United States Patent

[11] 3,618,939

[72] Inventor **Jaroslav Jiruse**
Blansko, Czechoslovakia

[21] Appl. No. **802,335**
[22] Filed **Feb. 24, 1969**
[45] Patented **Nov. 9, 1971**
[73] Assignee **Adamovske Strojirny, narodni podnik**
Adamov, Czechoslovakia
[32] Priority **Feb. 23, 1968**
[33] **Czechoslovakia**
[31] **1390/68**

[54] **MECHANISM FOR ORIENTING PAPER SHEETS**
7 Claims, 2 Drawing Figs.

[52] **U.S. Cl.** **271/89**
[51] **Int. Cl.** **B65h 31/34**
[50] **Field of Search** 271/89

[56] **References Cited**

UNITED STATES PATENTS

1,851,972	4/1932	Blauvelt et al.	271/89
2,732,206	1/1956	Dietrich	271/89

FOREIGN PATENTS

185,046	6/1906	Germany	271/89

Primary Examiner—Joseph Wegbreit
Attorney—Richard Low

ABSTRACT: In a mechanism adapted to be used, for instance, with installations such as printing presses in order to provide for proper orientation of stacked sheets, the sheets are stacked on a table and at one end the sheets are located against a given stop structure. A shifting structure coacts with the opposed end of the sheets to shift them into engagement with the stop structure. In addition, a pair of opposed side-edge-shifting structures are provided for engaging the opposed side edges of the sheets so as to properly position them laterally. A single drive is provided to coact with the end-shifting structure while a transmission extends therefrom to the pair of opposed side edge shifting structures so that in this way the drive is transmitted to all of the shifting structures. In the drive, there is a friction type of transmission giving the possibility of adjusting the several shifting structures even while the mechanism operates.

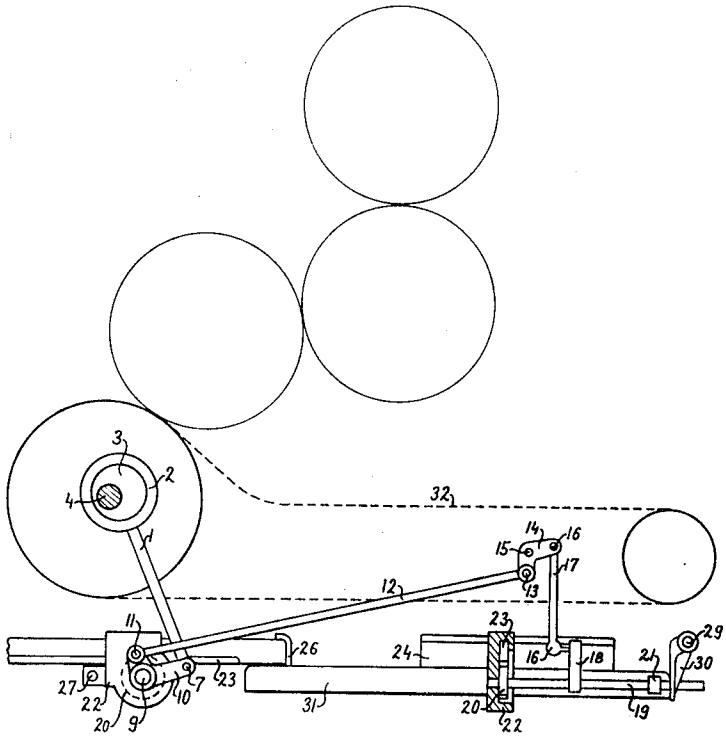
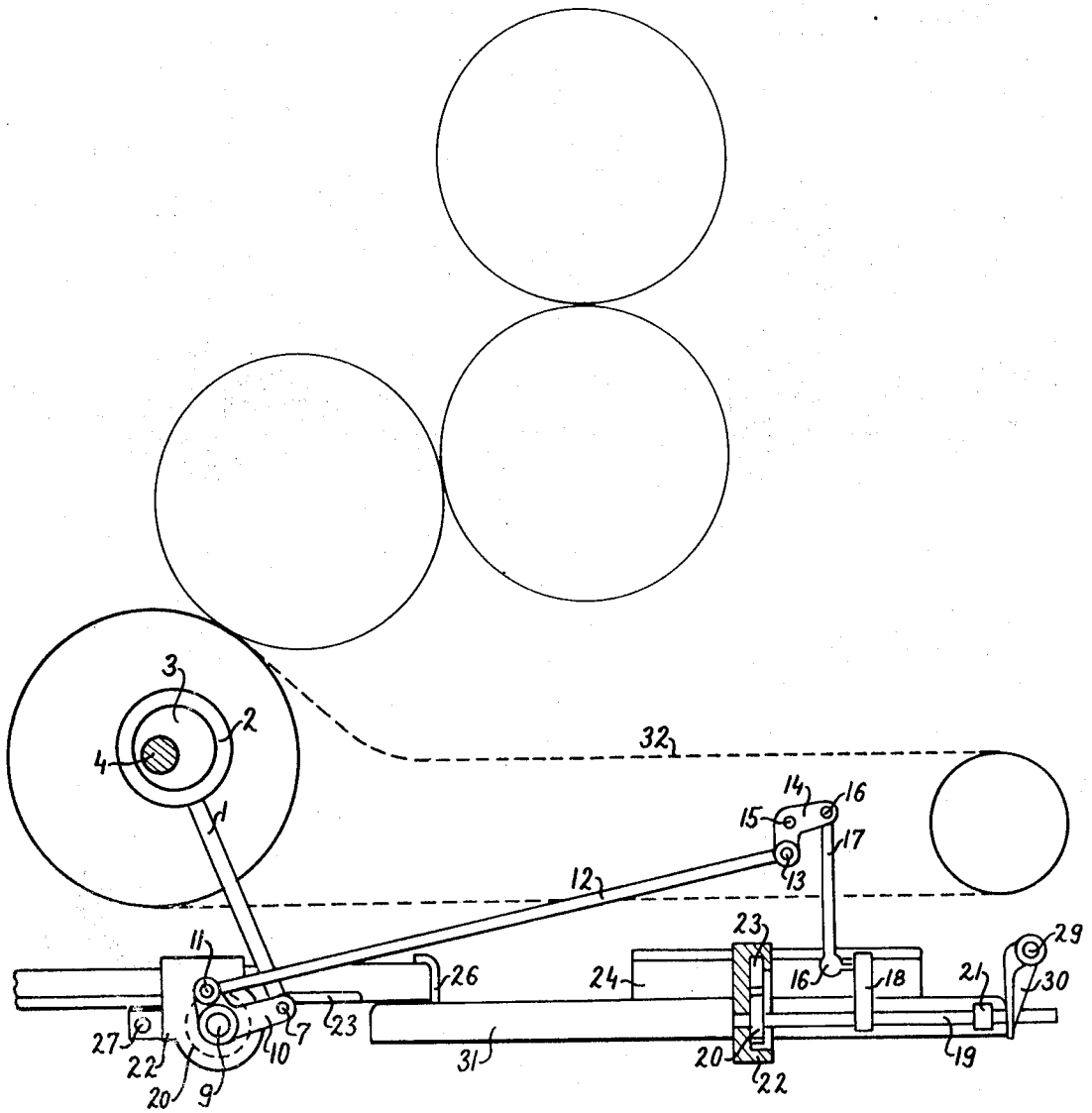
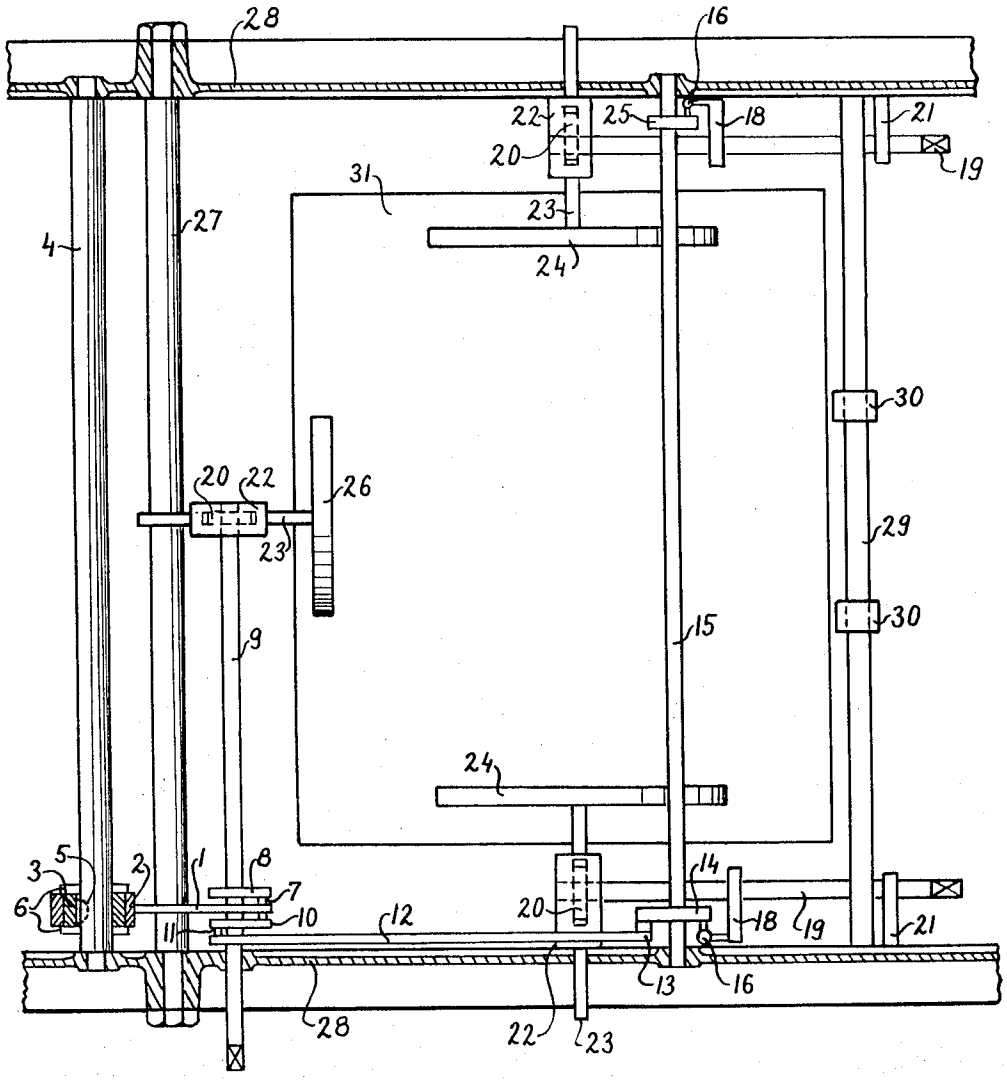


Fig. 1



INVENTOR
Jaroslav Jiruše
By Richard Good Agt

Fig. 2



INVENTOR
Jaroslav Jiruše
By Richard Low Agt

MECHANISM FOR ORIENTING PAPER SHEETS

BACKGROUND OF THE INVENTION

The present invention relates to mechanisms for orienting paper sheets in a stack.

More specifically, the invention relates to that type of stacking device used, for instance, with printing presses where a sheet-stacking structure deposits the sheets one upon another in the stack.

This stacking structure functions to remove the printed sheets from the printing cylinders, to deposit the thus-removed sheets onto a table where the sheets are stacked, whereupon end and side-orienting devices engage and shift the sheet to orient it properly in the stack.

There are known devices which orient a paper sheet by means of end- and side-orienting components, with the end component shifting a sheet up to an end stop while the drive for such a component is taken from a lever mechanism driven by rotary elements of the printing press. A lateral-orienting component is fixedly arranged to be stationary, and the stacked sheet is shifted into engagement with the stationary lateral stop structure by means of a second orienting structure which is movable and which also derives its movement from a laver mechanism driven by rotary elements of the machine. This latter drive is completely independent of the drive for the end-orienting components. With such constructions when it becomes necessary to change from one paper format to another, it is essential to stop the operation of the machine and to change the manner in which the orienting components are guided in order to adapt them to the new paper format.

Such known constructions have the disadvantage of requiring extremely complex driving mechanisms for the orienting components and there is the additional very serious disadvantage of requiring a termination of the operation of the machine in order to adjust the orienting components to accommodate sheets of different sizes and formats.

There are other known devices for orienting paper sheets by means of lateral- or side-orienting components the movement of which is derived from gears supported for eccentric rotary movement, so that the paper sheets are oriented from both sides and are simultaneously pressed against an end stop structure. Mechanisms of this type are, however, also extremely complex and are in addition very expensive to manufacture.

Devices of this type operate in such a way that the paper sheets are oriented by way of end- and side-orienting components, with the movements being derived by way of lever mechanisms which are independent of each other and are driven by rotary components of the machine. As contrasted with the above-referred-to known constructions, the latter type of devices has a certain advantage in that the adjustment of the orienting components in accordance with a particular sheet format can also be carried out during the operation of the machine. However, an important disadvantage resides in the fact that such mechanisms are necessarily of extreme complexity.

SUMMARY OF THE INVENTION

It is accordingly a primary object of the present invention to provide a construction which will avoid the above drawbacks.

In particular, it is an object of the invention to provide a construction which is far simpler than known structures as referred to above, while at the same time being capable of properly orienting sheets which are stacked at machines, such as, for example, printing presses.

One object of the invention is to provide a construction which makes it possible to very readily carry out adjustments, even while the assembly continues to operate.

Further, it is an object of the invention to provide a construction which will enable sheets to be accurately oriented in a stack even in the case where the mechanism operates at a very high speed, while retaining at the same time a relatively low cost of manufacture for the relatively simple structure, thus making it also relatively simple to replace components at low cost.

An additional object of the invention is to provide a construction which not only can be adjusted during operation but which can be adjusted in such a way that each of the orienting components can be adjusted during operation of the mechanism, independently of the other orienting components, so that outstanding advantages are achieved from the standpoint of convenience of operation and adjustment as well as from the standpoint of safety.

In accordance with the invention, the structure includes a table on which the sheets are stacked with an end stop means located at the table for engaging one end of the stack of sheets. An opposed end-shifting means coacts with the opposed ends of the sheets for shifting them toward the one stop means to locate the sheets against the latter. A pair of opposed side-shifting means are provided for respectively engaging each side edge of the sheet and thus for orienting both side edges with respect to the one end stop means. A drive means is provided for driving all of the shifting means, this drive means directly driving the end-shifting means while a transmission means transmits the drive from the end-shifting means to the pair of opposed side-shifting means. In addition, an adjusting means coacts with the several shifting means for adjusting each of them independently of the others whenever desired.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is illustrated by way of example in the accompanying drawings which form part of this application and in which:

FIG. 1 is a schematic partly sectional side elevation of one possible structure according to the invention; and

FIG. 2 is a schematic top plan view of the mechanism of FIG. 1, also showing certain parts in section.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring to the drawings in greater detail, the illustrated structure of the invention, for orienting paper sheets which are stacked by a nonillustrated stacking structure of a printing press, includes a push-pull rod 1 which is fixed at its upper end, as viewed in FIG. 1, to a ring 2 that in turn slidably surrounds and engages the periphery of an eccentric 3. The eccentric 3 is in the form of a disc fixed to a rotary drive shaft 4 by means of a key 5 shown in FIG. 2. Securing devices 6 prevent falling of the eccentric 3 out of the ring 2.

The end of the push-pull rod which is distant from the ring 2 is connected with a cylindrical pin 7 which extends, respectively, through a suitable opening in a crank arm 8 and in an arm of a bellcrank lever 10 so that a pivotal connection is provided between the push-pull rod 1 and the elements 8 and 10. The crank arm 8 is shown in FIG. 2. Both elements 8 and 10 are frictionally mounted on an elongated adjusting shaft 9 which in turn is fixed to a pinion 20 that meshes with a rack 23. The elements 8 and 10 may have split sleeves pressed by springs against shaft 9 to turn the latter when the elements 8 and 10 turn while permitting shaft 9 to turn with respect to arm 8 and lever 10. Rack 23 as well as pinion 20 are supported for movement in a support means formed by a suitable supporting body 22 which itself is carried by a connecting bar 27 extending between the sidewalls 28 of the machine.

The bellcrank lever 10 is connected by a pivot pin 11 with a push-pull rod 12 forming a link for transmitting the drive from the bellcrank 10 to a pin 13 which is carried by a second bellcrank 14. The rack 23 is fixed at its front end to an end-shifting means in the form of an elongated shifting component 26 adapted to engage the ends of the stacked sheets and to shift the sheets so that their opposed ends engage the stops 30 which are fixedly carried by a shaft 29 which, too, extends between and is carried by the sidewalls 28. A bellcrank 14 and an opposed lever 25 are to a transmission shaft 15 carried in suitable bearings by the opposed walls 28, and by way of spherically shaped members 16 in suitable bearings and connecting rods 17 (FIG. 1) a transmission is provided between the parts 14 and 25 and crank arms 18 which extend from elongated adjusting shafts 19 respectively situated between

and adjacent the walls 28. Arms 18 also have a friction mounting on shafts 19, respectively. Thus, because of the spherical configuration of the portions 16 of the transmission elements 17, they are capable of swinging and turning to convert the movement of elements 14 and 25 about the axis of the 15 into swinging of the arms 18 about the axes of the shaft 19.

The shafts 19 are themselves supported for rotary movement in suitable bearing brackets 21, respectively, carried by the walls 28, and the shafts 19 are also supported in a pair of additional supporting brackets 22 which may be identical with the support means 22 associated with the rack 23 of the end-shifting means 26. The pinions 20 respectively fixed to the shafts 19 respectively mesh with a pair of additional lateral racks 23 also supported together with the pinions for movement by the pair of additional support means 22 respectively located adjacent the sidewalls 28 as shown in FIG. 2 which illustrates how these additional lateral racks 23 extend through openings of walls 28. The inner ends of the lateral racks 23 which are directed toward each other are respectively fixed with side-shifting means 24 in the form of elongated parallel components extending along and adapted to engage the side edges of the sheets.

As was pointed out hereinbefore, the shaft 15 extends between and is supported for rotary movement by the sidewalls 28. The transverse bar 29 which carries the stops 30 is fixedly carried by the pair of opposed sidewalls 28. The sheets are stacked on a table 31 against one edge of which the stops 30 are located.

The drive to the shaft 4 and printing cylinders is provided by way of a belt 32, as shown schematically in FIG. 1.

The above-described structure operates as follows:

The drive means for the end-shifting means 26 includes the eccentric 3 which is driven from the shaft 4 and which transmits the drive by way of the ring 2 to the push-pull rod 1 so that through the pin 7 of the drive means a swinging reciprocating movement of the crank arm 8 and the lever 10 is provided. The arm 8 rotates the adjusting shaft 9 and thus the pinion 20 which reciprocates the rack 23 so that the end-shifting means 26 carries out its operating cycle.

The swinging movement is transmitted by a transmission means of the drive means from the lever 10 to the shaft 15 by way of the pin 11, the rod 12, the pin 13, and the bellcrank 14. As a result of the oscillatory turning of shaft 15, the swinging movement is transmitted to the crank arms 18 and the adjusting shafts 19 through the swing levers 17, and the arms 18 turn toward and away from each other. The adjusting rods 19 turn the pinions 20 which in turn shift the lateral racks 23 toward and away from each other so that the side-orienting means 24 are laterally moved.

The paper sheets which are taken from the printing cylinders by the nonillustrated stacking structure and are deposited on the table 31 are oriented by this structure. The end-shifting means 26 shifts the sheets into engagement with the end stops 30, while the pair of opposed side-shifting means 24 move toward each other and thus serve to engage the side edges of the sheets in order to orient them laterally. The movement of the end- and lateral-shifting means 26 and 24 is carried out simultaneously and continuously, with each operating cycle being repeated for each sheet. The adjustment of the components 24 and 26 is brought about by turning of the adjusting shafts 9 and 19 by way of suitable keys, wrenches, or the like which may be placed on the noncircular ends of the shafts 9 and 19, which may, for example, be of square cross section. Because of the friction engagement provided by way of the spring-pressed friction structure equivalent to a friction clutch between the crank arms 8 and 18 and the shafts 9 and 19, respectively, it is possible to turn the shafts 9 and 19 so as to adjust components 24 and 26 during the operation while the drive can still be transmitted frictionally from the crank arms 8 and 18 to the shafts 9 and 19, respectively.

Thus, through this exceedingly simple construction it is possible to bring about the desired orientation with an inexpensive structure parts of which can be readily replaced with the possibility of adjusting each of the components 24 and 26 during the operation independently of the others.

I claim:

1. In an assembly for properly orienting sheets which are stacked one upon another, end stop means for engaging sheets at one end thereof, end-shifting means for engaging an opposed end of the sheets and shifting them toward said end stop means to locate said one end of the sheets in engagement with end stop means, a pair of opposed side-shifting means for respectively engaging opposed sides of the sheets to situate them laterally at a predetermined location with respect to said end stop means, a single drive means operatively connected with said end-shifting means, and transmission means extending from said drive means to said opposed side-shifting means for transmitting the drive thereto, said transmission means comprising a shaft associated with each of said end-shifting and side-shifting means and friction clutch means interconnecting each of said shafts, said drive means coacting with said friction clutch means and with said end-shifting means and said pair of opposed side-shifting means for cyclically actuating them whenever a sheet is deposited on a stack in order to properly orient the sheet with the remainder of the stack, said friction clutch means permitting adjustment of each of said end- and side-shifting means to selectively vary the distance between said end-shifting means and said end stop means and between said side-shifting means for different size sheets.

2. The combination of claim 1 and wherein each of said shifting means is in the form of an elongated member extending along the sheet edge which is to be engaged, and said drive and transmission means including elongated racks respectively fixed to and extending perpendicularly from said elongated members, pinions respectively meshing with said racks, and means coacting with said pinions for rotating them in opposed directions to reciprocate said elongated members during each operating cycle.

3. The combination of claim 2 and wherein three support means are respectively provided for said racks and pinions of said three shifting means to support the pinions for rotary movement and to support the racks for longitudinal movement.

4. The combination of claim 3 and wherein the pinion of said end-shifting means has a shift of said drive means fixed to and projecting therefrom, a crank arm fixed to and extending from said shaft, a push-pull rod pivotally connected to said crank arm a ring fixed to said rod distant from said crank arm, a rotary eccentric situated within said ring for actuating the latter to displace said rod back and forth for turning said shaft back and forth, and said transmission means extending from said shaft to said pair of side-shifting means.

5. The combination of claim 4 and wherein said transmission means includes a bellcrank on said shaft and having one arm also connected with said push-pull rod, an elongated link pivotally connected to and extending from the other arm of said bellcrank, a second bellcrank connected to said link distant from said one bellcrank, a shaft fixed to and extending from said second bellcrank, a lever fixed to said latter shaft, a pair of shafts respectively fixed to and extending from said pinions of said pair of opposed side-shifting means, a pair of additional crank arms respectively fixed to and extending from the latter shafts, and a pair of swing-lever means respectively interconnecting said second bellcrank and said lever with said crank arms to swing the shafts and thus turn said pinions of said side-shifting means back and forth.

6. The combination of claim 5 and wherein said swing-lever means have spherical joints between said second bellcrank and lever and said additional crank arms.

7. The combination of claim 6 and wherein all of said shafts which are connected with said pinions are respectively frictionally driven by the crank arms connected therewith so that by turning the latter shafts the location of all of said shifting means can be adjusted independently of each other to provide for proper orientation of a sheet of a given size.

* * * * *