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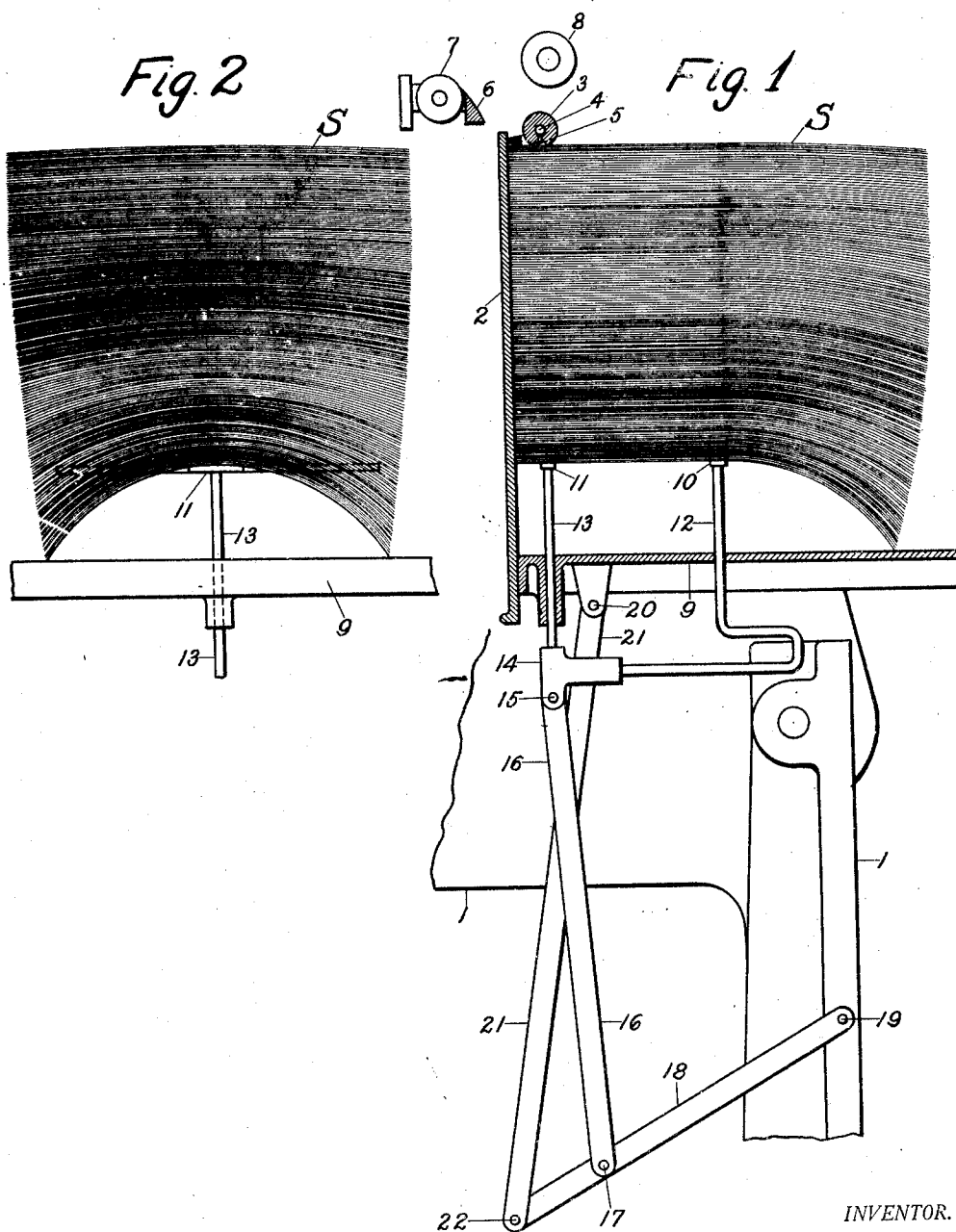
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J. W. BAKER

SHEET FEEDING APPARATUS

Filed Jan. 28, 1925

2 Sheets-Sheet 1



INVENTOR.

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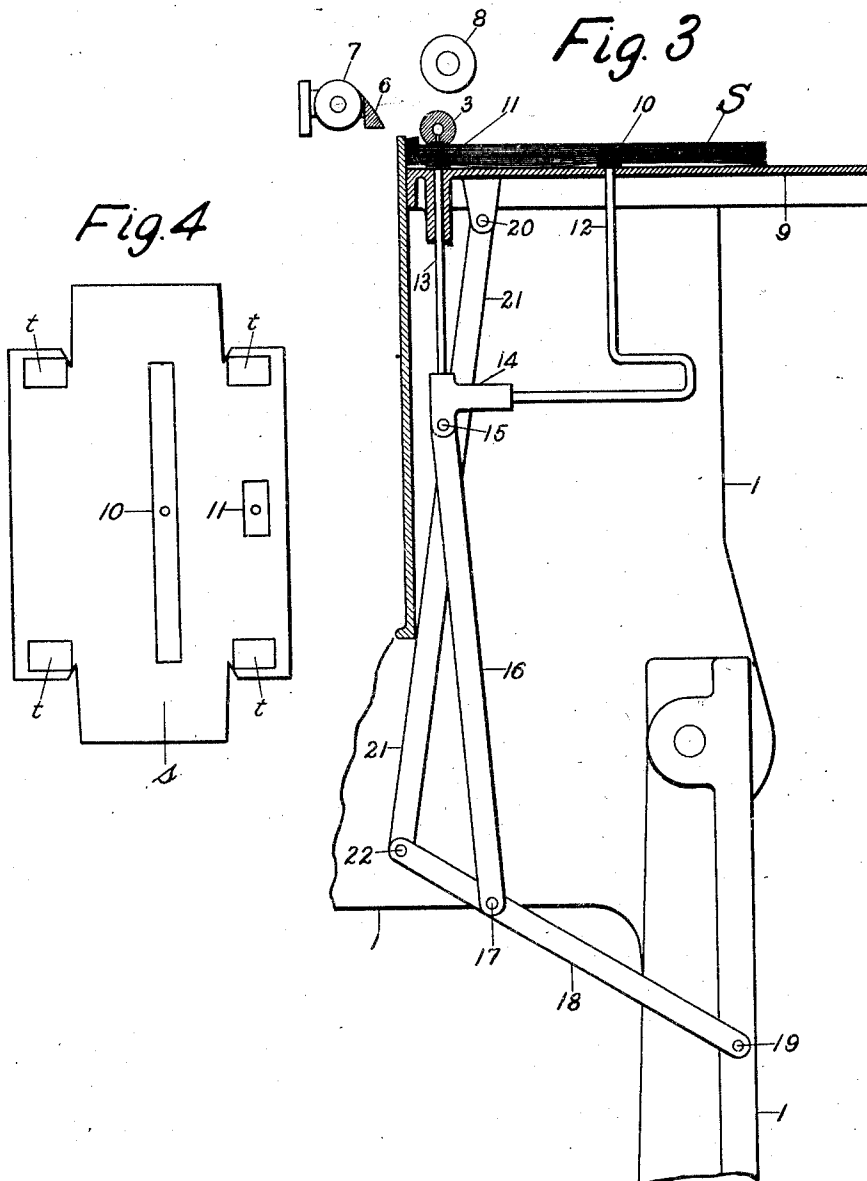
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

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SHEET-FEEDING APPARATUS.

Application filed January 28, 1925. Serial No. 5,208.

My invention relates to the feeding of sheets, as of paper or other material, to any destination, for example, to adhesive-applying apparatus; and more particularly to the maintenance of the top of a stack or pile of sheets substantially flat, at least throughout a considerable portion of the upper face thereof, to ensure proper positioning with respect to the means which picks up and withdraws the sheets in succession from the stack.

When sheets of ununiform thickness, as when embossed over a portion of their area, or when provided locally with reinforcing elements or tabs, are disposed in a stack or pile and fed in succession from the top thereof, there occurs sagging of the stack between the areas of greater thickness, with the result that the upper surface or top of the stack from which the sheets are withdrawn in succession is bowed, or departs from a plane or flat position, or is otherwise unsuitable to effect co-operation with the sheet-picking and withdrawing means.

In accordance with my invention, the aforesaid difficulty is overcome by supporting the stack in substantially vertical alignment with the sheet-picking and withdrawing means and further at a region more remote therefrom to cause the top face of the stack, or at least a substantial portion thereof adjacent the sheet-picking and withdrawing means, to lie substantially flat, and by feeding the stack upwardly and following it by a table or support which, when the stack has been materially reduced in thickness, supports and elevates the remainder of the stack.

My invention resides in the method and structure of the character hereinafter described and claimed.

For an understanding of my method and for an illustration of one of the various forms my apparatus may take, reference is to be had to the accompanying drawings, in which:

Fig. 1 is a side elevational view, partly in vertical section, of apparatus embodying my invention.

Fig. 2 is a fragmentary end elevational view of the stack and supporting means therefor.

Fig. 3 is a view similar to Fig. 1, with the parts in the position they occupy when the stack has been materially reduced in height.

Fig. 4 is a bottom plan view of a sheet and its supporting members.

Referring first to Fig. 4, there is shown in

plan a sheet *s*, of paper or other material, whose thickness is not uniform. This lack of uniformity of thickness may be due to various causes, such as embossing upon a portion of the surface of the sheet *s*, or, as indicated, the application thereto of reinforcing elements or tabs *t*, which latter are employed, for example, to reinforce those portions of the sheet *s*, when used for wrapping or covering boxes, which are lapped around the corners of the boxes.

A stack of sheets of this character will sag between the areas of greater thickness, with the result that the top face of the stack will not lie flat or plane and will prevent or at least render difficult the picking and selection of sheets from the top of a stack by a suction roller or equivalent sheet-picking and withdrawing means.

To overcome this difficulty, the stack is supported at its bottom by engagement therewith of localized supporting members which are fed upwardly as the stack diminishes in thickness, and eventually, when the stack is reduced to suitably small height, is picked up or supported by a table, whereafter the sheets may be removed in succession from the stack until the last sheet has been fed from the table.

Referring to Figs. 1 to 3 inclusive, there is fixed upon the main frame 1 the front plate or stop 2, against which abuts the forward end or edge of the stack *S* of superposed sheets *s*.

The top or upper feeding surface of the stack *S* is maintained at a substantially constant height, so that there may co-operate therewith any suitable sheet-picking and withdrawing means, such, for example, as the suction roller 3, whose bore 4 is in communication with a vacuum pump and with the cup or recess 5 in its periphery, in communication with the passage 4, for sucking up into contact with the roller 3 the uppermost sheet of the stack. The roller 3, by virtue of suitable mechanism, not shown, then transports the picked-up sheet and delivers it on to the guide or tongue 6 when the latter, together with the feed roller 7, has been moved from left toward the right to position to bring the roller 7 into contact with the driven feed roller 8, to thereafter further advance the selected sheet. The movements of roller 3, tongue 6 and roller 7 may be effected by structure of the character disclosed in Nitsch and Baker

application Serial No. 3,316, filed January 19, 1925.

The stack-supporting table 9, by suitable mechanism, not shown, is fed upwardly in
5 accord with diminution of the height of the stack S.

At the beginning, or when the stack S has considerable height, it does not rest directly upon the table 9, but is supported indirectly
10 thereby upon the supporting members 10 and 11, indicated in plan in Fig. 4. The support 10 is disposed at a suitable distance from the support 11, which latter is preferably disposed in substantially vertical alignment
15 with the suction roll 3 when in position to pick up the uppermost sheet of the stack. The supporting members 10 and 11 are carried, respectively, upon the vertically extending bars 12 and 13, extending freely
20 through apertures in the table 9 and carried by the member 14, to which is pivoted at 15 the link 16, in turn pivoted at 17 to the link 18 pivoted to the base 1 at 19. Pivoted to the table 9 at 20 is the link 21, pivoted to the
25 link 18 at 22.

The lengths of the links 16, 18 and 21 are so related to each other in conjunction with the relative positions of the pivots 15, 17, 19, 20 and 22 that the supporting members 10 and
30 11 are fed upwardly by the upward movement of the table 9, but at a suitable lower rate such that when the number of sheets in the stack S has become relatively small by successive feeding of sheets therefrom, the
35 stack is no longer directly supported by the members 10 and 11, but is supported by the table 9, Fig. 3, which then suffices to maintain the upper surface of the stack suitably plane or level to effect the desired pick-up and
40 sheet-feeding operations.

By the operation described, the upper face of the stack S, and particularly that portion thereof with which the suction roller 3 or equivalent co-acts, is maintained substantially
45 ly plane or level throughout the decrease in height of the stack consequent upon removal of the sheets therefrom.

What I claim is:

1. In the art of feeding sheets of ununiform
50 thickness from the top of a stack thereof wherein the uniform arrangement of the sheets gives to the stack different heights in different vertically disposed regions, the step of supporting the stack when of considerable
55 thickness at its bottom substantially solely in a region of minor stack height to effect at its top a predetermined feeding formation.

2. In the art of feedingsheets of ununiform thickness from the top of a stack thereof
60 wherein the uniform arrangement of the sheets gives to the stack different heights in different vertically disposed regions, the step of supporting the stack when of considerable thickness at its bottom substantially solely
65 in a region of minor stack height to effect at

its top a localized substantially flat feeding surface.

3. In the art of feeding sheets having reinforcing tabs adhering thereto from the top of a stack thereof wherein the uniform arrangement of the sheets and tabs gives to the
70 stack greater height only in the vertically disposed regions occupied by the tabs, the method which comprises locally supporting the stack at its bottom in a plurality of
75 regions removed from the regions occupied by said tabs, and raising the stack by applying forces only in the regions removed from said tabs.

4. In the art of feeding sheets having reinforcing tabs adhering thereto from the top of a stack thereof wherein the uniform arrangement of the sheets and tabs gives to the stack greater height only in the vertically disposed
80 regions occupied by the tabs, the method which comprises locally supporting the stack at its bottom in a plurality of regions removed from the regions occupied by said tabs, raising the stack by applying forces
85 only in the regions removed from said tabs, and after substantial reduction of height of the stack supporting it over a greater area of its bottom.

5. In the art of feeding sheets of ununiform thickness from the top of a stack thereof, the
90 method which comprises locally supporting the stack at its bottom to effect at its top a predetermined feeding formation, feeding the stack upwardly, and after substantial reduction of height of the stack supporting it
100 over a greater area of its bottom.

6. In the art of feeding sheets of ununiform thickness from the top of a stack thereof, the method which comprises locally supporting the stack at its bottom at a plurality of separate
105 areas to effect at its top a predetermined feeding formation, feeding the stack upwardly, and after substantial reduction of height of the stack supporting it over a greater area of its bottom.

7. Sheet-feeding apparatus for feeding upwardly a stack of sheets of ununiform thickness wherein the uniform arrangement of the sheets gives to the stack different heights in different regions comprising interdependent
110 members for locally supporting the stack at its bottom in regions of minor stack height, and means for feeding such members upwardly simultaneously at substantially the same speed.

8. Sheet-feeding apparatus comprising means for locally supporting the bottom of a stack of sheets of ununiform thickness to effect at the top of the stack a predetermined feeding formation, and an upwardly moving
125 support for the bottom of the stack controlling the upward movement of said supporting means with respect to said support.

9. Sheet-feeding apparatus comprising means for locally supporting the bottom of a
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stack of sheets of ununiform thickness to effect at the top of the stack a predetermined feeding formation, an upwardly movable support for the bottom of the stack, and means for feeding upwardly said supporting means at a rate slower than the rate of upward movement of said support.

10. Sheet-feeding apparatus comprising means for locally supporting the bottom of a stack of sheets of ununiform thickness to effect at the top of the stack a predetermined feeding formation, an upwardly movable support for the bottom of the stack, and means for supporting said supporting means upon said support and for feeding said supporting means upwardly at a rate slower than the rate of upward movement of said support.

11. Sheet-feeding apparatus comprising means for locally supporting the bottom of a stack of sheets of ununiform thickness to effect at the top of the stack a predetermined feeding formation, an upwardly moving support for the bottom of the stack, a fixed member, and links connecting said support and said supporting means to each other and to said fixed member for effecting predetermined difference in rate of upward movements of said support and said supporting means.

12. Sheet-feeding apparatus comprising means for locally supporting the bottom of a stack of sheets of ununiform thickness to effect at the top of the stack a predetermined feeding formation, an upwardly moving support for the bottom of the stack, a fixed member, a link pivoted to said fixed member, and links pivoted, respectively, to said supporting means and said support and to said link for effecting upward movement of said supporting means at a different rate from that of said support.

13. Sheet-feeding apparatus comprising means for locally supporting the bottom of a stack of sheets of ununiform thickness to effect at the top of the stack a substantially flat facial area, means for feeding said supporting means upwardly, a suction member

co-acting with said substantially flat area for removing sheets from the stack, and a support for the bottom of the stack moving upwardly at a rate greater than the upward movement of said feeding means.

14. Sheet-feeding apparatus for feeding upwardly a stack of sheets of ununiform thickness wherein the uniform arrangement of the sheets gives to the stack different heights in different regions, comprising a member for supporting the stack at its bottom, substantially solely in a region of minor stack height, and means for feeding said member upwardly.

15. Sheet-feeding apparatus for feeding upwardly a stack of sheets of ununiform thickness wherein the uniform arrangement of the sheets gives to the stack different heights in different regions, comprising a member for locally supporting the stack at its bottom in a region of minor stack height, and an upwardly moving support for the bottom of a stack having a predetermined position with respect to said member for each position thereof.

16. In the art of feeding substantially identical sheets, each having portions of its surface in different planes, from the top of a stack thereof wherein the uniform arrangement of sheets gives to the stack different heights in different vertically disposed regions, the step of locally supporting the stack at its bottom in a region of minor stack height, and raising the stack by applying force thereto substantially solely in said region.

17. Sheet-feeding apparatus for feeding upwardly a stack of sheets having reinforcing tabs adhering thereto wherein the uniform arrangement of the sheets and tabs gives greater height to the stack in the vertically disposed regions occupied by said tabs, comprising structure for locally supporting the stack in a region removed from said tabs, and means for feeding said structure upwardly.

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