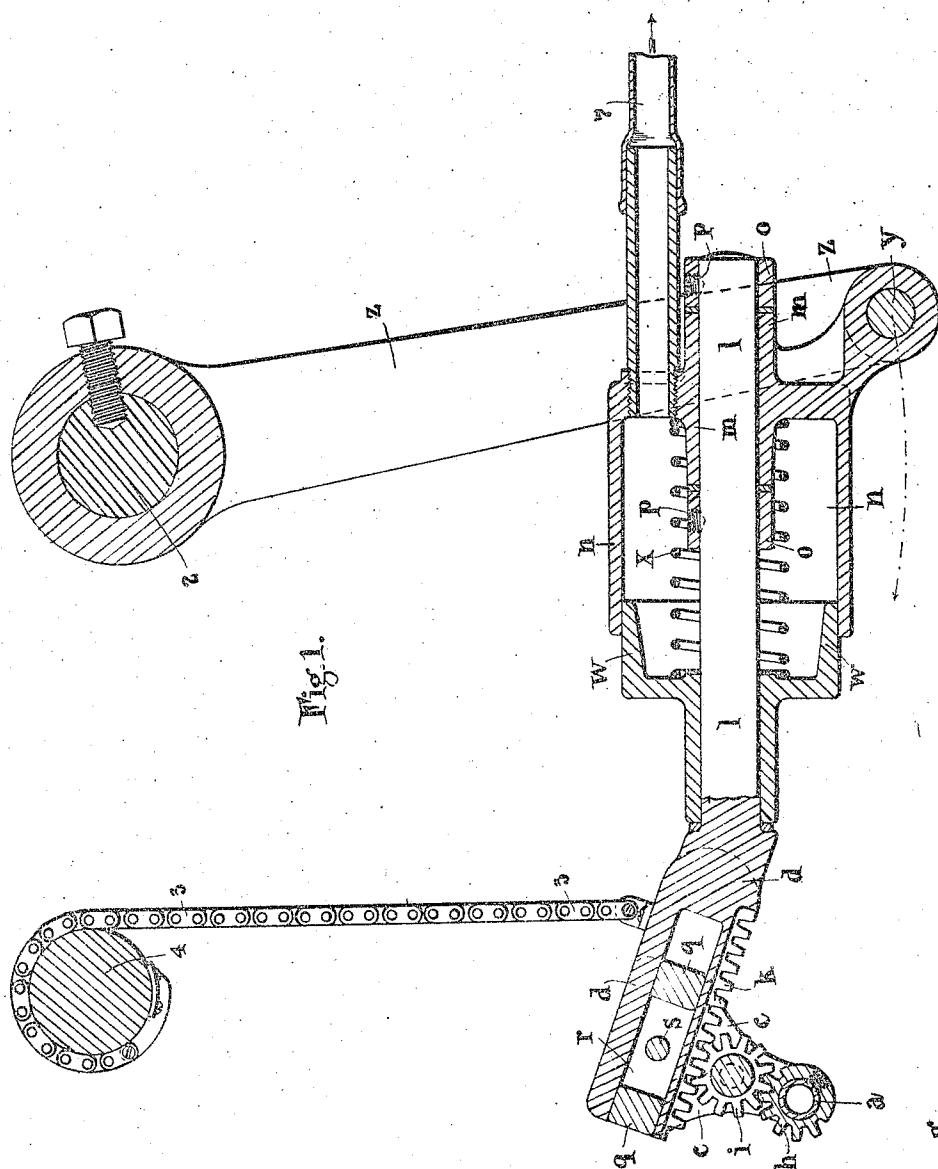


F. W. VICKERY.
 APPARATUS FOR SEPARATING SHEETS OF PAPER OR LIKE MATERIAL.
 APPLICATION FILED JAN. 12, 1909.

956,456.

Patented Apr. 26, 1910.

4 SHEETS—SHEET 1.



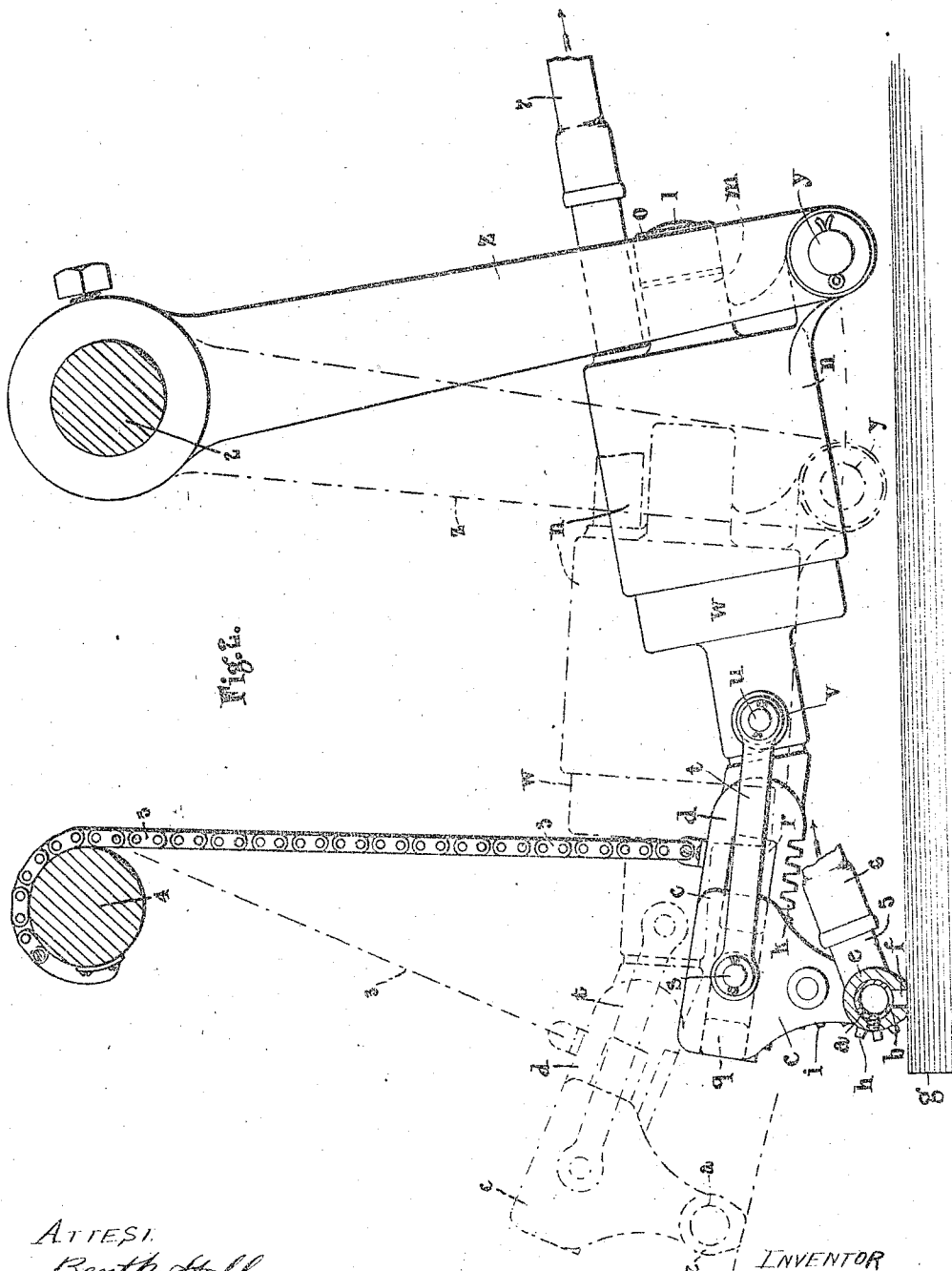
ATTEST
 Bent. McStahl
 Edward N. Sartor

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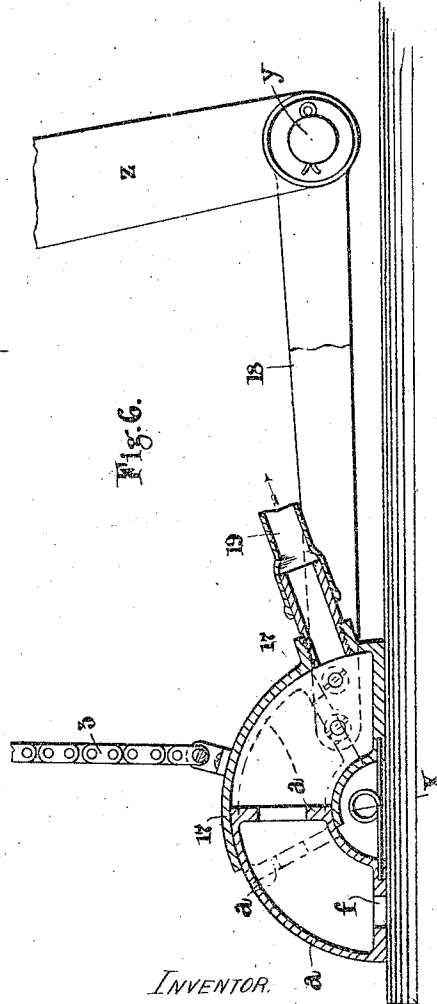
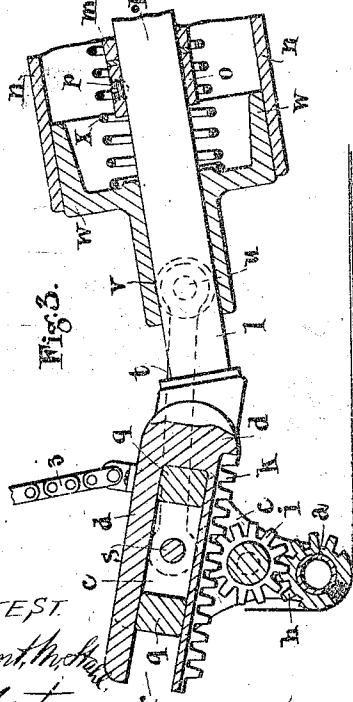
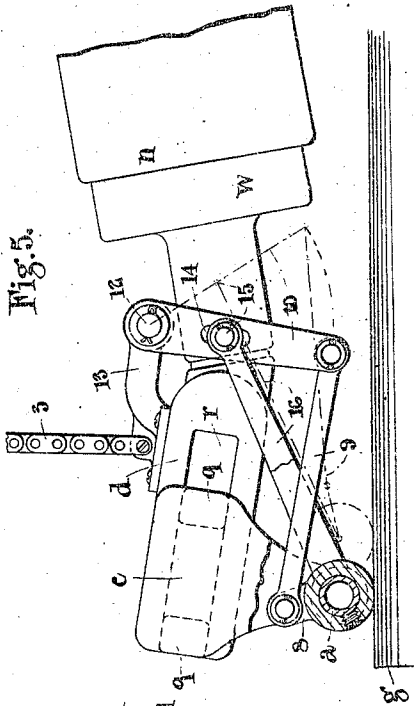
INVENTOR
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 By *Spencer, Middleton, Donaldson & Spencer*
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ATTEST

Bent, Mich.
 Eng. Sartor

INVENTOR.

FREDERICK W. VICKERY.

BY Spear, Middleton, & Associates, Attys.

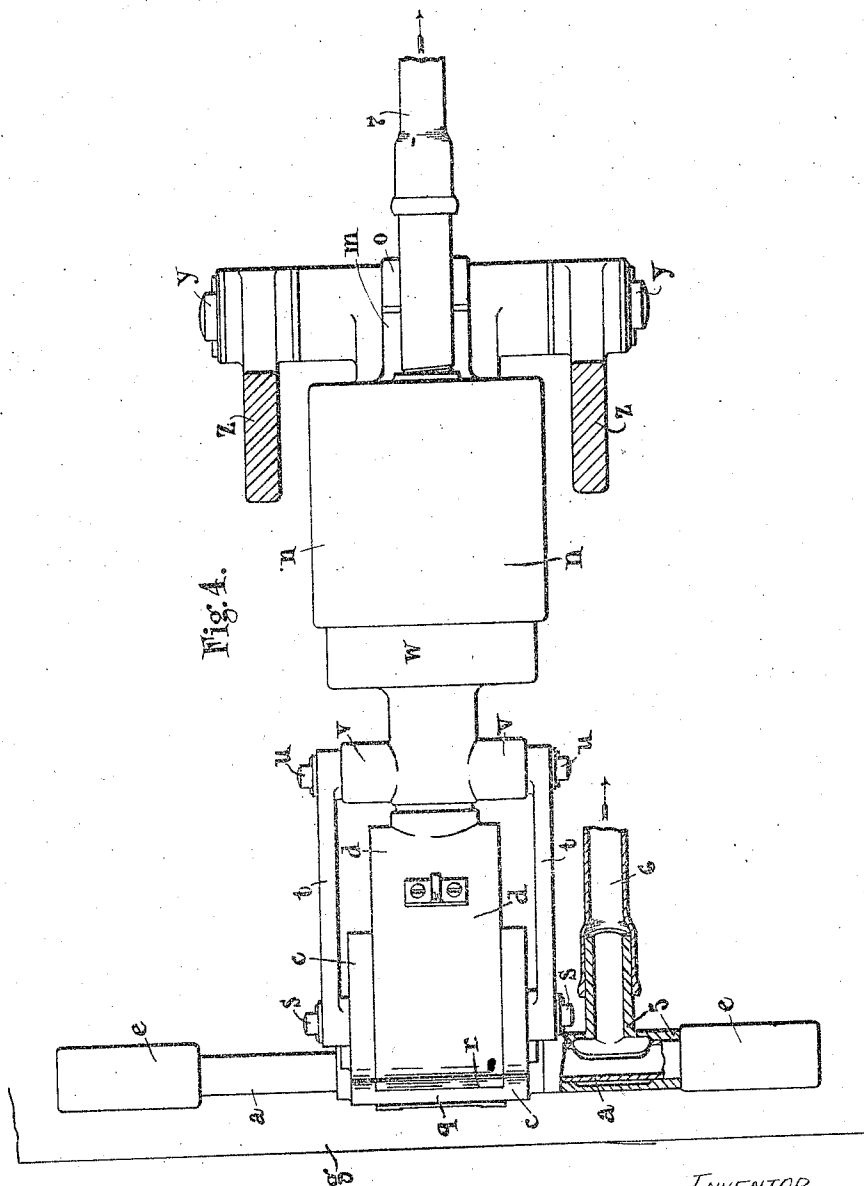
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4 SHEETS—SHEET 4.



ATTEST.

Bent M. Stahl,
Edward M. Sartor

INVENTOR.

FREDERICK W. VICKERY

By Spear, Middlecott, Donaldson & Spear
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UNITED STATES PATENT OFFICE.

FREDERICK WILLIAM VICKERY, OF BUSHEY, ENGLAND, ASSIGNOR TO VICKERY'S PATENTS LIMITED, OF LONDON, ENGLAND.

APPARATUS FOR SEPARATING SHEETS OF PAPER OR LIKE MATERIAL.

956,456.

Specification of Letters Patent.

Patented Apr. 26, 1910.

Application filed January 12, 1909. Serial No. 471,931.

To all whom it may concern:

Be it known that I, FREDERICK WILLIAM VICKERY, a subject of the King of Great Britain and Ireland, and residing at Glenburn, Hillside Road, Bushey, in the county of Hertford, England, have invented certain new and useful Improvements in Apparatus for Separating Sheets of Paper or Like Material, of which the following is a specification.

This invention relates to apparatus for separating sheets of paper, cardboard, and the like, one by one from a pile, and more particularly to apparatus wherein a nozzle connected with an air suction pump, is moved into contact with the top sheet of the pile so that when the sheet thereby closes the orifice or orifices of the nozzle, the ensuing vacuum within a chamber connected with the same pump as the nozzle causes sharp movements to be imparted to the latter to bend the top sheet adhering to it, resulting in separation of this sheet from the second sheet, which latter owing to its elasticity is able to resist the sharp movements, even against adhesion to the first sheet due to electricity or sticky ink, and consequently drops back on the pile. To further insure that the second sheet shall not be raised it has been proposed to use inclined blowing nozzles to blow down on to the pile, the power of the blast not being sufficient to separate the first sheet from the lifting nozzle. Now the apparatus of the above mentioned type has failed in practice either by stretching, creasing, breaking or smearing the paper, and further such have been operated from the sides of the pile of paper necessitating a nozzle bar or tube extending right across the pile, or have otherwise been of such a nature, that the nozzle has been unable to conform to the inequalities or undulations which usually occur in the surface of the pile, so that proper contact between the nozzle and paper has been prevented.

The object of the present invention is to avoid these difficulties and it consists in so arranging the nozzle that when it is sharply moved to bend the paper no relative movement occurs between the surface of the nozzle and the part of the paper in contact with it, and also in independently mounting the nozzle above the pile, so that it is free to

oscillate and adapt itself to the inequalities or undulations of the pile.

The invention also comprises various details hereinafter referred to.

The accompanying drawings illustrate several forms of the invention intended to be used, not only for separating the top sheet, but also for carrying forward the sheet so separated to the feeding tapes or other usual feeding devices of a printing or like machine.

Figure 1 is a sectional side elevation of one form in the raised position preparatory to the nozzle being dropped onto the pile, Fig. 2 being a side elevation of the same showing in full lines the apparatus with the nozzle in section and as dropped onto the pile, the dotted lines indicating the apparatus in the position occupied when the nozzle has raised and is about to release a sheet. Fig. 3 is a detail sectional view, showing the nozzle after it has been sharply moved to bend the top sheet. Fig. 4 is a plan partly in section corresponding to Fig. 1. Figs. 5 and 6 are side elevations of other forms.

In one form of the invention a tubular nozzle *a*, provided with two or more orifices *b*, is freely mounted in brackets *c*, carried by an arm *d*. At the parts where the orifices are formed the nozzle is enlarged or has sleeves *e*, firmly secured to it, the sleeves having orifices *f*, coinciding with the orifices *b*, and being of such a form as to insure good contact with the top sheet of the pile *g*, when upon the same as indicated in Fig. 2. A pinion *h*, is secured to the nozzle *a*, and meshes with an intermediate pinion *i*, which meshes with a rack *k*, formed on the underside of the arm *d*. The pinion *h*, is plain for part of its circumference, which part and the sleeves *e*, are of equal radius to that of the pitch circle of the pinion *h*. The arm *d*, has a rod *l*, preferably formed integral with it and supported in a long bearing *m*, cast on a cylinder *n*. Two collars *o*, secured to the rod *l*, by set screws *p*, prevent longitudinal movement of the rod in its bearing, but it is free to oscillate about its longitudinal axis so as to enable the nozzle to adapt itself to the undulations or unevenness of the pile *g*. The brackets *c*, are united at the top by bars *q*, which

are guided in a slot *r*, in the arm *d*. They are also connected by a cross pin *s*, and links *t*, to a pin *u*, passing through a cross-head *v*, formed on a piston *w*, adapted to slide on the rod *l*, and in the cylinder *n*. A spring *x*, maintains the piston *w*, in the normal position indicated in Fig. 1. The cylinder *m*, is pivoted on a pin *y*, to two rocking levers *z*, carried by a shaft 2, and the apparatus is supported at its other end by a chain 3, attached to the arm *d*, and to a rotary shaft 4. A branch 5, on the nozzle *a*, is connected by a flexible tube 6, to a suitable conduit leading to a vacuum pump or fan, a similar tube 7 also connecting the cylinder *n*, to the same conduit.

The area of the orifices *f* and of the piston *w*, are in such relation that immediately the orifices are closed the ensuing vacuum in the cylinder is sufficient to enable the atmospheric pressure on the outside of the piston to force in the latter, but immediately the orifices are opened again the spring *x*, is able to return the piston to its normal position. Thus assuming that the apparatus has dropped from the position indicated in Fig. 1, to that indicated in Fig. 2, due to a rotation of the shaft 4, and that the orifices *f*, are closed by the top sheet, the piston *w*, is forced into its cylinder *n*, and draws back with it the brackets *c*, relatively to the arm *d*. The pinion *i*, is thereupon rotated by the rack *k*, and rotating the pinion *h*, sharply rotates the nozzle *a*, which bends back the top sheet as indicated in Fig. 3. As the plain part of the pinion *h*, and the sleeves *e*, are of the same radius as that of the pitch circle of the pinion *h*, there is no relative motion between the surfaces of the sleeves *e* in contact with the paper and the latter, that is the peripheral speed of the sleeves is equal to that which would result if they were merely rolled on the paper, so that there is no rubbing or frictional contact, and creasing, breaking and smearing are avoided. After the nozzle has bent the top sheet in the manner described, the shaft 4 winds up the chain 3 and the shaft 2 rocks the levers *z*, forward so that the top sheet is carried forward to the tapes or other usual feeding devices. As this forward motion is nearing completion the vacuum is destroyed by any suitable means so that the spring *x*, returns the piston *w*, and therefore the nozzle *a*, to the positions indicated in dotted lines in Fig. 2 and the sheet is released by the nozzle in an unbent condition. The apparatus is then moved back to the position indicated in Fig. 1 and the operation is repeated.

In another form the nozzle is given the requisite rotary movement by means of a crank 8 Fig. 5, which is connected by a

link 9 to the lower ends of a pair of levers 10, pivoted at their upper ends 12, to a bracket 13, secured to the arm *d*. The levers 10 have slots 14, through which pass pins 15 carried by the piston *w*, and to which the upper ends of links 16 are also pivoted, the lower ends of the links 16 embracing the nozzle *a*. The parts are so proportioned that the rotation imparted to the nozzle is equal to that which it would have if merely rolled on the paper.

In a further form the nozzle *a*, is of bent tubular shape as indicated in Fig. 6 and has an orifice *f*, in its outer end. It is adapted to slide in a corresponding casing 17, carried partly by a pair of links 18 pivoted to a rocking lever *z*, and partly by a chain 3, which lever and chain perform the same functions as the corresponding parts referred to in the modifications previously described. The casing 17 has a flexible connection 19 leading to the vacuum pump; a spring *x*, maintaining the nozzle *a*, in the outer position so long as there is insufficient vacuum to draw it in. When however the nozzle *a*, is dropped onto the top of the pile *g*, and the orifice *f*, is closed, the nozzle is drawn into the casing 17, as indicated in dotted lines, and bends the top sheet. The curvature of the nozzle is struck from a center line situated in the plane of the top sheet when the nozzle is in contact with the latter so that the top sheet is bent about this center line and no relative movement or rubbing contact between the paper and nozzle occurs.

From the above description it will be evident that the invention comprises mechanism capable of bending or giving a sharp movement to the paper or like material, such mechanism being self-contained and capable of having independent bearing upon the pile, operating without putting strain, pressure or friction upon the paper, and requiring one nozzle only, which can be dropped upon the pile at any desired position without any reference to mechanism outside the sides of the pile of paper.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:—

1. Apparatus for successively separating sheets of paper or like material from a pile, comprising a suction nozzle having orifices and adapted to be moved onto the pile with the orifices adjacent to the top sheet thereof for the purpose of attaching said sheet, means for moving the nozzle so as to bend the top sheet adhering to it, the nozzle being of such a form that when so moved no relative movement occurs between the surface of the nozzle and the part of the sheet in contact with it, and means for support-

ing the nozzle adapted to permit universal movement thereof relatively to said support and the pile for the purpose hereinbefore set forth.

5 2. Apparatus for successively separating sheets of paper or like material from a pile, comprising a suction nozzle having orifices and adapted to be moved onto the pile with the orifices adjacent to the top sheet thereof for the purpose of attracting said sheet, means for moving the nozzle so as to bend the top sheet adhering to it, the nozzle being of such a form that when so moved no relative movement occurs between the surface of the nozzle and the part of the sheet in contact with it, means for supporting the nozzle adapted to permit universal movement thereof relatively to said support and the pile, and means for raising the nozzle with the sheet adhering to it.

3. Apparatus for successively separating sheets of paper or like material from a pile, comprising a suction nozzle having orifices and adapted to be moved onto the pile with the orifices adjacent to the top sheet thereof for the purpose of attracting said sheet means for moving the nozzle so as to bend the top sheet, adhering to it, the nozzle being of such a form that when so moved no relative movement occurs between the surface of the nozzle and the part of the sheet in contact with it, means for supporting the nozzle adapted to permit universal movement thereof relatively to said support and the pile, and means for raising and moving forward the nozzle with the sheet adhering to it.

4. Apparatus for successively separating sheets of paper or like material from a pile, comprising a suction nozzle having orifices and adapted to be moved onto the pile with the orifices adjacent to the top sheet thereof for the purpose of attracting said sheet means for imparting a rotary movement to the nozzle, said means and the nozzle being of such form that no relative movement occurs between the paper and the surface of the nozzle in contact with it and means for supporting the nozzle adapted to permit universal movement thereof relatively to said support and the pile.

5. Apparatus for successively separating sheets of paper or like material from a pile, comprising a tubular suction nozzle having orifices, brackets for carrying said nozzle, an arm supporting said brackets adapted to permit relative movement between them and the arm, a rod on the arm, a vacuum cylinder, a bearing thereon for the said rod permitting rotation thereof, a piston in the cylinder, and means intermediate of said piston and the nozzle for imparting a rotary and a rearward movement to the latter on inward

movement of the piston for the purpose hereinbefore set forth.

6. Apparatus for successively separating sheets of paper or like material from a pile, comprising a tubular suction nozzle having orifices, brackets for carrying said nozzle, an arm for supporting said brackets permitting reciprocatory movements of the latter, a rod on the arm, a vacuum cylinder, a bearing on the cylinder for said rod, permitting rotation thereof, a piston and a spring in the cylinder, means for connecting the aforesaid brackets to the piston and means for imparting rotary motion to the nozzle on reciprocations of said brackets by the piston, for the purpose hereinbefore set forth.

7. Apparatus for successively separating sheets of paper or like material from a pile, comprising a tubular suction nozzle having orifices, means for supporting said nozzle permitting universal movement thereof, a vacuum cylinder fitted with a piston, and means intermediate of said piston and nozzle for imparting rotary and reciprocatory movements to said nozzle on reciprocations of the piston, substantially as and for the purpose hereinbefore set forth.

8. Apparatus for successively separating sheets of paper or like material from a pile, comprising a tubular suction nozzle having orifices, means for supporting said nozzle permitting universal movement thereof, a vacuum cylinder fitted with a piston means intermediate of said piston and nozzle for imparting rotary and reciprocatory movements to said nozzle on reciprocations of the piston, a pair of levers to which said cylinder is pivoted, a rock shaft for supporting said levers and means for raising and lowering the aforesaid nozzle, substantially as and for the purpose hereinbefore set forth.

9. Apparatus for successively separating sheets of paper or like material from a pile, comprising a suction nozzle having orifices, brackets for supporting said nozzle, bars connecting said brackets, an arm having a slot for receiving said bars, a vacuum cylinder, a piston and a spring therein, links connecting the piston and the brackets, a rod on the arm, a bearing for the same on the cylinder permitting rotation of said rod, rack teeth on the arm, a pinion on the aforesaid nozzle, and an intermediate pinion meshing therewith and with the said rack teeth, substantially as and for the purpose hereinbefore set forth.

10. Apparatus for successively separating sheets of paper or like material from a pile, comprising a suction nozzle having orifices, brackets for supporting said nozzle, bars connecting said brackets, an arm having a slot for receiving said bars, a vacuum cylinder, a piston and a spring therein, links con-

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the arm, a bearing for the same on the cylin-
der permitting rotation of said rod, rack
teeth on the arm, a pinion on the aforesaid
5 nozzle, an intermediate pinion meshing
therewith and with the said rack teeth, a
shaft, a chain attached at one end thereto
and at the other end to the aforesaid arm,
a pair of levers to which the aforesaid cyl-

inder is pivoted and a rock shaft supporting 10
said levers, substantially as and for the pur-
pose hereinbefore set forth.

In testimony whereof, I affix my signature
in presence of two witnesses.

FREDERICK WILLIAM VICKERY.

Witnesses:

H. D. JAMESON,

A. NUTTING.