United States Patent

Gadler

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[54] **TRANSFER DEVICE FOR USE IN CUTTING UNITS FOR PAPER SHEETS**

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[51] **Int. Cl.**.....**B65g 59/02**

[58] **Field of Search**.....214/8.5 SS, 8.5 A, 8.5 R

[56] **References Cited**

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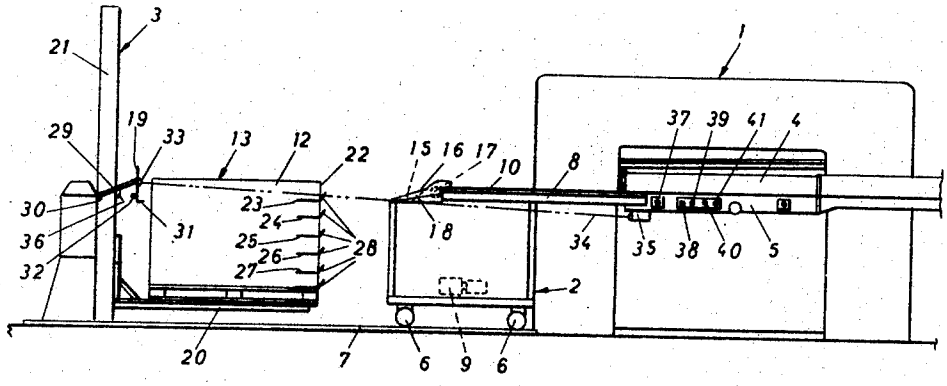
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[57] **ABSTRACT**

A cutting unit for paper sheets comprising a conveyor carriage for transferring paper sheets from a vertically displaceable support unto the working table of said cutting unit, by engagement of horn-like extensions provided on said carriage with the amount of sheets to be transferred at each transfer movement of the carriage. To prevent the paper sheets from sliding during transfer and to ensure correct positioning thereof on the carriage so as to avoid improper engagement with the feeder roller advancing the sheets from the conveyor onto the cutting means proper, a counter-holder means is arranged which operates independently of the vertically movable support and is adapted, upon displacement of the conveyor carriage into the stack of sheets, to lift the rear end of said sheets. The counter-holder preferably consists of a plate mounted on arms which are hingedly connected to a frame. Guide means are arranged on the conveyor carriage to cooperate with roller means on the counter-holder to lift it during displacement of the carriage.

5 Claims, 4 Drawing Figures



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SHEET 1 OF 3

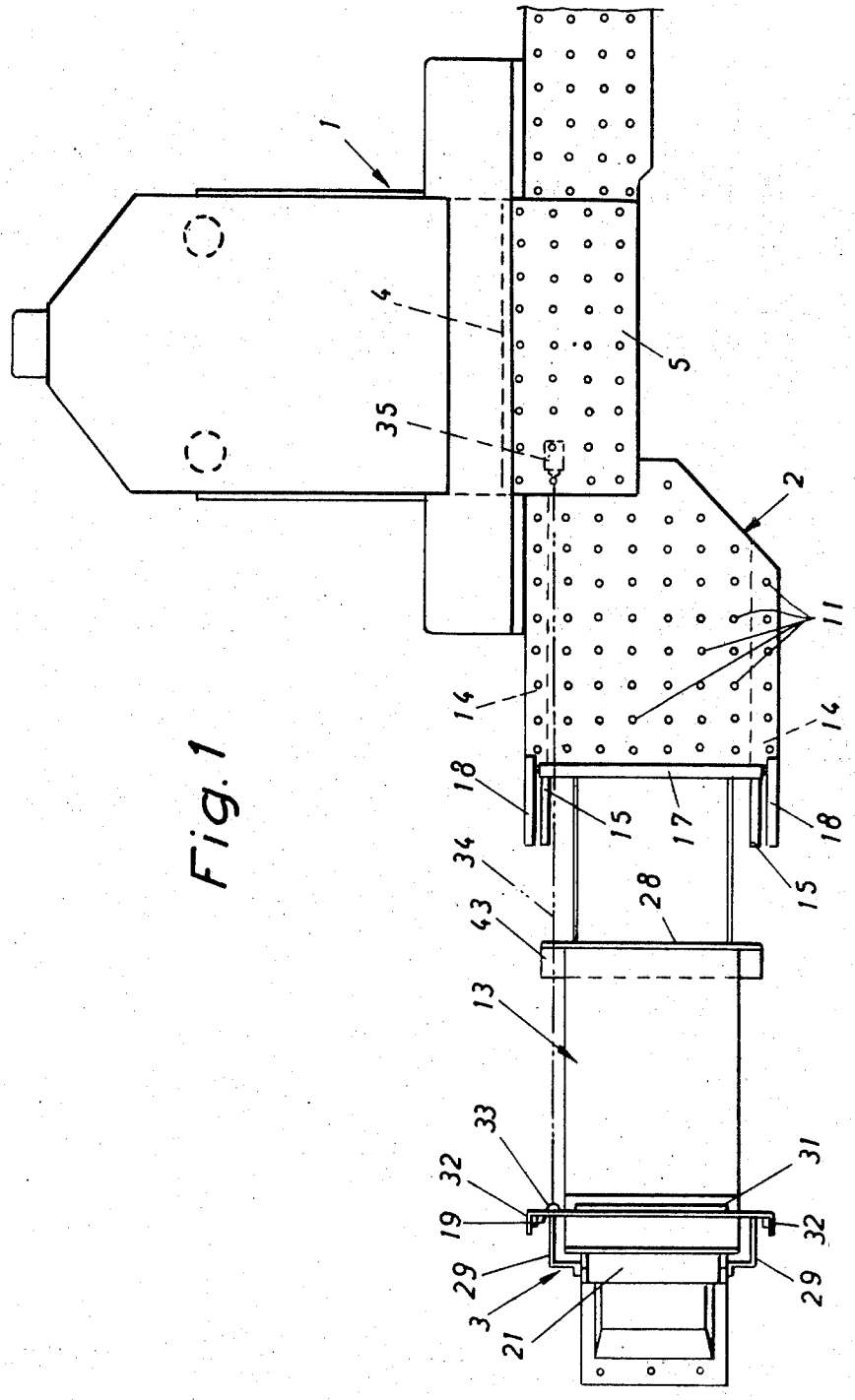


Fig. 1

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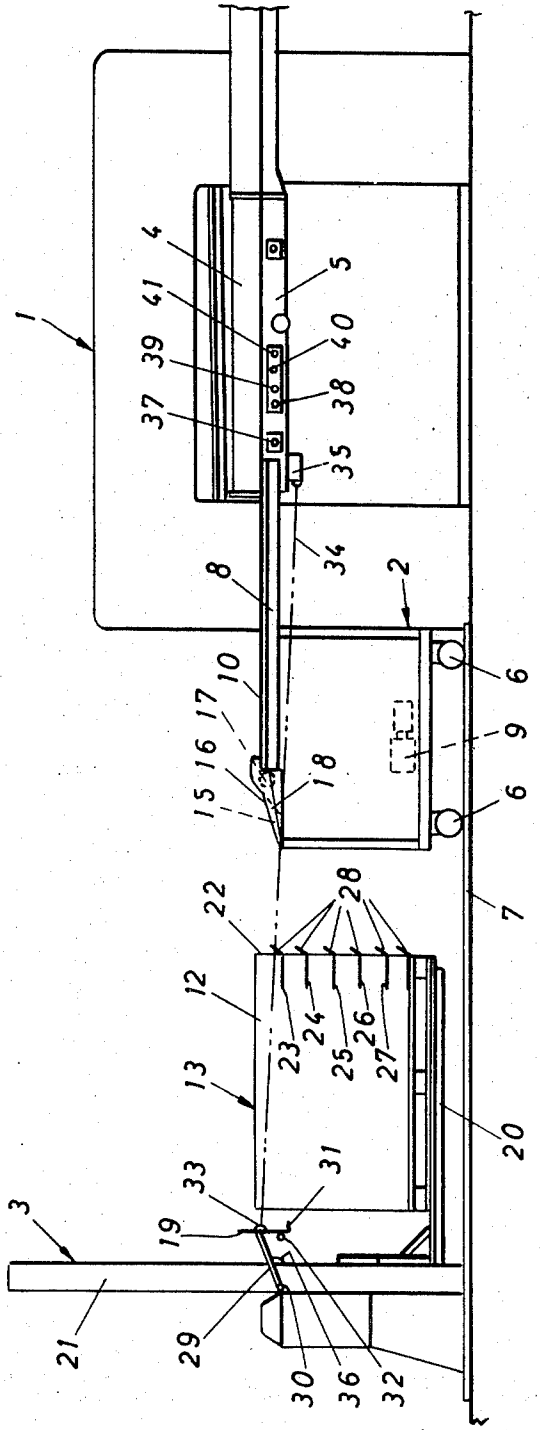


Fig. 2

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Fig. 4

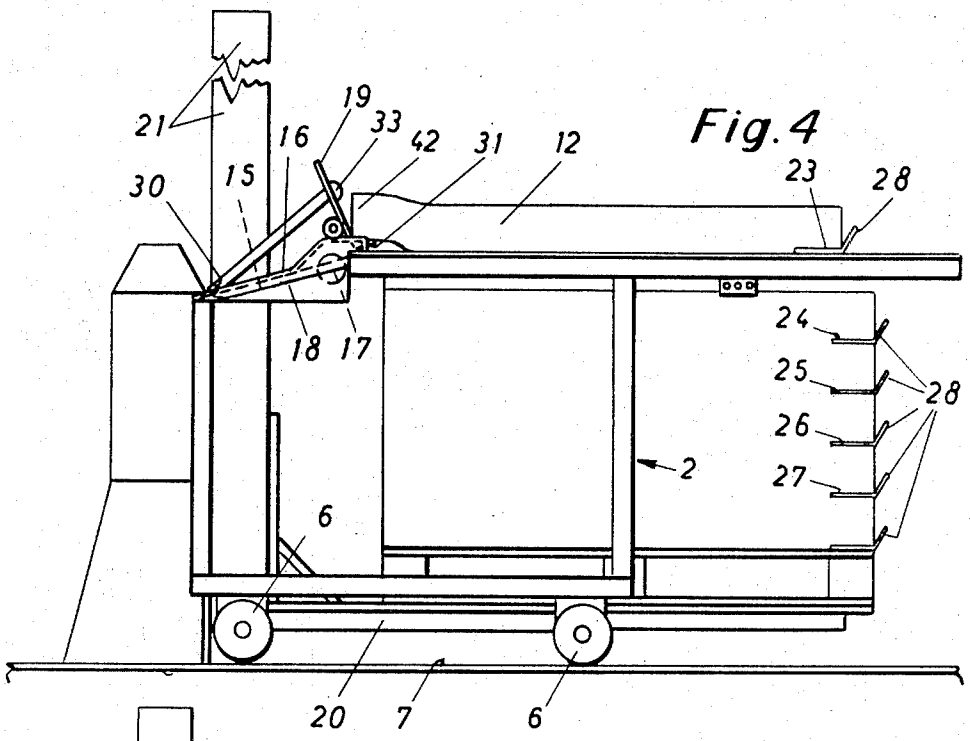
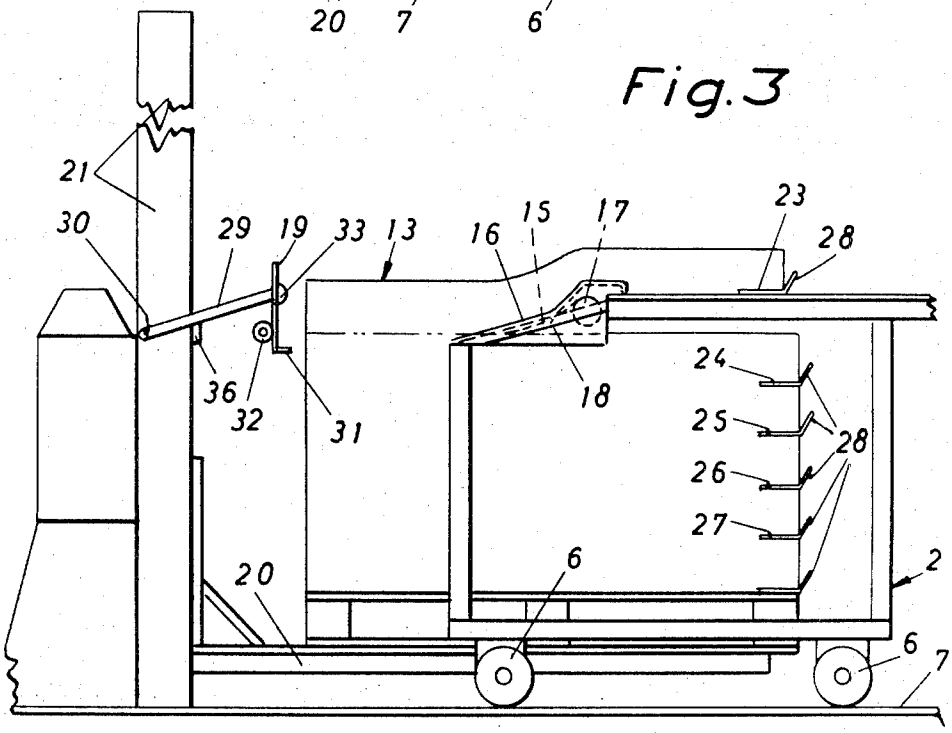


Fig. 3



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TRANSFER DEVICE FOR USE IN CUTTING UNITS FOR PAPER SHEETS

BACKGROUND OF THE INVENTION

The present invention relates to cutting units for paper sheet of the kind incorporating a conveyor carriage by means of which the paper sheets are transferred in piles from a support, adapted to be raised and lowered and on which a stack of paper sheets rests, onto the working table of the cutting unit, said conveyor carriage being provided with a table top presenting horns at the edge facing the paper sheet stack, said horns being adapted upon displacement of the carriage towards the stack, to engage underneath the free ends of rails inserted in the stack in order to lift the sheet pile which at that moment is above the uppermost rail, said table top also between the horns a rotatably driven feeder roller and preferably also a number of upright nozzles connected to a source of compressed air.

SUMMARY OF THE INVENTION

The invention is characterized in that it comprises a counter-holder which is arranged independently of the vertically movable support and adapted, upon displacement of the carriage together with the table top to its forward end position into the stack of sheets, to lift the rear end of the sheet pile, divided by the table top. Owing to the provision of the counter-holder it is ensured that the sheet pile does not slide away from the stack of sheets when the table top of the carriage engages in the stack. Because the counter-holder lifts the rear end of the sheet pile it is also ensured that the sheet pile will be positioned correctly on the table top with its rear edge at a safe distance away from the feeder roller. Thanks to this arrangement, the feeder roller cannot damage the lowermost sheet of the sheet pile during its rotation, nor can it engage the lowermost sheet to pull it down into the gap in the table top where the roller is mounted.

Further advantages and characteristics of the invention will become apparent upon reading of the following detailed description with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of the cutting unit, a conveyor carriage and a sheet stack support incorporating the counter-holder in accordance with the invention,

FIG. 2 is a side view of the arrangement showing the conveyor carriage in its rear end position, i.e., its position adjacent the cutting unit,

FIG. 3 illustrates on an enlarged scale the conveyor carriage together with its table top while moving into the stack of sheets, and

FIG. 4 illustrates the conveyor carriage in its forward end position, wherein the table top is entirely embedded in the stack of sheets.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

On the drawings the cutting unit has received reference numeral **1**, the conveyor carriage **2** and a stack lifter **3**.

The cutting unit **1** is provided with a vertically operating guillotine **4** dividing paper sheets into smaller sizes on the working table **5** of the cutting unit.

The conveyor carriage **2** is provided with runner wheels **6** driven for instance by means of an electric motor (not illustrated) in both directions such that the wheels run on rails **7** extending between the cutting unit **1** and the stack lifter **3**. The conveyor carriage **2** is provided with an essentially rectangular table top **8** positioned at the same level as is the working table **5** of the cutting unit **1**. The table top **8** is shaped like a box and connected to a compressor **9** and its upper surface **10** presents a number of nozzles **11** known per se incorporating ball valves. The nozzles are constructed in such a way that when a pile **12** of paper sheets from the sheet stack **13** of the stack lifter **3** is resting thereon, the valves open and air flows out through the nozzles, thus forming an air cushion on which the sheet pile rests. The side walls **14** of the carriage **2** are spaced apart a distance permitting the carriage to roll in over the stack **13** of sheets. At the left end of the carriage **2** with reference to the drawings the side walls **14** are provided with horn-like extensions **15**, the upper edges **16** of which slope downwards from the table top **8**. In addition the table top **8** is provided at its left edge with a rotatably driven feeder roller **17** extending in the horizontal direction. Furthermore, the side walls present guide means **18** which are provided laterally of the extensions **15** and on the outside thereof and arranged to lift a counter-holder plate **19** in a manner to be described more in detail in the following.

The stack lifter **3** is preferably of the type comprising a support **20** upon which rests a stack **13** of sheets said support being provided with a nut into which is threaded a vertical screw spindle which is rotatably but axially non-displaceably mounted in a frame **21** and driven by an electric motor. The nut, the spindle and the motor are not illustrated on the drawings. A number of angle rails **23,24,25,26** and **27** are spaced an equal distance apart, i.e. 10 to 15 cm, in the vertical direction and arranged to be inserted into the stack **13** of sheets from that side **22** thereof facing the cutting unit **1** such that one leg **28** of the rails extends obliquely upwards and outwards externally of the stack **13** of sheets.

The counter-holder plate **19** is provided with two rearwardly extending arms **29** the rear ends of which are hingedly connected to the frame **21** by means of horizontal pins **30**. The counter-holder plate **19** presents at its lower edge a horizontal flange **31** which is directed towards the stack **13** of sheets, and also two rollers **32** intended to cooperate with the guide means **18**. In addition, the counter-holder plate **19** is provided with a photocell **33** towards which a beam **34** of light is directed from an electric lamp **35** positioned below the working table **5** of the cutting unit **1**. An abutment means **36** on the frame **21** limits the movement of arms **29** together with the counter-holder plate **19** with respect to a lower position.

The device also comprises a number of electric limit position switches and electrical push-buttons **37,38,39,40** and **41** by means of which the carriage **2** may be started to move towards the stack lifter **3** and back towards the cutting unit **1**, and stopped, and also the compressor **9** and the guillotine **4** started. The means for effecting these movements have not been described in detail or illustrated in detail on the drawings as they are known to one skilled in the art.

The device operates in the following manner. When the carriage **2** moves to the left as seen on the drawings and the horn-like extensions **15** engage underneath the ends of rail **23**, the pile **12** of sheets positioned above said rail is lifted during the continued movement to the left of the carriage such that the right pile end reaches up on the table top **8** whereafter the entire pile will be advanced onto the top by means of the roller **17**. When the carriage **2** reaches its left end position (FIG. **4**) the guide means **18** engage underneath the rollers **32** and swing the counter-holder plate **19** upwards whereby the rear edge **42** of the sheet pile **12** will be lifted by means of flange **31** over feeder roller **17** and past the latter. The counter-holder plate **19** prevents the pile **12** from being displaced out of order on the rest of the sheet stack **13**. In its left end position the carriage **2** abuts against a limit position switch, bringing about a change of the drive direction of the runner wheels **6**, whereupon the carriage moves to the right on the rails **7**. Opposite the cutting unit **1** the carriage stops automatically. The compressor, started earlier, supplies compressed air to the nozzles **11** via the ball valves. These are kept open on account of the weight on them by the paper pile **12** on the table top **8** such that the pile will be supported on an air cushion above the table top. Consequently, the cutting means may easily transfer the paper pile **12** unto the working table **5** of the cutting unit, said working table preferably having similar nozzles provided with ball valves and connected to the source of compressed air. When the edges of the paper pile **12** have been cut and possibly divided by means of the guillotine **4**, the finished, edge-cut paper pile or pile sections, is or are transferred by the cutter to a deposit table (not shown). When the carriage **2** reaches the right end position, it actuates a limit position switch to close the circuit to the lamp **35** emitting a beam **34** towards the photocell **33**. The result is that the electric motor of the stack lifter **3** starts to lift the support **20** together with the stack **13** of sheets until the beam **34** is broken by the end **43** of the angle rail **24** extending beyond the one side of the stack of sheets (FIG. **1**). The motor of the stack lifter **3** is hereby stopped and the rail **24** together with the sheet pile positioned thereabove are then in correct position to be lifted unto the table top **8** upon repeated displacement of the carriage **2** to the left. The procedure is repeated until the entire sheet stack **13** has been treated.

The embodiment as shown and described is to be regarded as an example only and the various details of the device may be constructively altered in many ways within the frame of the appended claims. Instead of a photocell **33** other means for sensing and stepwise lifting of the stack **13** of sheets may be considered. Also the counter-holder for the pile **12** of sheets may be given a different shape from the one illustrated on the drawings.

What I claim is:

1. In a mechanism for cutting paper sheets, said mechanism comprising a vertically displaceable support having a stack of paper sheets to be cut supported thereupon, a working table, a conveyor carriage having a table top and adapted to transfer piles of sheets from said supported stack onto said working table, horn-like extensions arranged on said table top to extend in the direction of said stack, rails inserted in said stack at spaced vertical intervals and having free ends extending therefrom in the direction of said carriage, said horn-like extensions being adapted upon displacement of said carriage toward said stack to engage beneath one of said rails thereby to effect lifting of a pile of said stack of sheets located above said engaged rail, and a rotatably driven feed roller located on said table top between said horn-like extensions, the improvement comprising counter-holder means positionable independently of the vertical movement of said support and adapted upon movement of said carriage toward said stack to engage beneath said pile of sheets located above said engaged rail at an end thereof opposite said rail and to lift said end of said sheet pile.

2. The improvement according to claim **1** comprising guide means located on said conveyor carriage and positioned to engage said counter-holder means to effect lifting thereof upon movement of said carriage to engage said sheet pile.

3. The improvement according to claim **1** wherein said counter-holder means comprise a plate extending adjacent and parallel to said stack of sheets, and pivotally mounted arms supporting said plate and enabling pivotal motion thereof to engage and lift said sheet pile end.

4. The improvement according to claim **3** wherein said plate comprises a horizontal flange extending in a direction into said sheet stack.

5. The improvement according to claim **2** wherein said counter-holder means has roller means mounted thereon and wherein said guide means comprise sloping cam surfaces laterally positioned on the outsides of said horn-like extensions to engage said roller means during movement of said carriage into engagement with said sheet pile for effecting lifting of said counter-holder means.

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