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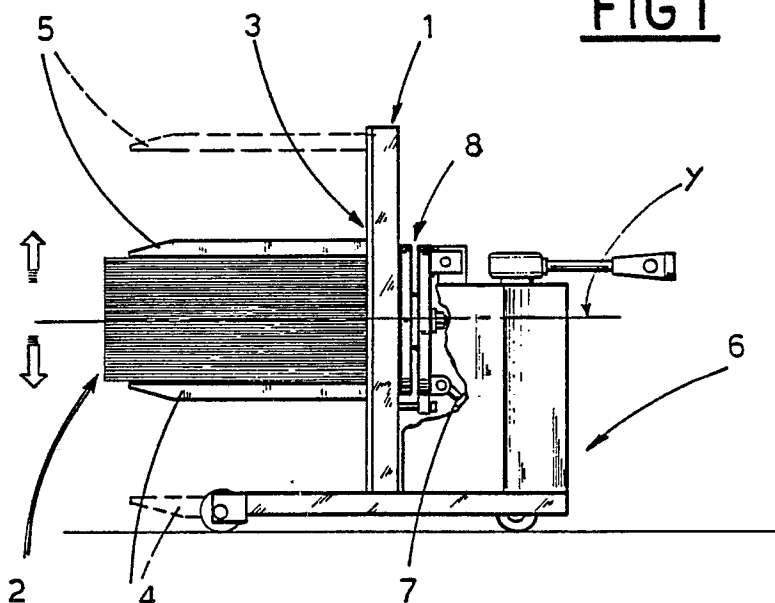
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Equipment for overturning stacks of sheet material.

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The stack of sheets (2) to be overturned is carried in a first frame (1) of the equipment, positioned with one edge butted against a locating surface (3) and held between two sets of prongs (4, 5) that enter into contact with the bottom and top sheets; this first frame is hinged to a supporting second frame (6) about a horizontal first axis (x) lying parallel with the locating surface, and can also be swivelled relative to the second frame (6) about a second axis (y) normal to the locating surface (3).

FIG 1



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Equipment for overturning stacks of sheet material

The invention relates to equipment for overturning stacks of single sheets (paper, cardboard etc.). Conventionally, large size sheets of material such as those used for billboard displays are subjected to manufacturing operations on both sides, for example the application of print to one side, and of an adhesive to the other. These operations are effected in two distinct steps: in a first step, a given operation is carried out on one side only of all the sheets of the stack, whereupon the stack is overturned, and the second operation carried out on the remaining side of each sheet.

The question that arises, clearly enough, is that of how the stacked sheets may be overturned swiftly on completion of the first step, and preferably, in a single manoeuvre.

The prior art embraces fixed and/or mobile types of equipment by means of which to overturn stacks of paper and/or cardboard sheets, including sheets of significantly large dimensions.

One such item of equipment, for example, consists in a structure designed to carry and encompass the stack of sheets, the reverse side of which (i.e. the side opposite that accommodating the sheets) affords a pair of semicircular rails slidably mounted to relative guides provided with bearing rollers on which the structure, loaded up with sheets, can be rotated about a horizontal axis passing through the centre of a circle coinciding with the semicircular rails in such a way as to turn the sheets around into a position removed 180° from the point of departure.

Another design of equipment for overturning stacks of sheets consists in a structure provided with a platform, serving to support the stack of paper or cardboard sheets, which is provided on one side with a vertically disposed and rigidly associated frame; the structure further comprises a shelf disposed at right angles to the platform, which is capable of sliding longitudinally along the frame and rotatable about its own perpendicular axis, hence about an axis parallel with the platform. The stack of sheets is positioned on the platform with one upright face butted against the shelf, whereupon the operator tilts the entire structure through 90° about a centre coinciding with the join between the platform and the vertical frame, in such a way as to dispose the frame horizontally and the platform vertically. With the structure in this position, the stack of sheets does no more than rest against the upright platform, its weight being taken by the shelf that hitherto served as vertical guide. The shelf is now traversed along the frame by the operator, and swivelled at the same time about its perpendicular axis so as to rotate the

stack of sheets through 180° ; this accomplished, the structure is tilted back into its original position with the sheets lying on the platform, placed exactly as before but turned upside down. Equipment of the general designs thus outlined is complicated and cumbersome, in particular the first type mentioned, and impractical in use, especially in the case of the second type mentioned.

Accordingly, the object of the present invention is to embody equipment for overturning stacked sheets of paper, cardboard etc., that ensures simplicity in construction and practical, swift operation. The stated object is realized with equipment as characterized in the appended claims, which affords the advantage that stacked sheets of material, even stacks of considerable weight, can be overturned without any need to rotate the entire structure of the equipment, and without any requirement for manual lifting effort on the part of the operator. The invention will now be described in detail, by way of example, with the aid of the accompanying drawings, in which:

-figs 1 and 2 illustrate equipment according to the invention, viewed in side elevation and in plan, respectively, retaining and supporting a stack of sheets to be overturned;

-figs 3 and 4 are side elevations of equipment as in figs 1 and 2, which illustrate two successive configurations assumed as the stack of sheets is turned through 180° .

With reference to the drawings, equipment according to the present invention comprises a first frame 1 serving to support the stack 2 of sheets (paper, cardboard), and a second frame 6 supporting the first frame. The first frame 1 comprises at least one surface 3 against which one upright face of the stack 2 is made to locate initially, and two sets of prongs 4 and 5 disposed parallel one with the other and at right angles to the locating surface 3.

The prongs 4 and 5 are designed to enter into contact respectively with the bottom sheet and the top sheet of a stack 2 to be overturned. The first frame 1 is hinged to the second frame 6, articulating about a first axis of rotation 'x' disposed horizontal and parallel to the locating surface 3 (see fig 2), and capable of movement at least between a first limit position coinciding with pick-up and release of the stack 2, in which the locating surface 3 is upright and the prongs 4 and 5 horizontally disposed, and a second limit position in which the locating surface 3 is turned horizontal, rotated through 90° from the first limit position, and the prongs 4 and 5 vertically disposed.

The mounting arrangement between the first

frame 1 and the second frame 6 also permits rotation of the first frame 1 in either direction, left or right, about a second axis 'y' disposed at right angles to the locating surface.

7 and 8 denote means located between the first and second frames 1 and 6, serving respectively to produce rotation of the first frame 1 about the first axis 'x' and to ensure its controlled support when rotating about the second axis 'y'.

Support means 8 consist in an intermediate frame 9, hinged to the second frame 6 about the horizontal first axis 'x', to which the first frame 1 is mounted in such a way as enables its rotation in either direction about the second axis 'y'.

The means 7 of producing rotation, located between the second frame 6 and the intermediate frame 9, consist in at least one extendible component, e.g. a double acting fluid power cylinder; such means 7 serve to rotate the first frame 1 (arrow F, fig 3) in relation to the second frame 6 about the first axis 'x', taking it into the second limit position in which the locating surface 3 is raised level. Having positioned the first frame 1 horizontally, and released mutual positioning means 10 associated with the intermediate and first frames 9 and 1 (consisting for example in a spring loaded detent the movement of which is arrowed 'f' in fig 4), the frame 1 can be rotated manually about the second axis 'y', now vertically disposed, in such a way as to turn the stack 2 through 180° (arrow F1, fig 4). This done, the cylinder 7 is retracted so as to return the frame 1 to the lowered limit position of fig 1 in readiness for release of the stack 2, now completely upturned through the prescribed 180°.

In a preferred embodiment of the equipment, the prongs 4 and 5 will be disposed symmetrically on either side of the second axis 'y', and their movement controlled in such a way that the symmetry is maintained. The advantage of this expedient is that, with the first frame 1 in the raised limit position, the swivel axis 'y' coincides with the centre of gravity of the stack 2; accordingly, to produce the necessary rotation, it will suffice simply to overcome such frictional forces as exist between the first and intermediate frames 1 and 9. Moreover, the stack 2 to be turned can be picked up and set down at the same height, every time. As regards the second frame 6, this can be embodied as a truck or trolley, so that stacks 2 of sheets may be picked up from one machine, overturned, and transferred to a successive machine.

Claims

1) Equipment for overturning stacks of sheet material, of the type consisting in:

-a first frame (1) serving to support the stack (2) of

sheets to be turned, comprising at least one surface (3) against which one edge of the stacked sheets is made to locate, and two sets of prongs (4, 5) disposed parallel with one another and at right angles to the locating surface (3), which are capable of drawing together and spreading apart in mutually parallel motion;

-a second frame (6) supporting the first frame, characterized

-in that the first frame (1) is mounted pivotably to the second frame (6), articulating about a first axis of rotation (x) lying horizontal and parallel with the locating surface (3), and capable of movement at least between a first limit position coinciding with pick-up and release of the stack (2), in which the locating surface (3) is disposed vertically and the prongs (4, 5) are disposed horizontally, and a second limit position in which the locating surface (3) is disposed horizontally, rotated 90° from the first limit position, and the prongs (4, 5) are disposed vertically;

-in that the first frame (1) is carried by the second frame (6) in such a way as permits rotation in either direction about a second axis (y) lying at right angles to the locating surface (3); and

-in that it comprises means (7, 8) located between the first and second frames (1, 6), by which the first frame (1) is caused to rotate about the first axis (x), and afforded controlled support when rotating about the second axis (y), respectively.

2) Equipment as in claim 1, comprising:

-means (8) of affording controlled support embodied as an intermediate frame (9), articulating with the second frame (6) about the first axis (x), by which the first frame (1) is carried in such a way as to permit its rotation in either direction about the second axis (y);

-means (7) of producing rotation, located between and interconnecting the second frame (6) and the intermediate frame (9);

-means (10) interacting between the intermediate frame (9) and the first frame (1), by which the first frame can be detained in at least two angular positions about the second axis of rotation (y).

3) Equipment as in claim 1, wherein the sets of prongs (4, 5) are disposed symmetrically on either side of the second axis of rotation (y), and their relative movement controlled in such a way that symmetry is maintained.

4) Equipment as in claim 1, wherein the second frame (6) is of mobile truck- or trolley-type embodiment.

FIG 1

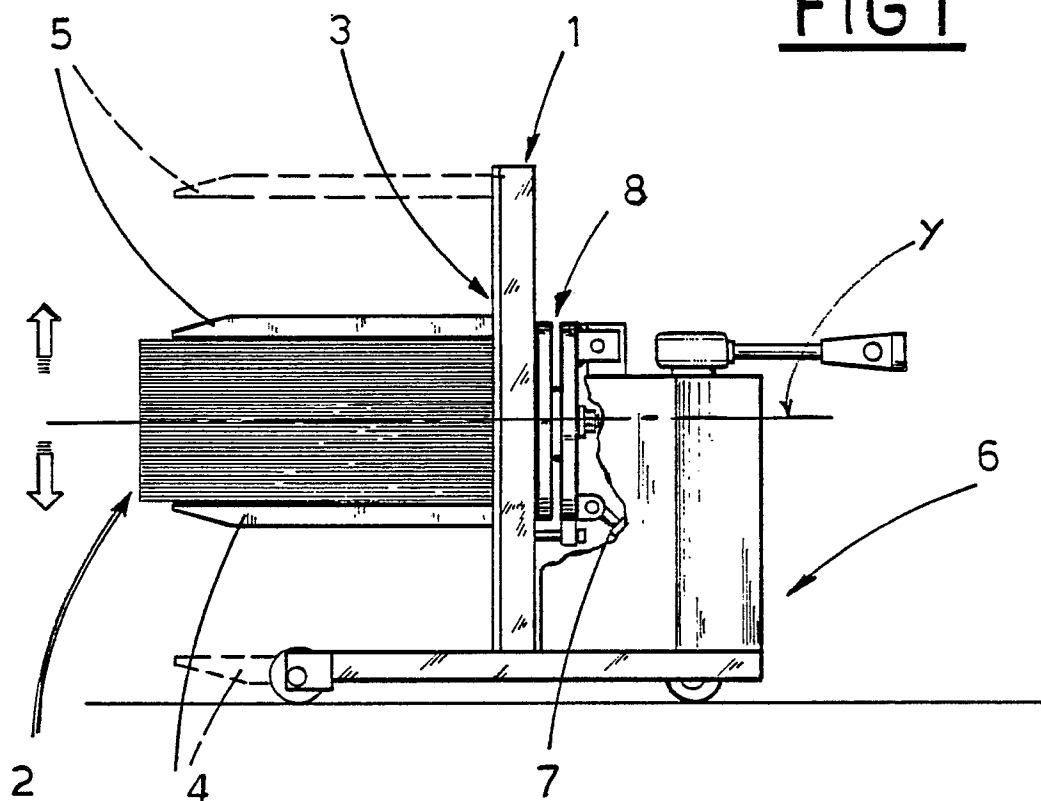


FIG 2

