July 15, 1952 L. K. HEINRICH 2,603,364

MAGAZINE FEED

Filed Sept. 13, 1946 2 SHEETS—SHEET 1

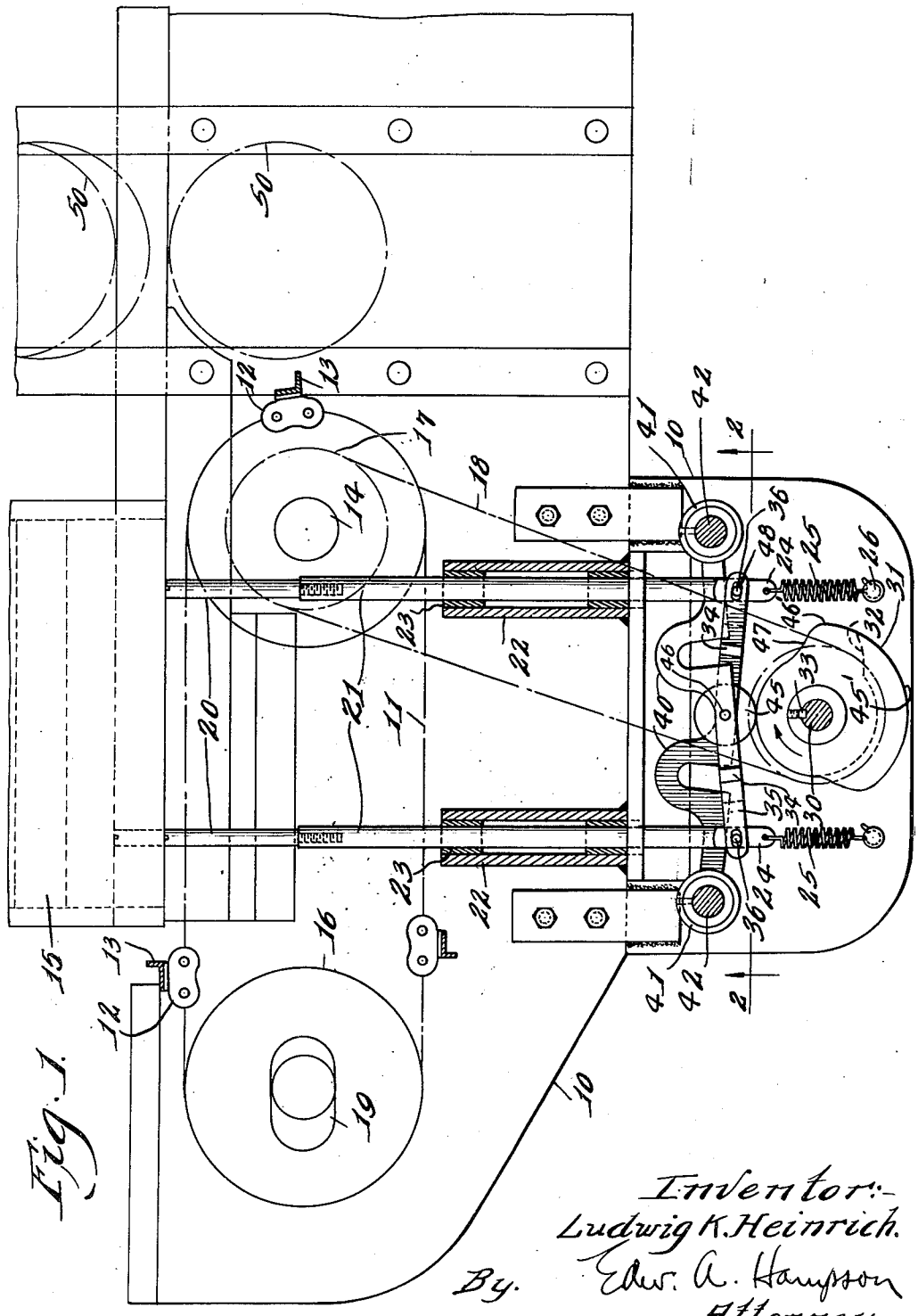


Fig. 1.

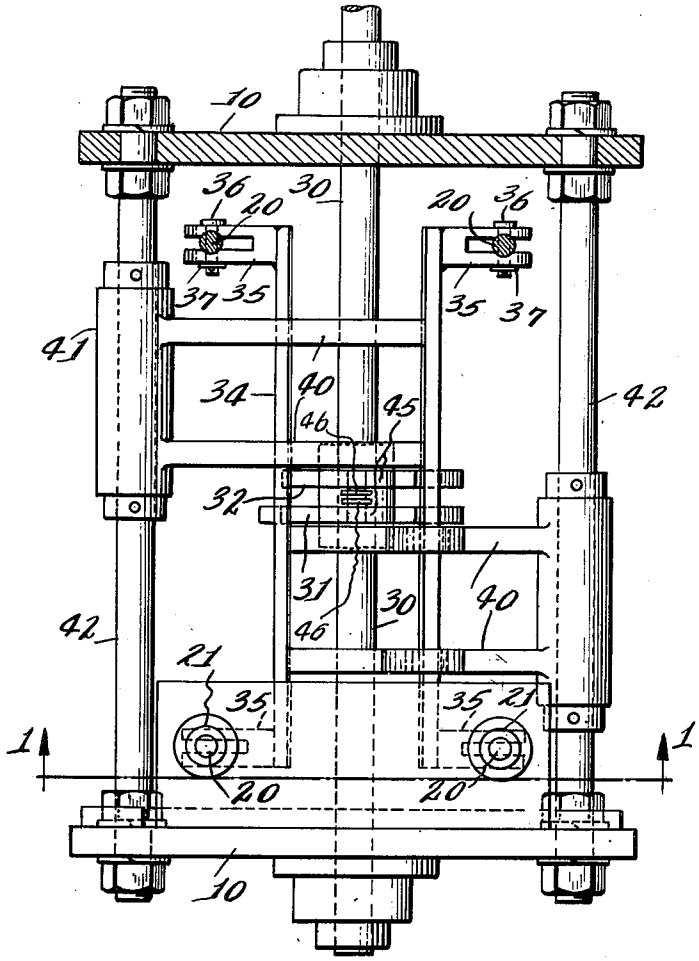
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Fig. 2.



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2 Claims. (Cl. 214—8.5)

1

It is common, in connection with various machines to which flat sheet material is fed, for some types of machine operation, to provide a magazine feed in which a stack of the sheets may be placed to be fed one by one to the machine to be operated upon.

The type of feeder to which this invention relates is that type of feeder for feeding sheets of appreciable thickness, say, at least one-eighth inch, or thicker, and it generally comprises an open end box member suitably supported over an endless conveyor or belt which is provided with lugs properly spaced on the conveyor, and which lugs successively engage the back edge of the bottom sheet of the pile or stack to push it out from under the pile, whereupon the pile settles down or falls so that the next lug on the conveyor will contact the rear edge of the next sheet of the pile and push it out from under the pile, and continuing until the magazine is emptied; or, if additional sheets are added from time to time, then continuing so long as the machine continues to operate.

The objects of this invention are to provide a new and improved magazine feeder of the general type above briefly described. In particular, it is an object of this invention to provide a mechanism, in connection with such magazine feeder, whereby the sheets being fed, while in the magazine, are prevented from "rocking" back and forth, as is usual in connection with the use of such magazine feeds as ordinarily used. Other and further objects of the invention will become apparent upon reading the following description of the device and as will be covered in the appended claims.

The magazine feed device hereof is illustrated in the accompanying drawings, wherein—

Figure 1 comprises a cross section of the feeder device taken on line 1—1 of Figure 2; and

Figure 2 comprises a composite view, one half being a bottom plan and the other half comprising a cross-sectional view taken on line 2—2 of Figure 1.

The magazine feed device hereof comprises, of course, a suitable frame in which the various parts, hereafter described, are mounted, but since the mounting frame is merely conventional, no detail description thereof will be given, and such is generally designated in the drawing by numeral 10. Mounted on frame 10 there is provided an endless belt conveyor, such being shown conventionally by dash-line 11, in connection with which, however, the several individual elements, or links 12, are illustrated, these illustrated links being those which carry pusher lugs 13 which, as the conveyor is operated, serve to feed the blanks or units successively to some following machine for machining or other step or processing.

2

Positioned above conveyor 11 and spaced slightly therefrom there is provided a box-like magazine 15 which is of suitable dimensions to receive the sheets or units which are to be fed by this magazine feed device. For example, if the units to be fed are units of one-half inch insulation board 12 inches by 12 inches, then the magazine will have dimensions just slightly over 12 inches by 12 inches, and will be of such height as will receive a plurality of the half inch insulating board units as a stack.

The conveyor 11 is, of course, trained over suitable sprockets or rolls 16, and mounted on one of the rolls 16 there is a suitable driving sprocket or pulley 17 which, through belt or chain 18, drives the cam mechanism, subsequently described, and provision may be made for a longitudinal adjustment of the axis of one of the conveyor sprockets 16, as is generally indicated at 19. Suitable power, of course, will be applied to shaft 14 of the conveyor system for driving the conveyor.

It is to be understood that the endless belt or conveyor, which has above been described, is described merely in a most general way, since the details of this will, of course, vary according to the designer and according to the specific type of material which is to be fed. The details of the conveyor 11 are not important in connection with the invention hereof, and it is to be understood that the conveyor is merely a conventional means for successively removing units of material from the bottom of the stack of material in magazine 15 to advance such units successively to suitable feed rolls which feed the sheets successively for a succeeding operation. In connection with the conveyor 11, however, there is one consideration which must not be lost sight of in connection with its design. Such conveyor cannot be one which is solid across the full width of the machine; that is, it must comprise a plurality of separate chains, belts, or the like, to provide at least one narrow gap width-wise in the conveyor, or, in most cases, two such narrow gaps or spaces spaced width-wise of the conveyor, one from the other. These spaces or openings in the conveyor 11 must be provided in order that supporting pins 20, which will be hereinafter more fully described, may pass through such gaps or spaces in the conveyor, and the function of which will also be subsequently described.

In a magazine feeder, such as has been described, and which is more or less common in use, there is a very definite defect which very commonly causes considerable damage to the sheet material which is being fed by the device from the magazine. Upon consideration of the general construction, as such has been described, it will be readily seen that as conveyor 11 advances, from left to right, a lug of the conveyor

will contact the rear edge of the bottom unit of elements in magazine **15**, and as the conveyor advances will push such unit out from under the stack of units in the magazine. As a lug **13** starts to push a unit from under the magazine, all the units being in a horizontal position, they will remain horizontal until the rear edge of the unit being advanced passes the center line of the stack of units, whereupon the rear end of the stack of units will tend to fulcrum on the top rear corner of the bottom unit being advanced, and the entire stack in the magazine will tend to tip backwards. Now as the bottom unit is pushed forward further, and finally clears the forward edge of the stack in the magazine, the entire superposed stack of units tends to do two things: One, they drop downwardly a distance which is the thickness of the bottom unit which has been removed from under the stack, and two, to come back to a horizontal position. This action just described imparts to the stack of units in the magazine **15** a continuous "rocking" movement, backward and forward, and a jolt, as the unit being advanced clears the forward edge of the stack, resulting in the forward edge of the stack abruptly dropping to return the stack to its horizontal position.

The invention hereof prevents the back and forth "rocking" motion which is imparted to the pile of units in the magazine, and by suitably supporting the pile of units, with a lowering of the pile as a unit and in a horizontal position, the drop and consequent jar, which was above referred to, is avoided.

The mechanism for carrying out the objects of this invention comprises essentially a pair of spaced supporting pins **20** which, together with suitable cam and connected lever mechanism, causes these supporting pins **20** to reciprocate under controlled conditions and in proper sequence to obtain the results comprising the particular objects of the invention.

The pins **20** are shown as separate pins mounted on push rods **21** but having their lower ends threaded into suitably threaded recesses in the upper ends of push rods **21**. It will be understood, of course, that this may be any suitable connection and that the supporting pins **20** and push rods **21** are separate elements only for the purpose of facility in removing pins **20**, since under some conditions of use the upper ends of these pins might wear or be damaged.

Push rods **21** operate through suitable supporting sleeves **22** which may be provided with removable bushings **23**, if desired.

The lower ends of push rods **21** are provided with small openings **24** for connecting the upper end of a spring **25** to push rod **21**, and the lower end of such spring **25** is fastened to a pin or rod **26**, which spring, so connected to the lower end of the push rod, biases the push rod downwardly. The push rods **21** and their supporting pins **20** are shown in the drawing as arranged in two pairs longitudinally of the machine with the push rods of each pair spaced transversely across the machine. The exact position of the push rods depends, of course, on the units which are to be fed, but for a 12 x 12 unit, for example, the push rods are preferably located approximately 10 inches apart transversely of the machine, so that the units may be supported near their side edges, and the push rods are further positioned lengthwise of the machine, spaced about six inches apart, and positioned so as to approximately center under the unit to be fed, and thus lengthwise of the machine the supporting points are positioned about one-fourth of the lengthwise dimension of the unit from each, the front and rear edges, and the support points are spaced apart one-half the lengthwise dimension of the unit supported.

The push rods **21** are actuated by a cam and lever mechanism, and, as shown in the drawing, there is illustrated a single cam shaft **30** on which there are mounted cams **31** and **32** secured by key and set screw **33**, or other suitable securing means.

The cam **31** actuates the rear pair of push rods **21**, that is the pair toward the left in the drawing, Figure 1, and cam **32** actuates the forward pair of push rods, the pair to the right, Figure 1.

For actuating each of the pairs of push rods **21** there is provided a yoke connection for member **34** which has outwardly extending portions **35** which are slotted or bored, or the like, to receive the lower ends of push rods **21** which, in turn, are provided with holes drilled cross-wise near the lower ends of the push rods whereby, by means pins **36** passing through registering openings in the outwardly extending portion **35** of yoke members **34**, and through the openings provided in the lower ends of the push rods, the push rods are securely connected to such outwardly extending portions **35**. Pins **36** it is, of course, understood can be suitably retained in place by cotter pins or by a spring ring **37**, as illustrated, or by other suitable means.

Push rods actuating yokes **34** are mounted on the outer ends of pivoted arms **40** which, at the other end, are provided with a suitably bored portion **41** which is mounted on rod **42**, in turn appropriately mounted in the frame work **10** of the machine. This construction, just described, as will be understood, provides pivoted actuating arms for reciprocating one pair of the push rods, the such system being pivoted on cross-rod **42** and actuating one pair of the push rods, that is, either the forward or rear pair, and there is provided a similarly but oppositely arranged push rod actuating system for actuating the other pair of push rods.

Each of these push rod actuating systems has suitably mounted on one of its outwardly extending arms **40** a cam contacting roller **45**, shown as mounted on a pin **46**, which is suitably mounted in arm **40**. The cam rollers are mounted over cams **31** and **32** and ride on the surfaces of the cams as the cams rotate. In the operation of this device, with the cam rotating in a clockwise direction, and with a lug **13** having advanced to a point where it has pushed the bottom unit of the stack in the magazine forwardly to just beyond the rear supporting pins **20**, the leading face of cam **31** will be in position to and will begin to push its associated roller **45** upwardly which, due to its connection to pivot arm **40**, will move its associated yoke upwardly and through connection with the push rods will cause the connected push rods to rise as the cam roller rides up on the rising face of the cam.

At the point just described, the lower unit being fed from the magazine has not advanced sufficiently, so that the rear end of the pile of units in the magazine overbalances and tends to pivot, and since the rear set of push rods and supporting pins **20** have been raised to supporting position, it results that as the rear end of the bottom unit being advanced passes the center of the stack, the rear end cannot pivot and fall, since the rear end of the stack is supported on rear supporting pins **20**.

As the lowermost unit, which is being fed, is further advanced, its rear end will finally pass the position of the forward pair of supporting pins, and at this point the leading face of cam 32 will contact its cooperating roller 45 and cause the roller and connected pivoted arm 40 to rise as the rising face of cam 32 continues to rotate. This pivoting action of the push rod actuating mechanism which operates the forward pair of push rods causes, through the connections described, the forward pair of push rods to rise to support the forward end of the stack of units before the lowermost unit is carried entirely out from under the stack, and thus it results, when the lowermost unit does pass out from under the stack, that the forward end of the stack cannot fall, since it is supported on the forward pair of supporting pins 20, and at this point the entire stack is supported upon the two pairs of supporting pins 20, one pair located toward the rear of the stack and the other located toward the front end of the stack.

During the period following the projection of the rear pair of supporting pins 20 by the action of the rising face of cam 31, and for the short period between the projection of the forward pair of supporting pins 20 by the rising face of cam 32, and until just after the rearward edge of the unit being moved forward clears the forward edge of the stack, the pins are held in raised position by the arcuate portions 45' and 46', respectively, of cams 31 and 32, as will be readily understood from consideration of the drawings.

In further operation of the mechanism, and just after the rear end of the lowermost unit has cleared the forward end of the magazine, the movement of the cams, due to receding cam faces 47, and through the riding of rollers 45 down such receding faces, provide conditions whereby the push rod springs 25 retract the push rods, both pairs being retracted, since both rollers are riding down the receding faces, with consequent pivoting downward of the push rod arms 40 and connected yokes 34, so that it results that both pairs of push rods and supporting pins, through their downward movement, allow the pile of units in magazine 15 to move downwardly, all in a horizontal position, until the lowermost has reached the conveyor, whereupon the then lowermost unit will be picked up by the next lug 13 to be moved out from under the pile.

While it has not been above mentioned, it will, of course, be understood that a loose connection must be provided between push rods 21 and the pivoted push rod actuating systems, and for this purpose the opening in the outwardly extending portions 35 of yokes 34 are elongated somewhat, as at 48, to provide the required loose connection to compensate for the arcuate movement of the connecting point at the outer ends of the push rod yoke portions 35.

While it is believed that the operation of the device will be readily understood from the foregoing detailed description, the operation may be summarized as follows:

With a pile of units in the magazine, the units lying in a horizontal position and the lowermost down against the conveyor, the lowermost unit is picked up by lug 13 and begins to move forwardly. As the rear end of this unit passes the rear pair of supporting pins, the cam mechanism described causes these rear supporting pins to rise to support the rear end of the stack of units. As the bottom unit is advanced further to pass the forward pair of supporting pins, the cam mechanism causes these forward supporting pins to rise to support the pile of units adjacent their forward edges, and finally, just after the rear edge of the lower unit clears the forward edge of the magazine, both pairs of supporting pins are retracted so as to lower the pile of units down, still in a horizontal position, until the now lowermost unit rests on the conveyor for a repetition of the described cycle.

The units being advanced from the magazine may be pushed forward on the conveyor until their forward edges come into the nip of a pair of feed rollers, which are generally indicated at 50, and these feed rollers will feed the units successively to a machine of some type for further processing.

The invention having been described in detail in the foregoing, what I claim is:

1. A magazine feeder apparatus comprising a conveyor, a magazine receiving sheet material to be fed serially operatively positioned over the conveyor, pusher lugs mounted on the conveyor and functioning to push out and advance from said magazine the lowermost unit of a stack of sheet form units, horizontally positioned, stacked therein; and in combination therewith stack supporting fingers, mounted, for vertical movement, below the magazine and positioned both behind and in front of the transverse center line of the magazine, and means reciprocating the supporting fingers vertically.

2. A magazine feeder apparatus comprising a conveyor, a magazine receiving sheet material to be fed serially operatively positioned over the conveyor, pusher lugs mounted on the conveyor and functioning to push out and advance from said magazine the lowermost unit of a stack of sheet form units, horizontally positioned, stacked therein; and in combination therewith stack supporting fingers, mounted for vertical movement below the magazine and positioned adjacent the rear and front edges of the magazine, pivoted arms connected to the supporting fingers, cam means mounted for rotation operatively associated with the pivoted arms, the cam means formed with rising faces, dwell faces and receding faces and the such cam faces related in position to operate the pivoted arms serially to project a supporting finger, to hold such finger projected, to then project the other supporting finger and to then allow simultaneous retraction of the supporting fingers, there being connected to the supporting fingers means biasing the supporting fingers to retracted position.

LUDWIG K. HEINRICH.

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