No. 615,817. Patented Dec. 13, 1898.

T. C. DEXTER.

SHEET SEPARATOR FOR PAPER FEEDING MACHINES.

(No Model.) (Application filed Aug. 4, 1897.)

Fig. 1.

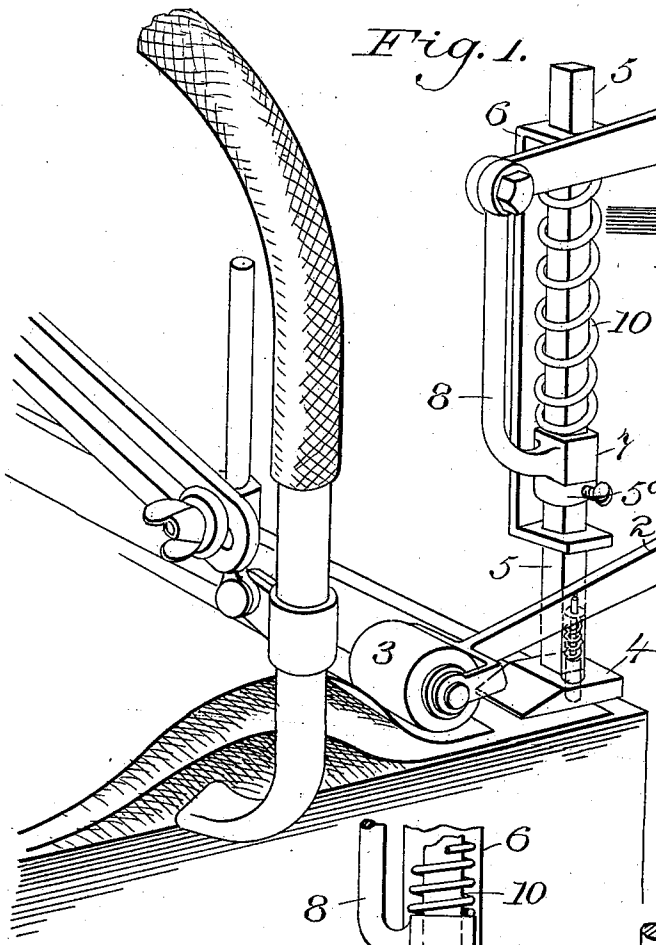


Fig. 2.

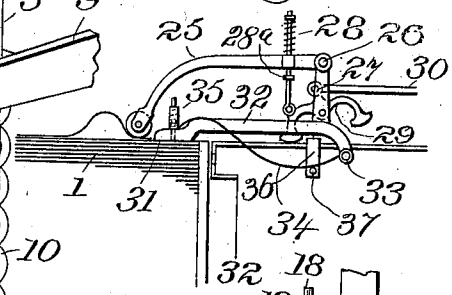


Fig. 3.

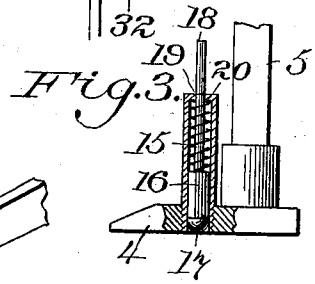


Fig. 4.

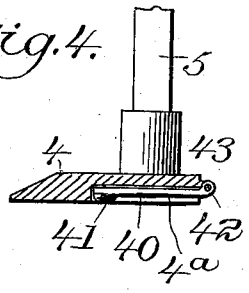


Fig. 5.

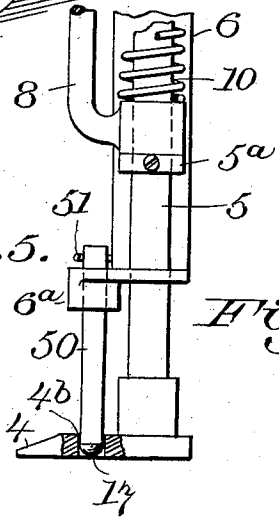
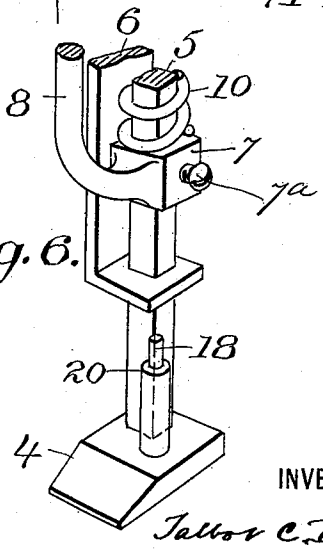


Fig. 6.



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UNITED STATES PATENT OFFICE.

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SHEET-SEPARATOR FOR PAPER-FEEDING MACHINES.

SPECIFICATION forming part of Letters Patent No. 615,817, dated December 13, 1898.

Application filed August 4, 1897. Serial No. 647,014. (No model.)

To all whom it may concern:

Be it known that I, TALBOT C. DEXTER, a citizen of the United States, residing at Pearl River, in the county of Rockland and State of New York, have invented certain new and useful Improvements in Sheet-Separators for Paper-Feeding Machines, of which the following is a specification.

My invention relates to improvements in paper-feeding machines of the buckling type in which the successive sheets of paper in an adjustably-supported pile are buckled and separated from the pile and then fed off from the pile to a printing-press, paper folding or ruling machine, or other machine designed to operate upon the paper.

Sheet-separating buckling devices as now commonly constructed consist of a buckling-finger having frictional engagement with the top sheet of a pile and a holding-down finger which is adapted to clamp the edge of the pile immediately after the top sheet is buckled for holding the pile while the separated sheet is fed off. It frequently happens that such buckling devices buckle more than one sheet at one time, and hence the two or more buckled or separated sheets will start off from the pile and will pass to the folder, ruling-machine, printing-press, or other machine unless the feeding-machine is provided with some mechanism for separating them or arresting their movement from the pile. This defect in sheet-buckling devices is usually counteracted by providing the feeding-machine with some form of sheet-separator at its delivery end and with an automatic stop mechanism, which will arrest the operation of the feeder in case of failure of the separator to separate the two or more sheets which were started forward by the buckling devices.

Feeding-machines with separators at their delivery ends have been practically used for separating and feeding sheets from a pile; but such machines cannot be considered an ideal form of sheet-feeding machines, because the employment of the delivery-separators is an indication of the imperfection of the buckling devices, inasmuch as they are for no other purpose than to correct the mistakes or inaccuracies of the sheet-buckling devices, which start the separation and feed of the sheets from the pile.

I propose to improve and simplify the structure and operation of sheet separating and feeding machines of the buckler type by combining with the sheet-buckling mechanism an auxiliary frictional device which will rest constantly upon the pile of sheets adjacent to the holding-down finger and exert sufficient frictional resistance upon any under sheets which may be partially separated from the pile by the buckling-finger to prevent such under sheets being completely buckled and separated and fed off with the top sheet. With such a device I remove the imperfection of the buckling device and render it impossible for the buckling device to separate and start off from the pile more than one sheet at one time, thereby obviating to a large extent the need of a sheet-separator at the delivery end of the machine.

The preferred form of my improved auxiliary frictional device, which I combine with the buckling device, comprises a small rod or finger supported upon or adjacent to the holding-down finger and carrying a small block or pad of soft rubber, which rests upon the top of the pile of sheets constantly. The holding-down finger is preferably constantly in engagement with the top of the pile of sheets, being actuated by suitable spring-pressure for clamping the pile in position and the pressure of the spring being intermittently released to allow the buckling of a sheet. The form of the holding-down finger may, however, be changed without departing from the scope of my invention; but whether the holding-down finger is constantly in engagement with the pile or only engages the pile intermittently the auxiliary frictional device is always in contact with the pile.

In order that my invention may be fully understood, I will first describe the same with reference to the accompanying drawings and afterward point out the novelty with more particularity in the annexed claims.

In said drawings, Figure 1 is a perspective view of a portion of a pile of sheets and a sheet-separating buckling device in operative position with relation thereto and having my auxiliary frictional device combined therewith. Fig. 2 is a detail elevation showing a slightly-different form of buckling device having my auxiliary attachment applied

thereto. Fig. 3 is a detail sectional elevation of the holding-down finger shown in Fig. 1, having my improved auxiliary frictional device applied thereto. Figs. 4 and 5 are detail sectional elevations of slight modifications. Fig. 6 is a detail perspective view of a further modification.

1 represents a pile of sheets adapted to be supported upon any suitable table or platform, which I have not thought necessary to illustrate.

2 is a buckling-finger having the rubber-faced friction-roll 3 clamped in its free end.

4 is a holding-down finger rigidly secured to the lower end of the vertically-movable rod 5, which rod 5 is freely supported in the bracket 6, mounted upon the stationary part of the machine-frame.

7 is a sliding head loosely mounted upon the rod 5 above the collar 5^a, secured to the rod, and 8 is an arm formed integral with and projecting upwardly from the head 7 and pivotally connected to a lever 9, which is operated by means of a cam or other suitable device, (not shown,) as fully explained in my pending application, Serial No. 617,263, hereinafter referred to.

10 is a spiral spring surrounding the rod 5 and confined between the sliding head 7 and the upper flange of the bracket 6, said spring tending to force the head 7 into engagement with collar 5^a and therethrough the holding-down finger 4 into engagement with the pile for clamping it in position. The finger 4 rests constantly upon the pile, but the spring-pressure is intermittently applied and removed.

The buckling-finger and holding-down finger, as far as above described, are constructed and operated as fully illustrated and described in my application filed December 28, 1896, Serial No. 617,263, covering improvements in paper-feeding machines, and I refer to said application for a fuller illustration of the exact structure and operation of said parts as the structure and operation have nothing to do with my present invention.

The holding-down finger 4, as shown more clearly in Fig. 3, has an opening bored vertically through it, in which is seated a tubular support 15. In the tubular support 15 is loosely mounted a cylindrical head 16, carrying at its lower end a small pad or block 17 of soft rubber, and a rod 18, projecting from its upper end through a central guide-opening 19 in the top of the tubular support 15.

20 is a delicate spiral spring surrounding the rod 18 and confined between the upper end of the tubular support 15 and the head 16, said spring holding the head 16 downwardly with a delicate pressure, so as to keep the rubber pad or block 17 constantly in engagement with the surface of the pile irrespective of the position of the holding-down finger, upon which the tubular support 15 is mounted. The head 16, carrying the rubber block or pad 17, constitutes the auxiliary frictional device which coöperates with the holding-down finger and prevents the buckling and separation from the pile of more than one sheet at one time.

The auxiliary frictional device has less frictional hold upon the sheets than the buckler, and hence will not interfere with the buckling of the top sheet, but will have sufficient frictional hold upon any under sheets to overcome the adhesion between the top sheet and said under sheets. It will be observed that the holding-down finger operates at or near the edge of the pile of the sheets, and the frictional buckling-finger is located farther in from the edge and operates away from the edge and holding-down finger to withdraw the edges of the successive top sheets from under the holding-down finger, while the auxiliary frictional holding device is located to engage the pile behind the inner edge of the holding-down finger, so that any under sheets which start off with the top sheet will be engaged at their edges by said auxiliary device before they get from under the holding-down finger.

In Fig. 2 I have shown the form of buckling device illustrated in my application filed June 12, 1896, Serial No. 595,373, for improvements in paper-feeding machines. This buckling device comprises a reciprocating buckling-finger 25, pivoted at 26 to a reciprocating head 27 and having a spring pressure device 28, controlled by double-armed rocking lever 29, to which the operating-rod 30 is connected. The holding-down finger 31 is mounted upon the end of a long lever 32, pivoted at 33 and held in engagement with the pile 1 by means of a spring 34. 35 represents my auxiliary frictional attachment, which may be constructed as already described. The spring 34 is attached to the journal 33 and engages the holding-down finger 31 at its forward end. 36 is an arm projecting from the reciprocating head 27 and formed with a downwardly-extending portion, which supports a pin 37 directly beneath the spring 34. In Fig. 2 the buckling device is shown in the position it assumes at the completion of the forward buckling stroke, the top sheet being withdrawn from under the holding-down finger by the buckling-finger. In this position the pressure of the spring 34 upon holding-down finger 31 is removed by the engagement of pin 37 under the spring, tending to lift the spring slightly and allowing the holding-down finger 31 and auxiliary device 35 to rest upon the pile by their own weight. Upon the reverse movement of the reciprocating head 27 the buckling-finger 25 is elevated from the pile by reason of the rocking of the three-armed lever 29 and the engagement of collar 28^a of the spring pressure device 28 with the buckling-finger, and the head 27 moves backwardly to return buckling-finger 25 to initial position and at the same time cause the pin 37 to disengage the spring 34 to allow said spring to reapply its pressure to the holding-

down finger 31 for holding the pile intact while the top buckled sheet is drawn from the pile by the feeding-off device. For a further description and illustration of this form of buckling device reference is made to said application Serial No. 595,373.

In Fig. 4 I have shown the holding-down finger 4 at the lower end of the rod 5 formed with a longitudinal groove 4^a, cut in its lower face, in which is mounted an auxiliary arm 40, carrying at its forward free end a small rubber pad or block 41 and pivoted at its rear end upon a pin 42, mounted in brackets 43 at the rear edge of the holding-down finger. This form of the device operates in practically the same manner as the form illustrated in Figs. 1 and 3, the lever-arm 40 moving freely upon its pivot 42 to keep the rubber pad 41 constantly in contact with the top sheet of the pile.

In Fig. 5 I have shown the auxiliary frictional device in the form of a rod 50, passing freely through an opening 4^b in the holding-down finger 4 and through an opening in a bracket-arm 6^a of the bracket 6, the rod 50 having a pin or other device 51 at its upper end to prevent its falling out of position in the absence of a pile of sheets, and the soft-rubber pad or block 17 at its lower end, which rests upon the pile of sheets.

In Fig. 6 I have shown part of a modified form of buckling device in which the holding-down finger 4 is intermittently raised and lowered to allow the buckling-finger to buckle the top sheet of the pile. The only difference between this form of device and the form shown in Fig. 1 is that the head 7, from which the operating-arm 8 extends, is rigidly clamped to the rod 5 by means of a set-screw or other similar device 7^a, the lower end of the spring 10 resting against the head 7 and by its pressure thereon tending to throw the holding-down finger 4 into engagement with the pile. In this form of the device the operating mechanism will cause the holding-down finger 4 to be elevated from the pile when the buckling-finger 2 moves forward to buckle the sheet, the auxiliary frictional device resting constantly in engagement with the pile whether the holding-down finger 4 is in elevated or depressed position. It will be observed that in the form shown in Fig. 1 the pressure of the spring upon the holding-down finger is removed without elevating the finger.

The operation of my improved sheet separating and buckling device will be clear with but few words of explanation. When the buckling-finger 3 is moved forward to buckle a sheet, the spring-pressure is released from the holding-down finger 4 without elevating said finger to allow the edge of the top sheet to be drawn out from under it, and the pressure is again applied to the holding-down finger immediately after the edge of the top sheet is free. The auxiliary frictional device rests constantly upon the pile of sheets, and should more than one sheet start forward under the action of the buckling-finger the under sheet or sheets will necessarily project a little in the rear of the edge of the top sheet by reason of the buckle, and this will allow the soft-rubber pad or block of the auxiliary device to come into engagement with the under sheet or sheets and exert sufficient frictional resistance upon them to arrest their movement and allow the top sheet, under the effective frictional engagement of the buckling-finger, to be separately buckled and separated from the pile. The auxiliary frictional device will hold the under sheet or sheets under the holding-down finger till the spring-pressure is again applied, when they will be firmly clamped and held upon the pile while the top sheet is being fed off under the action of suitable feeding-off devices, which have not been illustrated, but which may be of any suitable construction, such as illustrated in my above-named applications.

Having thus fully described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. The combination, in a paper-feeding machine, of a support for a pile of sheets, a holding-down or pile-retaining finger arranged near one edge of the pile, a frictional sheet-buckling finger operating away from the edge of the pile for withdrawing sheets from under the holding-down finger, and an auxiliary frictional device of less frictional capacity than the buckling-finger, said auxiliary device being supported adjacent to the holding-down finger and frictionally engaging the pile behind the inner edge of the holding-down finger in readiness to engage the edges of the under sheets to prevent more than one sheet being buckled at one time, as set forth.

2. The combination, in a paper-feeding machine, of a support for a pile of sheets, a frictional sheet-buckling finger, a holding-down or pile-retaining finger, and an auxiliary friction device, of less frictional capacity than the buckling-finger, arranged to frictionally engage the pile adjacent to the holding-down finger while the buckling-finger is buckling a sheet and adapted to prevent more than one sheet being buckled at one time, as set forth.

3. The combination, in a paper-feeding machine, of a support for a pile of sheets, a pile-retaining finger arranged to engage and hold the pile intact, a frictional sheet-moving instrument adapted to engage the top sheet of the pile and move it out of the engagement of the pile-retaining finger, and an auxiliary frictional device, of less frictional capacity than the sheet-moving instrument, arranged to frictionally engage the pile adjacent to the pile-retaining finger and prevent any under sheet or sheets moving from beneath the pile-retaining finger with the top sheet under the operation of the sheet-moving instrument, substantially as set forth.

4. The combination, in a paper-feeding machine, of a support for a pile of sheets, a sheet-

buckling finger, a holding-down or pile-retaining finger, means for forcing the holding-down finger against the pile and releasing its pressure upon the pile, and an auxiliary friction device resting constantly upon the pile adjacent to the holding-down finger and exerting sufficient friction upon the under sheets when the top sheet is buckled to prevent the buckling of more than one sheet, as set forth.

5. The combination, in a paper-feeding machine, of a support for a pile of sheets, a reciprocating sheet-buckling finger, a spring-pressed holding-down finger, means for removing the spring-pressure from the holding-down finger, to allow a sheet to be buckled, and an auxiliary frictional device resting constantly upon the pile adjacent to the holding-down finger in readiness to engage the edges of the under sheets to prevent the buckling of more than one sheet at one time, substantially as set forth.

6. The combination of a support for a pile of sheets, a holding-down finger, a reciprocating frictional buckling-finger, and an auxiliary frictional holding device of less frictional capacity than the buckling device provided with a light spring and resting constantly upon the surface of the pile with a yielding pressure, adjacent to the holding-down finger in readiness to engage the edges of the under sheets to prevent buckling more than one sheet, as set forth.

7. The combination, in a paper-feeding machine, of a support for a pile of sheets, a buckling-finger, a holding-down finger and an auxiliary frictional device supported by the holding-down finger and adapted to rest constantly upon the pile in readiness to engage the edges of the under sheets to prevent buckling more than one sheet at a time, substantially as set forth.

8. The combination, in a paper-feeding machine, of a support for a pile of sheets, a buckling-finger, a holding-down finger, and an auxiliary friction device provided with a small pad of soft rubber which rests constantly upon the pile of sheets adjacent to the holding-down finger, substantially as set forth.

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