July 19, 1966 C. L. PETERSON ET AL 3,261,603

FORMS STACKING DEVICE

Filed May 18, 1964 3 Sheets-Sheet 1

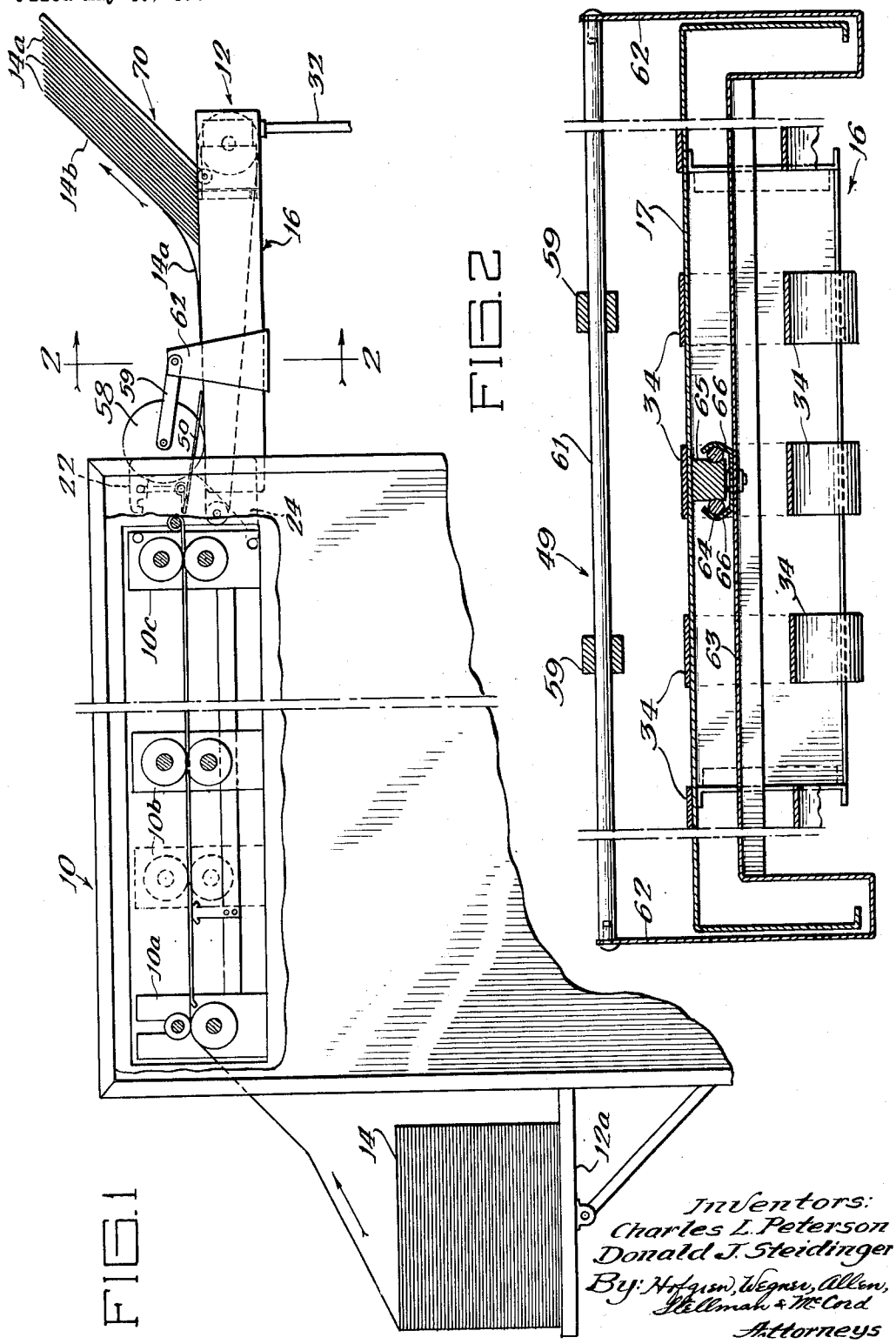


FIG. 1

FIG. 2

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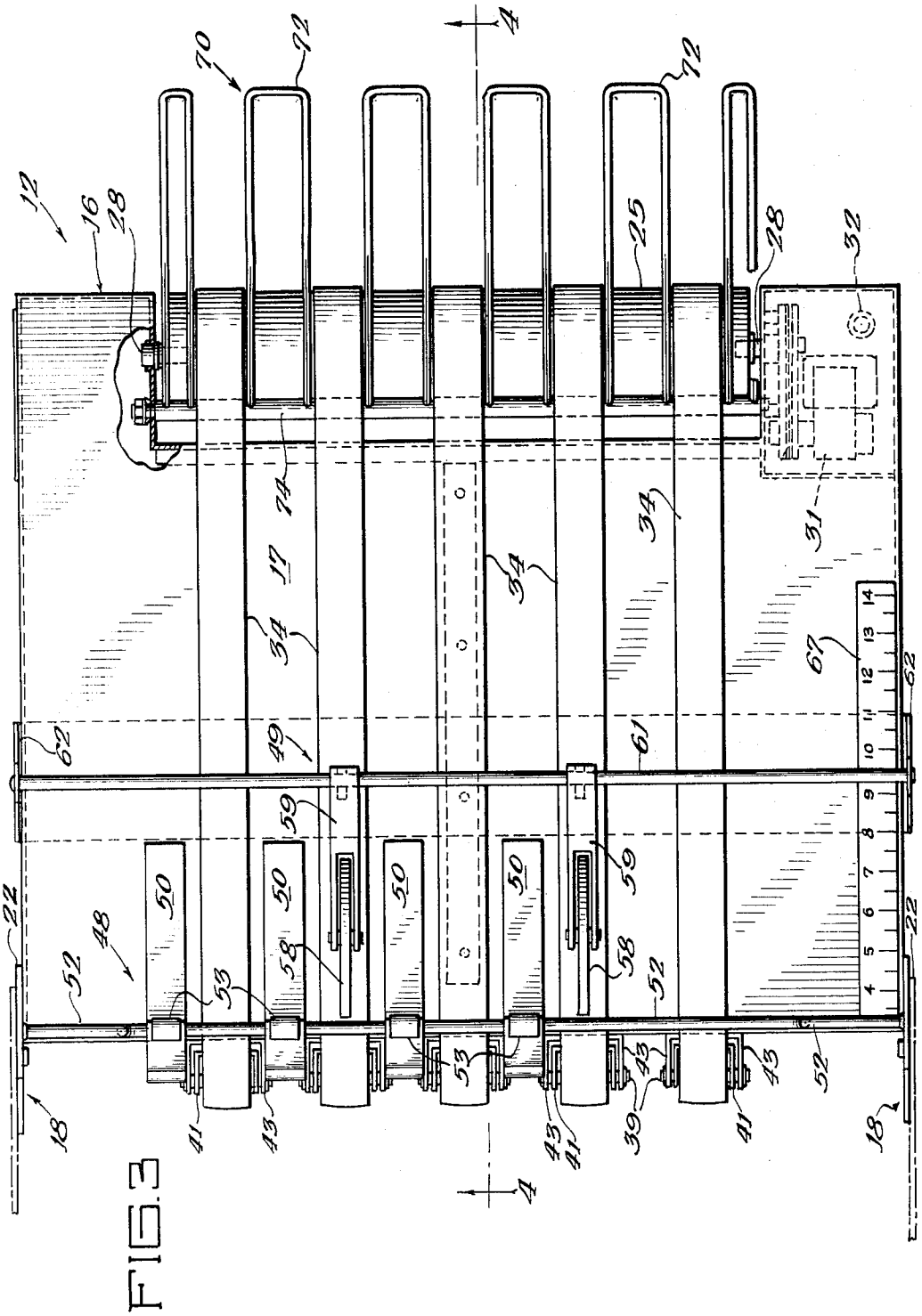


FIG. 3

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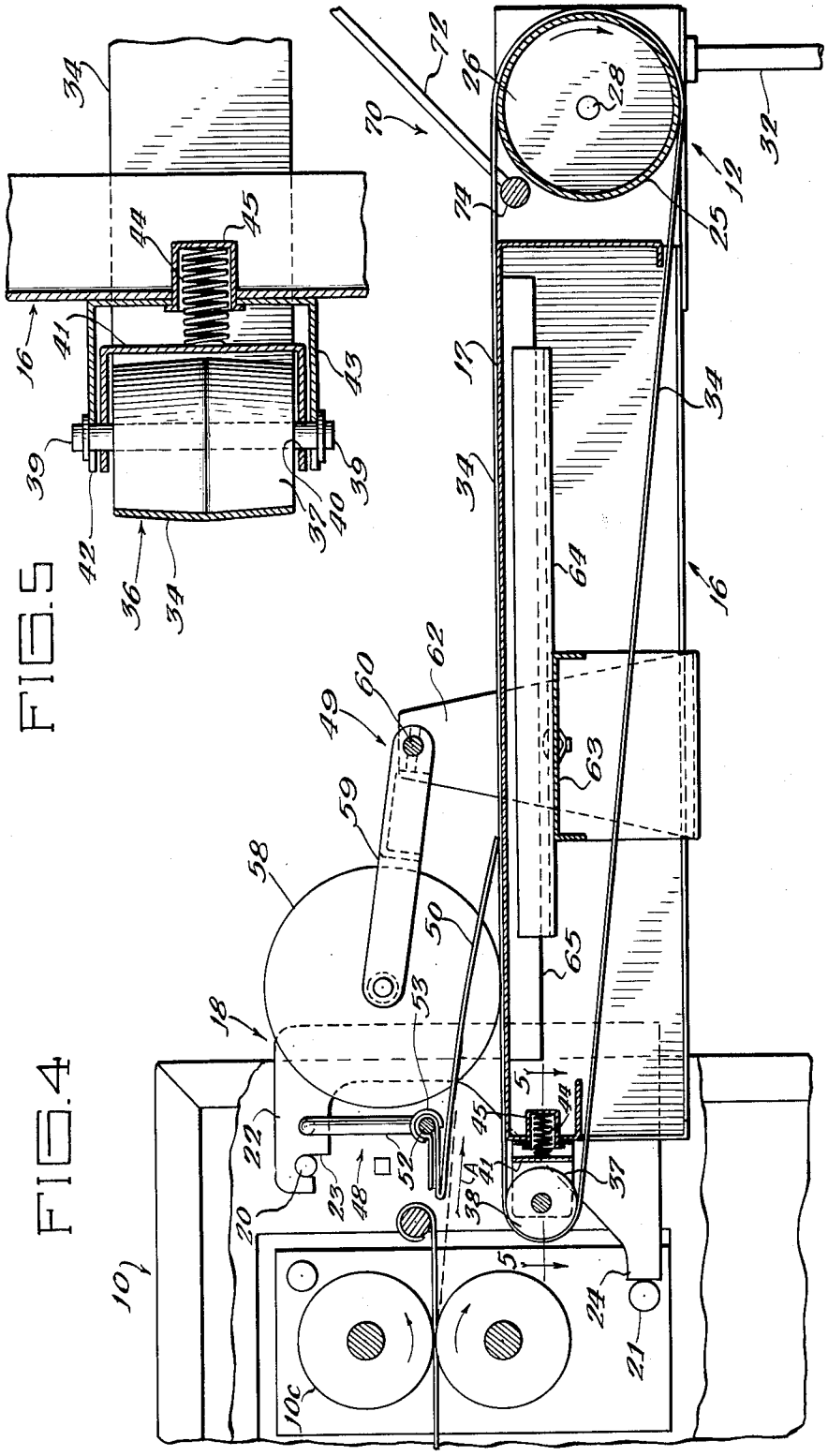


FIG. 5

FIG. 4

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FORMS STACKING DEVICE

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This invention relates to paper handling devices and more particularly to a stacking device for receiving and stacking individual from lengths of stationery which have been separated by a bursting apparatus.

Modern businesses require forms processing equipment which is capable of processing stationery with the greatest speed and facility while at the same time being capable of rapid and easy adjustment to meet the demands of different stationery processing situations. It is most desirable for such equipment to be capable of being operated and adjusted by those office personnel not known for, or expected to have, a great deal of knowledge or dexterity with tools. Since forms processing machines are frequently operated by female personnel, this desirable feature becomes a necessity. With regard to stacking mechanisms for burster apparatus, it is most desirable that the stacking device be capable of operating at least equal to, if not beyond, the capabilities of the burster apparatus to which it is attached. The capacity of the stacking mechanism should not be the limiting factor for the burster apparatus. It is also desirable that the stacking mechanism be capable of continually receiving individual form lengths of stationery and that there be no necessity for stopping the bursting operation in order to remove a portion of the burst forms from the stack. It is further desirable that the stacking mechanism be of such a nature as to insure sequential stacking i.e., that the sequential order found in the continuous form length be maintained among the several individual forms in the stack. Finally, it is desirable that the stacking mechanism be capable of stacking many different weights and qualities of paper within the purview of the aforementioned desirable features.

It is therefore a general object of this invention to provide a new and improved stacking device for a bursting machine.

It is a primary object of this invention to provide a new and improved stacking device for a bursting machine which is capable of stacking many different qualities of paper at a rate at least equal to the burster output in the same sequential order as found in the continuous form in such a manner as to permit withdrawal of some of the stacked forms without interrupting the bursting or stacking process.

It is another object of this invention to provide a new and improved stacking device for a burster apparatus wherein the stationery is stacked substantially on edge.

Yet another object of this invention is to provide a new and improved stacking device for bursting apparatus having means which carries the paper from its ejection from the burster to a stacked position.

Still another object of this invention is to provide a new and improved stacking device for a burster apparatus having means for reducing the speed of the ejected burst form and thence carrying the form to the stacking area.

It is a further object of this invention to provide a new and improved stacking device for a burster apparatus having means for reducing the speed of a form which is ejected from a burster and means for carrying the form at a constant speed over a driven belt to a stacking area wherein the form is stacked substantially on edge.

Yet another object of this invention is to provide a new and improved stacking device for a burster apparatus having means for carrying burst forms at a reduced speed from the point of the ejection from the burster and stacking the same substantially on edge, said burster being capable of handling extremely thin or light paper and being provided with appropriate adjustments all of which may be easily manually adjusted.

Other objects, features and advantages of the present invention will be apparent from the following description of the preferred embodiment illustrated in the accompanying drawings, in which:

FIGURE 1 is a fragmentary side elevational view of the burster to which the stacking mechanism of this invention has been attached;

FIGURE 2 is a broken section view taken along the line 2—2 of FIGURE 1 showing the nipper roller assembly in section;

FIGURE 3 is a top plan view of the stacking device of this invention;

FIGURE 4 is a longitudinal section view taken along the line 4—4 of FIGURE 3; and

FIGURE 5 is an enlarged fragmentary section view of the idler roller and its mounting.

Referring now to the drawings, in FIGURE 1 there is shown a burster **10** to which the stacking device **12** of this invention is attached. A stack **14** of zigzag folded continuous form stationery is shown supported on a tray **12***a* at the front of the burster and is driven through the burster through infeed rollers **10***a*, intermediate rollers **10***b* and rear bursting rollers **10***c* to be separated into individual form lengths **14***a* and expelled onto the stacking device where the individual form lengths are positioned in a stack **14***b*. The stacking device includes a generally elongate box-like frame **16** for supporting several of the components of this invention which will be described in detail later. The top of the frame comprises a generally flat bed **17** along which individual form lengths are carried into stacking position.

Attaching means **18** are provided for securing the stacking device to the rear of the burster in such a manner as to eliminate the need for any tools. The rear of the burster is provided with a hooking post **20** and an abutment post **21**. Similarly, the stacking device is provided with a forwardly extending upright arm **22** at either side which includes a notch at **23** at the top for embracing the hooking post **20** and an abutment surface **24** at the lower end for abutting the other post **21** to facilitate simple and rapid attachment of the stacking device to the burster in a relatively secure fashion. Gravity will tend to pull the substantially cantilevered stacking device into continual abutting position with the stop post. However, a simple upward movement will serve to easily withdraw the stacker from the burster.

Extending across the rear of the stacking device is a drive roll **25**. The drive roll comprises a generally elongate hollow tube closed at either end by disc-like end caps **26**. The roll is provided with outwardly projecting journals such as **28** which rotatably mount the roller in the frame. The drive roll is driven by an electric motor which is directly coupled to the journal **28** by a pin drive. The motor provides the stacking device with an independent source of power so that the device may be driven separately from the burster. The motor is connected by well known cord means **32** with a source of electrical power (not shown) which may be an outlet in the burster or a conventional wall outlet.

As the motor is driven to rotate the drive roll, the drive roll in turn will drive several belts **34** which are wrapped around a portion of the periphery of the drive roll and extend generally longitudinally over the bed of the stacker. At their opposite ends, the belts **34** are wrapped about the idler rolls **36** which are positioned at the front of the stacking device. Each idler roll has a generally barrel-shaped body **37** having disc-like opposed ends **38**. Journaling pins **39** project from either

end along the axis of each idler roll and extend through openings **40** in the ears of yoke **41** to mount the idler rolls for rotation relative to the yoke **41**. The pins protrude beyond the yoke mounting and are positioned in a slot **42** in a second yoke **43** which is affixed to the front of the frame. The several belts wrapped about each idler roll hold the rolls and yokes **41** in the yokes **43**.

A coil spring **44** is interposed between the yoke **41** and the frame to bias the yoke against the frame and thereby tension the belts which are wrapped about the rolls. Each spring is positioned in a small cup **45** positioned in the front of the frame and protrudes outwardly therefrom through the yoke **43** into abutting contact with the base of the yoke **41**. Thus, the several driven belts are tensioned in a front to rear position relative to the burster so that stationery form lengths ejected from the rear of the burster in the direction indicated by the arrow A in FIGURE 4 may be carried along the length of the bed of the stacking mechanism by the several driven belts to a stacking position at the rear of the platform member.

As the individual form lengths are ejected from the rear of the burster, they are traveling at a relatively high rate of speed, such as in the order of 250 feet per minute or so. It has been found that stacking may be more precisely and neatly accomplished if the speed of the individual form lengths is greatly reduced from the burster ejection speed. To this end, the drive roll is driven at a rate so that the belts will transport the form lengths along the length of the bed at a greatly reduced speed, such as about thirty to forty feet per minute. For reducing the speed of the ejected form length in the area immediately adjacent the rear of the burster and placing the ejected form lengths in an overlapping stackable condition, the stacking device is provided with a deflector assembly **48** and a nip roller assembly **49** to provide for the rapid deceleration of the form length.

The deflector assembly includes a plurality of deflector tapes **50**, preferably made of Mylar strips or similar stiff material, which are held about a deflector rod **52** by means of a generally C-shaped plastic snap **53**. The deflector rod extends across the path of stationery travel at a height generally coplanar with the path of ejection of the burst form length. The deflector tapes diverge downwardly and rearwardly to intersect the path of form length travel to deflect and retard the rate of travel of the ejected form lengths and feed them onto the bed of the stacking device in front of the nip rollers. The rod is pivoted at either end in the upright arms of the attaching means and may be swung about its mounting to change the degree of deflection of the deflector tape, and thereby change the point at which the tapes meet the conveyor and the amount of pressure between the tape and conveyor, as is required for paper of different "weight" or different burster speeds. Thus, as paper leaves the rear of the burster, indicated in dotted outline in FIGURE 4, the paper will be caused to strike the tape and be slowed and deflected downwardly to a proper position where it may be received by the nip roller assembly.

The plastic snap **53** fits snugly about the periphery of the rod but is rotatable relative thereto to change the degree of the deflection of each individual tape relative to the table. Thus, the entire assembly of deflection tapes is adjustable both collectively and individually. The frictional fit between the plastic snap and plastic rod is such that the snap will tend to stay in any one position to which it has been moved and the individual deflector strips will move with the snap.

The nip roller assembly includes a pair of generally disc-like large nip rollers **58** which rest on a pair of the belts in an area in between the deflector tapes. Each roller is held pivoted to a bifurcated nip roller arm **59** which is pivoted to the nip roller assembly at **60**. The nip roller assembly includes an elongate bar **61** positioned above the platform and extending across the path of stationery travel. At either end the bar is pivoted to a pair of generally upright spaced supports **62** which are positioned outside the platform **16**. The upright supports **62** are bent under the sides of the platform **16** and then bent upwardly and are joined by an intermediate cross bar **63** to form a unit which generally embraces the platform **16**. A channel **64** is secured to the top of the cross piece and partially envelopes a downwardly projecting rail **65** which is secured to the underside of the bed **17**. Both the channel **64** and rail **65** extend generally longitudinally of the platform. Positioned between the channel and the rail are a pair of spherical balls **66** which provide a rolling contact between the channel and the rail to permit the channel, and therefore the nip roller assembly, to be moved longitudinally relative to the bed while firmly retaining the assembly at any selected position along the longitudinal extent of its movement. A scale **67** is provided at one side of the bed so that different positions of the nip roller assembly movement may be recorded and re-established with ease to insure optimum performance. The nip roller may be positioned between the deflector tapes (as shown in the drawings) or to the rear thereof for optimum performance with longer forms by merely swinging the bar **61** about its pivot to displace the nip rollers approximately 180 degrees.

Once the individual form length has been deflected by the deflector tapes, it is caused to fall downwardly and strike the bed of the table wheer it is received approximately at the bight of the roller, so that, while the thrust of the paper will cause it to pass on through between the engagement of the bight of the roller and the belt on which the roller rests, the form length will be substantially decelerated in speed from the approximately 250 feet per minute at which it was ejected from the burster, to approximately 30 to 40 feet per minute, which is substantially the same as the speed at which the belts are driven. Since the nip roller assembly is manually movable along the length of the stacking device, it too can be suitably adjusted for optimum performance by mere manual effort without the need for any special tools.

Provided at the rear of the stacking device slightly in front of the drive rolls is a stacking rack **70** which projects upwardly from the bed of the stacking device and against which the several burst form lengths are stacked substantially on edge in a manner similar to that shown in FIGURE 1. The stacking rack **70** includes a plurality of generally U-shaped bars **72** which are fixed to a rod **74** pivoted to the frame of the stacking device. The rack may be swung to different positions of angularity relative to the bed of the device to adapt the stacking device for optimum stacking characteristics depending upon the paper weight and ejection speed of the forms being processed by the burster. As the forms are carried along the bed of the device by the several belts they come into contact with angularly disposed stacking rack and are urged upwardly therealong. The several successive forms are similarly urged upward in front of the preceding forms to maintain the sequential order of the forms which was present in the continuous form stack.

With the components positioned as shown in FIGURE 4, a burst form length ejected from the rear of the burster will follow a path where it will substantially simultaneously strike the deflector tapes and the nip rollers. To adjust the stacking device for optimum performance the attendant may (especially to use with rather short form lengths) either individually or collectively adjust the deflector tapes. For use with larger form lengths, the attendant adjusts the nip rollers by moving the entire assembly along the length of the platform or inverting the rollers by swinging the arms **59** about their pivot on the bar **61**. For optimum performance, the adjustment of the deflector tapes and nip rollers should be made so that the ejected form lengths will strike the tapes and be urged

downwardly toward the platform and into the bight of the nip rollers in tandem overlapping fashion to promote stacking. As the form lengths are advanced toward the stacking rack, each succeeding form length is caused to turn up and be stacked by the preceding form lengths to be carried into a stacking position substantially upright relative to the device and generally parallel with the stacking rack.

As forms are removed from the stack by an attendant, the stack will be "closed" and the stacking function will not be interfered with due to the unique structure of this invention. Those forms which are not lifted from the stack will be carried over against the rack by the underlying tapes which continue to move past the marginal edges upon which the stacked forms rest, thereby serving to keep the stack in a relatively trim condition by continuously urging the stacked forms against one another. If it is desired to remove some of the forms from the stack, either because the depth of the stack is approaching the maximum limitations of size of the bed or for any other reason, an attendant need merely to lift those forms from the stack as desired without the necessity for interrupting the bursting or stacking operation. Sequential order may be maintained by removing those stacked lengths from the rear of the stack which are adjacent the stack rack. With regard to the capacity of the stacking device the only limitations are in the length of the bed of the device or in the weight of the upright stack which will relate to the frequency with which the stack forms are removed. The weight of the upright forms will tend to stall the belts, the longer forms causing stalling when the pack is thinner in depth than the shorter forms. Since this invention provides a unique concept of stacking the stationery substantially on edge (at least angularly disposed to the bed of the stacker) as opposed to the hitherto known means of stacking in a generally upright column previous limitations as to depth of the stack and the necessity for halting the bursting and stacking process to remove part of the stack are now eliminated.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, for some modifications will be obvious to those skilled in the art.

We claim:

1. A stacking device for a continuous form stationery burster, comprising: a platform connected to the burster in a position to receive the ejected individual form lengths of stationery from the burster; a plurality of driven belts extending generally in the path of stationery travel affording a moving surface for carrying the ejected form lengths along the platform at a reduced speed relative to the burster speed; means for stacking the form lengths in a generally upright position near the end of the platform opposite from said burster, said means including a rack pivoted to the platform and projecting thereabove, said rack swingable to different positions of angular disposition relative to the platform for receiving the individual form lengths of stationery in a stacked condition substantially on their respective marginal edges; means for reducing the speed of the ejected form lengths, said means comprising a pair of rollers supported above said platform near the burster with a portion of the periphery of the rollers in contact with a pair of said belts so that form lengths ejected from the burster at a high rate of speed will pass between the point of contact of said rollers and said belts causing a reduction in the rate of travel of said form lengths, said rollers being connected to a frame which is slidably mounted to said platform for manual movement along the longitudinal extent of said platform to adapt the speed reducing means for optimum performance under different burster speeds or for use with stationery of different characteristics; and means for deflecting the ejected form lengths to guide the same into said speed reducing means, said deflecting means including a plurality of strips of relatively stiff material positioned in front of said speed reducing means and adjacent to the burster, said strip extending generally across the path of the ejected form lengths and toward the belts so that stationery ejected from the burster can be deflected onto the belts and toward the point of engagement between the rollers and the belt, said deflecting means including a pivoted rod to which said strips are connected, said pivoted rod being spaced above the platform and manually swingable to different positions of angular disposition relative to the platform to change the angular disposition of the strips relative to the platform to adapt the deflecting means for optimum performance under different burster speeds as well as for use with stationery of different characteristics.

2. The device of claim 1 wherein each of said strips is connected to said pivoted rod by a snugly fitting sleeve arrangement to provide a means for individually changing the degree of deflection of each strip relative to the platform by rotating said sleeve relative to said rod.

3. In a stacking device for a continuous form stationery burster including a platform having a movable surface for carrying form lengths ejected from the burster along the platform at a reduced speed relative to the speed of ejection from the burster and further including a stacking member for stacking individual form lengths near the end of the platform, means for deflecting the individual form lengths as they are ejected from the burster, comprising: a plurality of strips of relatively stiff material positioned in the path of ejection of form lengths from the burster, said strips being yieldable in the direction of ejection so that stationery ejected from the burster can be deflected onto the movable surface of the platform.

4. The stacking device of claim 3 wherein said strips are connected to a pivoted rod which is connected to and spaced above the platform and wherein said rod may be manually swung to different positions of angular disposition relative to the platform to change the angular disposition of the strips relative to the platform to adapt the stacking device for use with stationery of different characteristics and different burster speeds.

5. The stacking device of claim 4 wherein said strips are connected to said pivoted rod by means affording a change in the degree of deflection of each individual strip relative to the platform.

6. A stacking device for a continuous form stationery burster, comprising: a platform connected to the burster in a position to receive ejected form lengths of stationery from the burster, said platform having a movable surface for carrying ejected form lengths along the platform at a reduced speed relative to the burster speed; a stacking member at the end of the platform opposite the burster for stacking form lengths carried by said movable surface; means intermediate the ends of the platform for reducing the speed of ejected form lengths including a plurality of members in at least tangential contact with said moving surface affording a restricted passage through which said form lengths are fed after ejection from the burster; and means for deflecting the ejected form lengths into said speed reducing means including a plurality of strips of relatively stiff material positioned between the speed reducing means and the burster, said strips extending generally across the path of ejected form lengths and toward the moving surface so that stationery ejected from the burster will be deflected onto the moving surface and toward the point of engagement between the speed reducing means and the moving surface.

7. A stacking device for a continuous form stationery burster, comprising: a platform connected to the burster in a position to receive ejected form lengths of stationery from the burster, said platform having a movable surface for carrying said ejected form lengths along the platform at a reduced speed relative to the paper speed; roller means connected to the platform at a point intermediate the ends thereof with a portion of the periphery of the roller means in contact with said movable surface forming

a restricted passage through which form lengths ejected from the buster at a high rate of speed must pass; and means for deflecting and directing said form lengths to the point of contact between said roller means and said movable surface, said means including a plurality of tape-like strips of slightly flexible material connected to the platform at a point between the roller surfaces and the burster, said strips extending generally across the path of travel of ejected form lengths and toward the moving surface so that stationery ejected from the burster will be deflected onto the movable surface and toward the point of contact between the roller means and the movable surface.

8. The stacking device of claim 7 wherein said strips are individually and collectively adjustable relative to the moving surface to change the degree of deflection of stationery directed thereto.

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