Aug. 3, 1965 HANS-JOACHIM BARTSCH 3,198,519

METHOD OF AND APPARATUS FOR STRAIGHTENING STACKS OF SHEET MATERIAL

Filed Dec. 27, 1962 2 Sheets-Sheet 1

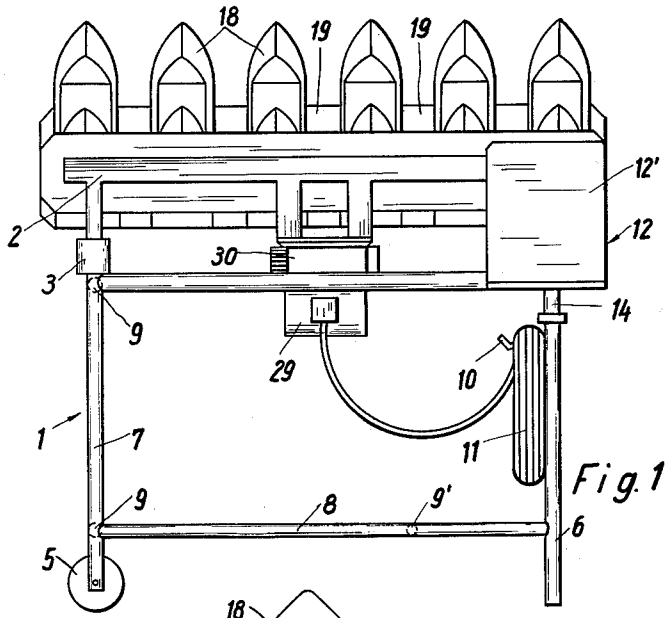


Fig. 1

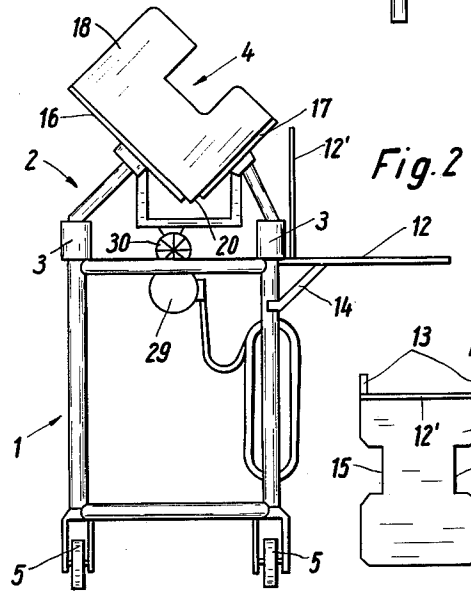


Fig. 2

Fig. 2a

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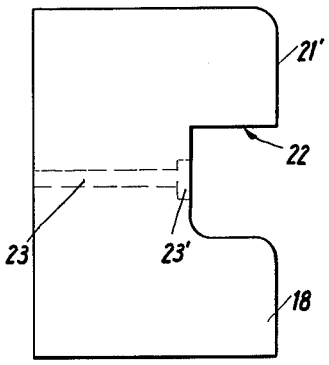


Fig. 3

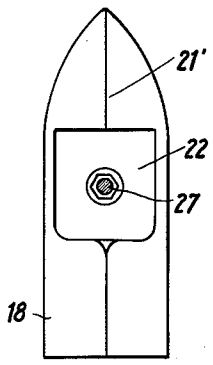


Fig. 4

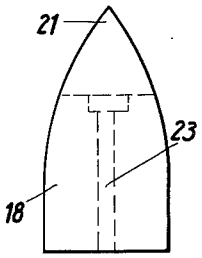


Fig. 5

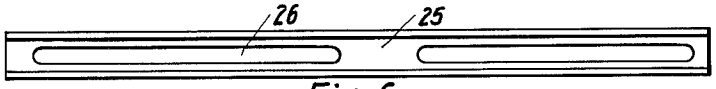


Fig. 6

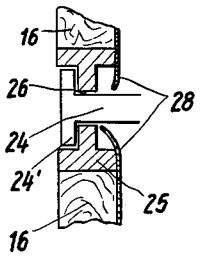


Fig. 7

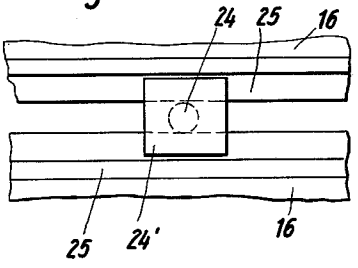


Fig. 8

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METHOD OF AND APPARATUS FOR STRAIGHTENING STACKS OF SHEET MATERIAL

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3 Claims. (Cl. 271—89)

The present invention relates to a method of and an apparatus for straightening generally rectangular stacks of sheets and, more particularly, to a device for arranging and straightening printed sheets which are produced in large quantities by rotary printing machines and the like.

While other devices for the straightening and arranging of printing-shop products are known, such devices generally employ vibrating or oscillating means to shake down the stacks of sheets that are not suitable for use with high-output printing presses (e.g. rotary presses) which are capable of discharging up to 30,000 sheets per hour at each press outlet. These sheets may still be wet and are often also electrostatically charged so that arranging or "knocking up" of the stacks by hand is rather difficult. In the absence of straightening devices the sheets are gathered into a pack and repeatedly dropped edgewise upon a flat table so that the stack can be stapled or otherwise processed further. This method of straightening is, however, time consuming and involves considerable labor cost.

It is an object of the present invention to provide a method of straightening and arranging stacks of sheet material (e.g. printing-shop products) which avoids the aforementioned disadvantages and permits the orienting and packeting of large numbers of sheets in a short time.

It is another object of the invention to provide a device for stacking and orienting such sheets which is operable at a relatively high rate but yet is of simple and inexpensive construction.

These objects are attained, in accordance with the invention, by a method of straightening generally rectangular stacks of sheets wherein the stacks are supported along two adjoining edges with the sheets disposed substantially vertically and their edges at angles to a horizontal plane, and vibrated with a component of vibration acting substantially along each of the adjoining edges to align the corresponding edges of the stacked sheets. Advantageously, the stacks are supported by a pair of plates which include between them a right angle while the vibrations are generally vertical oscillations imparted to the plates. Since the latter are inclined to the vertical as well as to the horizontal, such vertical oscillation will impart a component of vibration to the stacks along the plates and the supported edges. It should, however, be noted that a displacement of the plates will likewise provide components of vibration as previously described. The plates may extend longitudinally in the horizontal direction and may be provided with a plurality of spaced vertical partitions whose relative positions can be set with the aid of a gauge. This gauge may consist of a plurality of strips of different widths (preferably integral multiples of a unit thickness) which may be selectively disposed between the partition walls in order to set the width of each component.

The plates can thus form an upwardly open trough of V-shaped cross-section as defined by a pair of knock-up plates. The vertical partitions advantageously have wedge-shaped profiles so that the compartments diverge upwardly to facilitate insertion of the stacks. The wedge edges of these partitions may be interrupted by respective gripping recesses facilitating the removal of the stacks from the components. Preferably, the two plates are laterally spaced from each other to form a longitudinal gap therebetween through which dust and air can pass out of the trough.

The plates may be rigidly interconnected by a common superstructure resiliently mounted upon a supporting frame. The vibrator means, which can be provided with an eccentric eight of adjustable throw and an adjustable clutch or coupling connecting the weight with the superstructure, can be provided upon the supporting frame. The throw adjustment of the vibration means permits alteration of the magnitude of the oscillations imparted to the plates while the coupling affords adjustment of the direction of these oscillations.

The support frame may be provided with a table removably mounted thereon which projects laterally from the frame and has an upright backing member rigid with the table to facilitate the gathering and assembling of the sheets of the stacks. This table may have one or more recesses extending inwardly beyond the edges of stacks carried thereby to enable gripping of these stacks by an operator. The support frame can be provided with legs and transverse struts, at least one of which is inwardly of the legs at one end of the frame so as not to interfere with the legs of an operator when moving the device. The other legs are, of course, provided with roller means such as a pair of casters, so that elevation of one end of the device will permit the support to be moved in wheelbarrow fashion.

The above and other objects, features and advantages of the present invention will become more readily apparent from the following detailed description, reference being made to the appended drawing in which:

FIG. 1 is a front-elevational view of a device according to the invention;

FIG. 2 is a side-elevational view thereof;

FIG. 2*a* is a plan view of a gathering table removably mounted on the apparatus;

FIG. 3 is a side-elevational view of a partition employed with the knock-up plates;

FIG. 4 is a front elevational view of this partition drawn to an enlarged scale;

FIG. 5 is an end view of the partition;

FIG. 6 is a plan view of a guide rail along which the partitions are movable;

FIG. 7 is an enlarged projectional view of a knock-up plate showing details of the means for longitudinally adjusting the partitions; and

FIG. 8 is a front-elevational view of this portion of the device.

The device shown in the drawing comprises a supporting frame 1 upon which a superstructure 2 is resiliently supported by rubber or spring cushion 3, the superstructure 2 carrying a knock-up section 4 adapted to being vibrated.

The support frame is of tubular construction and has a pair of legs 7 which are provided with casters 5 at one end of the frame while a second pair of legs 6 is adapted to rest against the floor at the liftable end thereof. The legs 7 are interconnected by a pair of vertically spaced transverse struts 9 while a further horizontal strut 9' is provided inwardly of the legs 6 along longitudinal traverses 8. Strip 9' does not interfere with the operator's legs during transportation of the device in the course of which the operator lifts the legs 6 and pushes the frame along the floor. One of the legs 6 also carries a hook 10 upon which a coil 11 of electric cable can be hung. A gathering table 12 is provided with a pair of hooks 13 by which it is removably mounted upon the frame 1 and with a support 14 which backs against a leg 6 to maintain the table in its horizontal position. The table is also provided with a backing member 12' and with a pair of inwardly extending recesses 15 through which sheet material, gathered into a stack upon the table, can

be gripped. The table **12** can, of course, be mounted at either end of the frame so as to serve for feeding stacks into the knock-up compartments or assist in the removal of the stacks therefrom. The backing member **12'** prevents contact between material on the table and the operator's hands with the vibrating superstructure.

This superstructure is provided with a pair of knock-up plates **16, 17,** which are disposed at right angles to each other and include a longitudinal gap **20** therebetween through which air and dust can escape from the trough. The latter is subdivided by a plurality of vertical partitions **18** into longitudinally spaced compartments **19** of variable capacity. The partitions (FIGS. 3–5) have wedge profiles **21** terminating in a wedging edge **21'** and form compartments **19** which open divergingly upwardly. This edge **21'** is interrupted by a centrally located gripping recess **22** facilitating removal of the stacks from the compartments. The partitions **18** are each provided with a bore **23** through which a retaining bolt **24** passes into engagement with a longitudinal slot **26** in a guide rail **25** recessed in partitions **16**. The bolts **24** are formed with T-shaped heads **24'** and may be tightened by nuts **27** receivable in a counter sunk recess **23'** at gripping recess **22**. Loosening of the lock nuts **27** will, consequently, permit shifting of the partitions in the longitudinal direction.

To facilitate the setting of the width of the compartment, it is preferred to provide a gauge consisting of a plurality of strips of different thickness which are integral multiples of a unit thickness. These strips are provided with an aperture at one extremity and are mounted upon a flexible member passing through these apertures and supported at opposite extremities on plate **16** via a bracket. It should also be noted, however, that the setting gauge can be disconnected from the device and be substantially in the form of a key ring. Thus four of the wood strips can have respective thickness of 2 mm. while the remainder have thicknesses of 10 mm. so that respective juxtaposition of thick and thin strips can provide widths of any desired dimension and relatively great precision.

The vibrator motor **29** is provided with an adjustable eccentric which is connected to the superstructure **2** via a coupling **30** which permits adjustment of both the magnitude and direction of the oscillations.

When a five-compartment unit is provided, each compartment can have a capacity of 50 sheets so that 250 sheets are continuously being processed. The device can easily have a throughput of approximately 500 sheets per minute and thus is capable of handling the output of a high-speed printing press. After adjustment of the compartments to the proper width, the operator turns on the vibrator motor **29**, gathers the printed sheets on the table **12** and deposits stacks of them in the several compartments **19**. After filling all of the compartments he reverts to the first compartment withdraws the straightened stack and replaces it by another pile of sheets from the table. The finished stacks then may be disposed upon a pallet or other conveyor for further processing.

I claim:

1. A jogging device for straightening stacks of generally rectangular sheets, comprising support means; a pair of knock-up plates mounted on said support means generally perpendicularly to one another and at an inclination to the horizontal to form an upwardly open longitudinally extending trough; a plurality of longitudinally spaced partitions extending perpendicularly to said plates and subdividing said trough longitudinally into a plurality of compartments, said partitions each being provided with a pair of spaced apart walls defining one side of a respective compartment, said walls converging toward one another at an upper edge of each partition in wedgelike configuration for directing respective stacks of said sheets away from the respective edge into respective compartments adjoining the latter, said partitions each having a lower portion along which the respective walls are generally parallel to one another and an arcuate upper portion terminating at the respective edge which is outwardly convex, one of said plates being provided with a longitudinally extending slot; and adjustable mounting means on each of said partitions engageable with said slot for adjustably securing it to said one of said plates and a selected longitudinal position therealong for regulating the size of said compartments.

2. A device as defined in claim **1** wherein said fastening means includes a respective bolt mounted between the walls of each partition and extending perpendicularly to said one of said plates into engagement with said slot.

3. A device as defined in claim **2** wherein said slot is formed by a guide rail in said one of said plates.

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