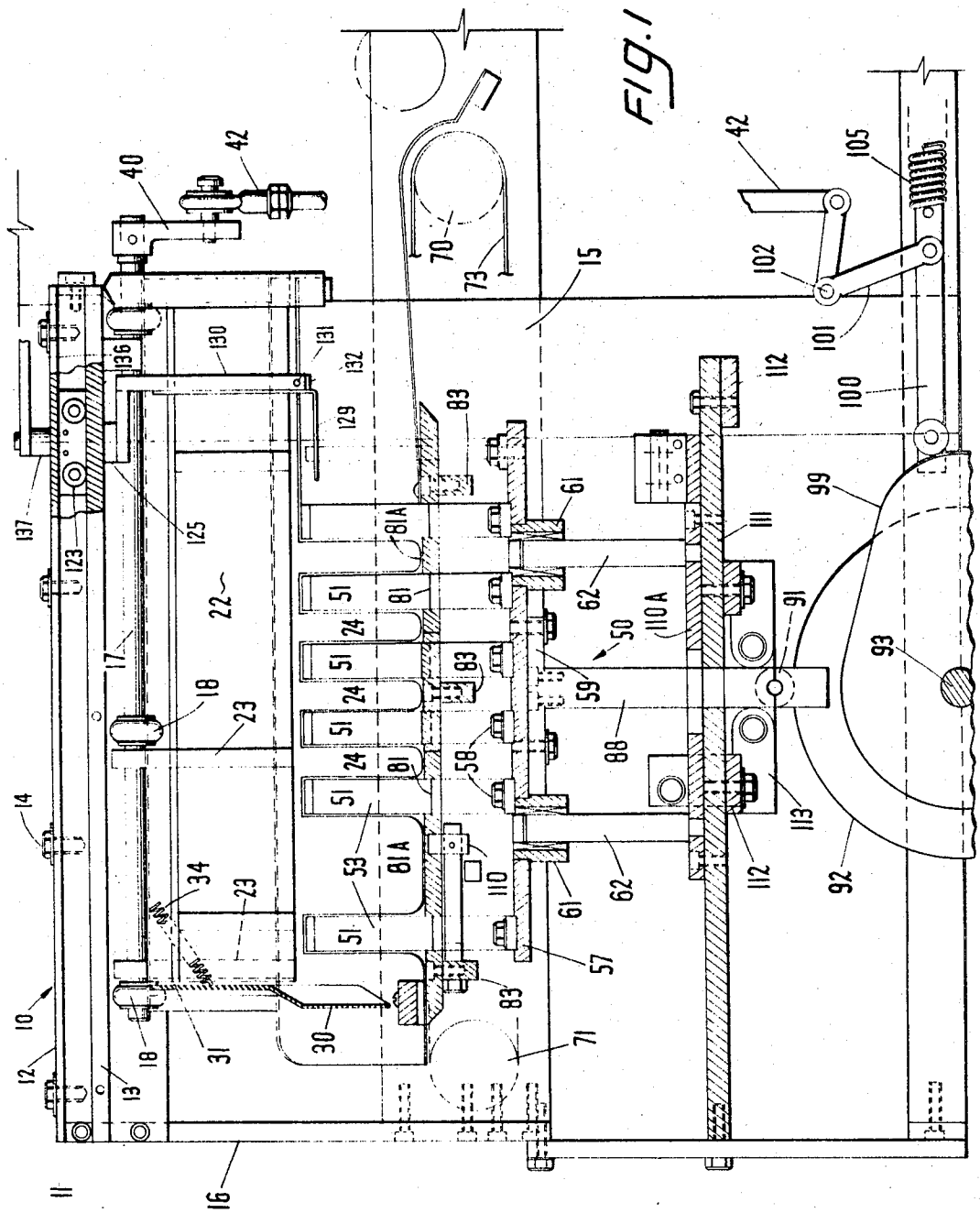
June 24, 1969 R. L. SJOSTROM 3,451,562

STACKER

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FIG. 1



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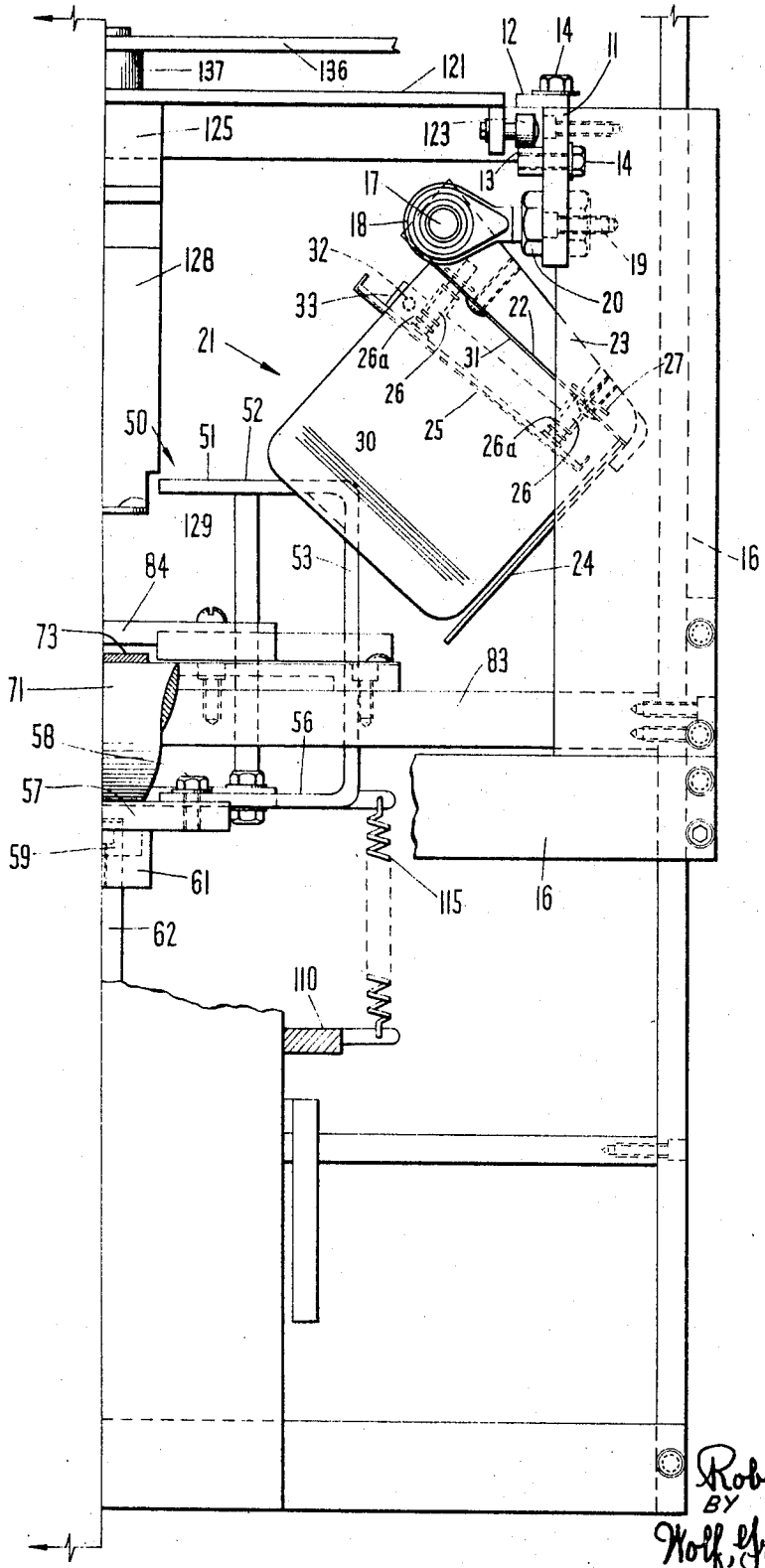


FIG. 2

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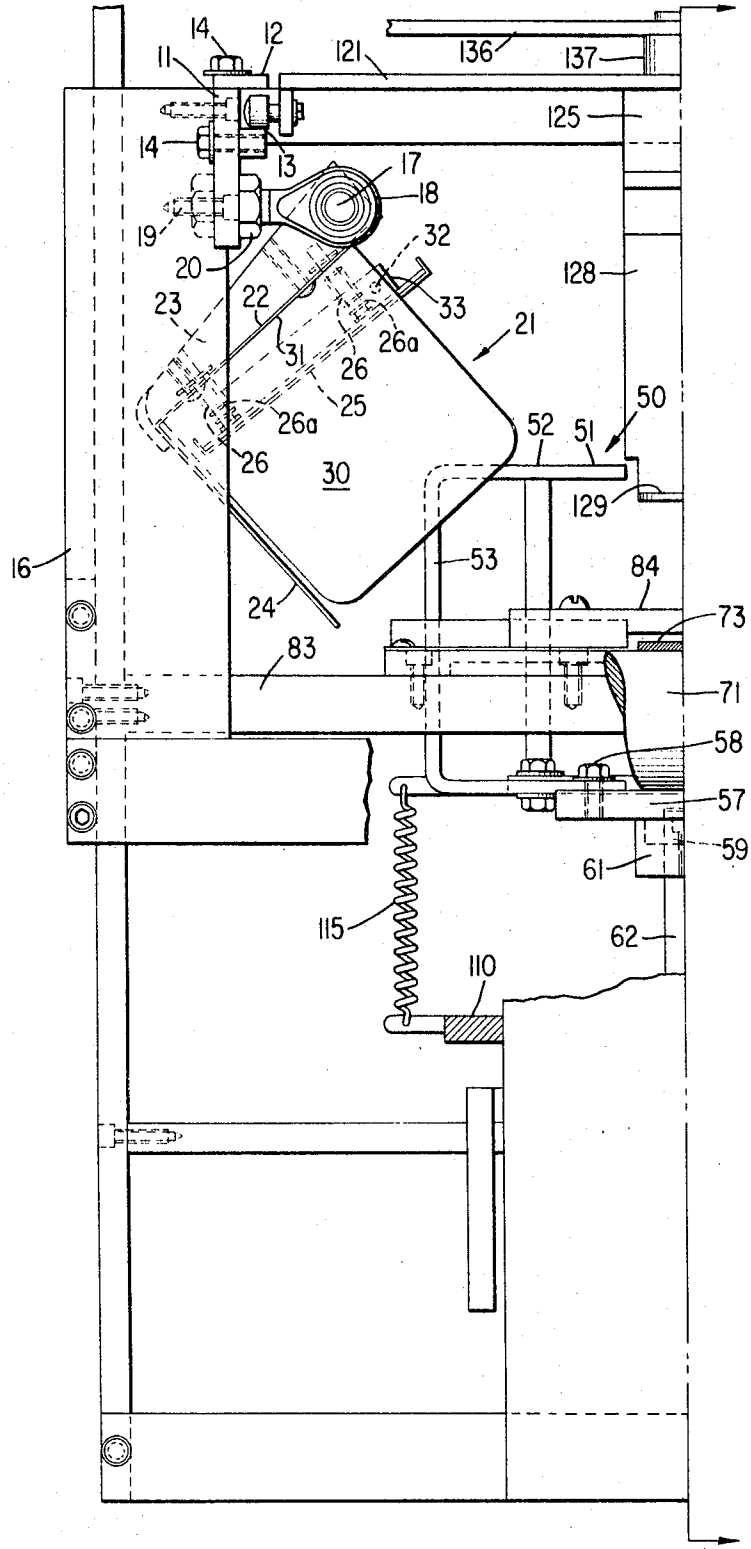


FIG. 2A

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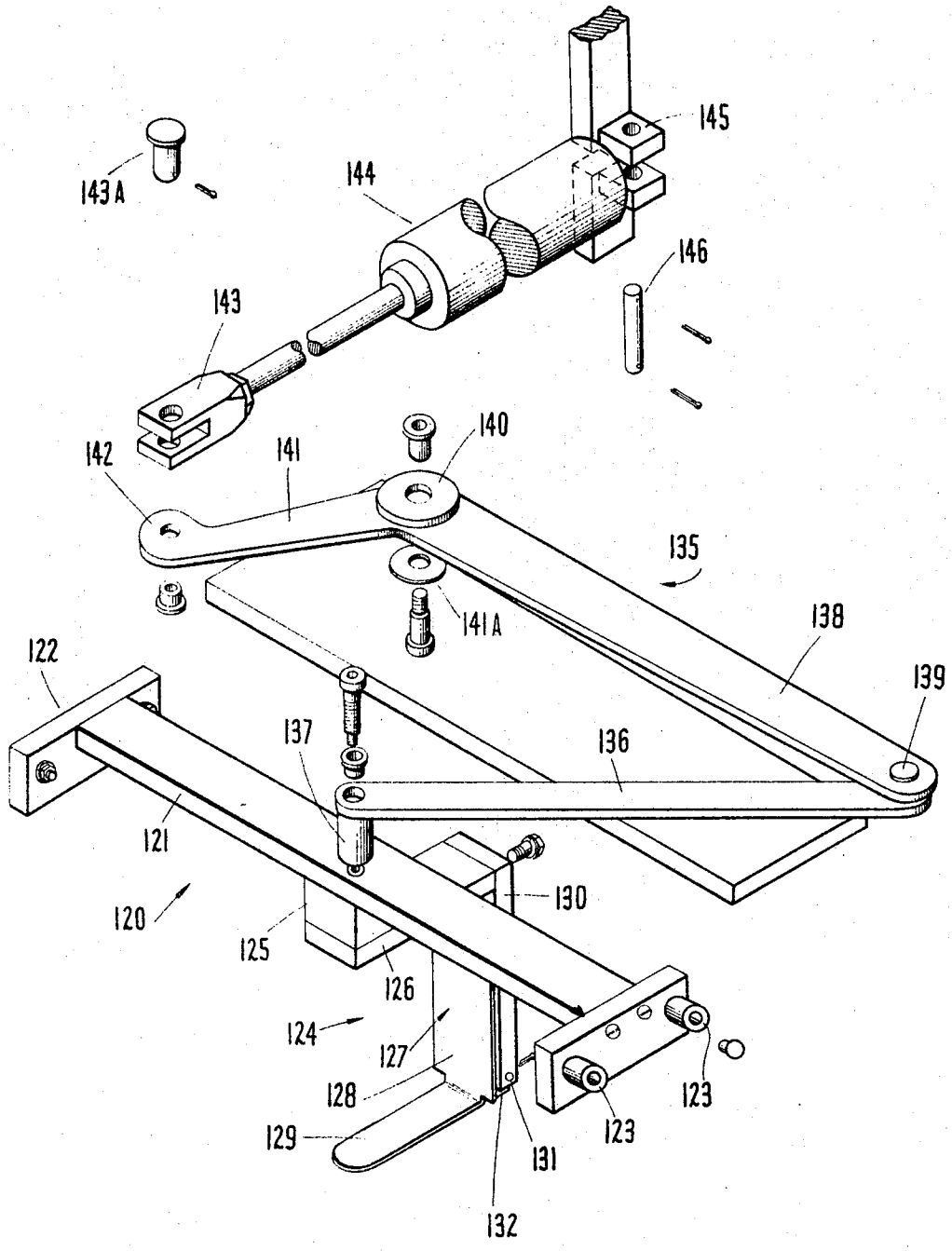


FIG. 3

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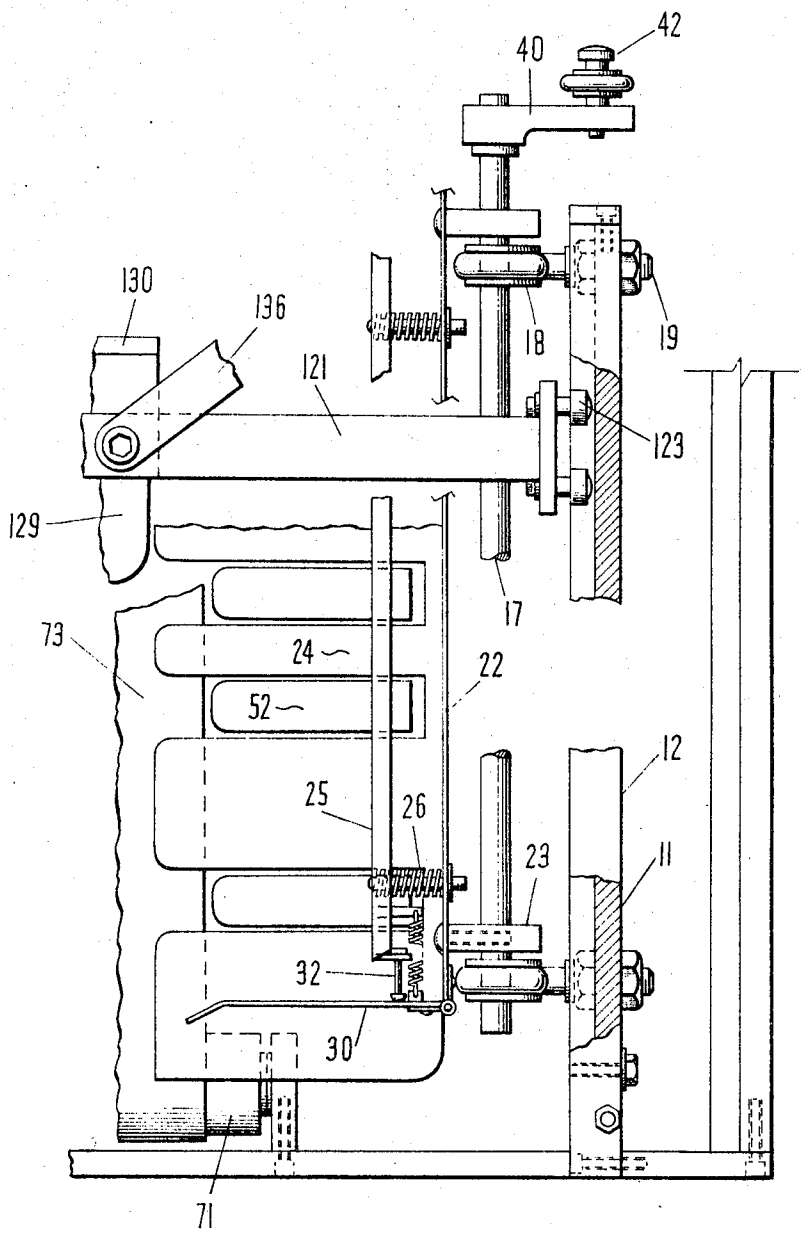


FIG. 4

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3,451,562

STACKER

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Int. Cl. B65g 57/14, 57/18
U.S. Cl. 214—6 7 Claims

ABSTRACT OF THE DISCLOSURE

A stacker for a plurality of folded sheets in which successive sheets are fed forwardly by a belt to a first position and then raised upwardly by an elevator to a second position. A cradle engages and supports the successively delivered sheets in a stack in the second position with each later delivered sheet positioned below the earlier delivered sheet. A means comprising a carriage and a pusher are provided for moving the stack forwardly at selected intervals from the cradle. The pusher includes means for engaging and raising the rear edge of the stack and the cradle includes side plates resiliently tensioned toward the sides of the stack of sheets.

The present invention relates to a stacker mechanism particularly adapted for use with folding machines for flexible sheets.

Many folding machines, particularly those designed for folding textile materials, sheets, towels and the like are used in conjunction with a variety of integrated stacking mechanism which are designed to receive and stack the folded articles in selected numbers. Many of the now existing stacking mechanisms have limitations with respect to the speed, neatness or accuracy with which they operate. These factors are of some commercial importance in selling these machines in a highly competitive industry. Consequently it is an object of the present invention to provide an efficient and accurate stacking mechanism for folding machines which is capable of stacking multiple folded articles with such uniformity that all the edges of the folded articles are vertically aligned.

It is also an object of the present invention to provide a stacking mechanism for a folding machine which is simple in operation, inexpensive to maintain and repair, sturdy and unlikely to break down, and unlikely to malfunction.

These and other objects and advantages of the present invention will be more clearly understood in connection with the accompanying drawing in which:

FIG. 1 is a partially cross sectional side elevational view of a machine embodying the invention;

FIG. 2 is an end elevation in partial fragmentation looking from the left of FIG. 1 of the right side of the machine;

FIG. 2A is an end elevation and partial fragmentation looking from the left of FIG. 1 of the left side of the machine, FIG. 2A being a mirror image of FIG. 2 and illustrating a part integral therewith;

FIG. 3 is an exploded perspective view of a pusher mechanism which is shown at the right of FIG. 1; and

FIG. 4 is a top plan view in partial fragmentation.

The stacker mechanism of this invention is adapted to be used on the frame of a variety of folding machines on which folded articles are successively delivered. The folder described in United States Patent No. 3,190,640 is typcial of the type of machine with which this folder may be used. Frame **10** of this machine projects forwardly from the delivery end of the folder to provide a supporting means for the stack mechanism. The frame includes a pair of opposite side bars or plates **11**. Suitably

secured to each of the plates **11** are upper and lower guide bars **12** and **13** respectively which form opposed parallel guide rails. These bars **12** and **13** may be suitably secured by bolts **14** or other suitable means. Also forming a part of the frame **10** are integrally connected side and end members **15, 16** which provide suitable support for the various components comprising the stacker.

A pair of shafts **17** are each supported for rotation on the side plates **11** by a plurality of suitable journalling means **18**. These journalling means **18** may each comprise journals supported on brackets in turn bolted by bolts **19** and nuts **20** to the plates **11**. A stacker cradle comprising a pair of opposed similar portions **21** is supported with one portion secured for pivoting movement to each of the shafts **17**. Each portion **21** of the stacker cradle includes a supporting side plate **22**. The plate **22** is secured by rods or other suitable securing means **23** to a shaft **17** so that the plate **22** may pivot with the shaft **17**. Continuous with the lower edge of plate **22** are a plurality of fingers **24** which extend angularly from plate **22**. Preferably fingers **24** and plate **22** are at right angles to one another. Spaced equally from each plate **22** and substantially parallel to it is adjustable aligning plate **25**. This aligning plate **25** is supported for movement toward and away from plate **22** by a plurality of pins **26**. These pins **26** have coaxially mounted on them springs **26***a* interposed between the plates **22** and **25** so that the plates **25** are tensioned inwardly toward one another. The pins **26** are secured at their outer end to the plate **22** by bolts and/or washers or other suitable means **27**.

Also secured to each plate **22** is a hinged front plate **30**. Each front plate **30** is suitably secured by hinges **31** to the forward end of plate **22**. The plate **30** is normally positioned in a plane normal to the plane of plate **22** but is adapted to pivot forwardly from that position. A stop pin **32** is secured to a lip **33** flared from the adjustable plate **25**. This stop pin **32** provides a limit to rearward movement of the plate **30**. The plate **30** is normally tensioned against this pin **32** by a spring **34** which is secured at one end to the plate **25** and at the other end to the hinged forward plate **30** (FIG. 1).

The rear end of shaft **17** is connected to a suitable power source for reciprocally rotating the shaft over an arc of approximately 45 degrees from the position illustrated in FIGS. 1 and 2 to the position in which the fingers **24** are in a horizontal position. This connection may comprise a linkage which includes arm **40** connected at one end to the end of shaft **17** for rotation thereof. The other end of arm **40** is pivotally linked to connecting rod **42**. Rod **42** is connected to cam follower **100** through the L-shaped lever **101** which is pivotally supported on pin **102**, in turn secured to the frame. The cam follower **100** is maintained in contact with the cam **99** by spring **105** which in turn is suitably supported on the frame of the machine. Cam **99** is keyed to drive shaft **93** which in turn is connected by suitable means such as gearing or chain drive to a frame source such as a motor (not shown).

At the forward end of the support of the frame **10** is an elevator mechanism **50** (FIG. 2) This elevator mechanism **50** comprises an opposed pair of a plurality of parallel fingers **51**. These fingers **51** are formed with a horizontal component or leg **52** and continuous vertical component or leg **53**. These legs **52** and **53** are adapted to move in a vertical reciprocal motion between the fingers **24** when the fingers **24** have been pivoted downwardly to a position as illustrated in FIG. 2. The lower ends of the components **53** are continuous with the laterally extending finger **56** which in turn are secured to longitudinally extending plate **57** by bolts **58** or other suitable means. The longitudinally extending plate **57** in

turn is secured to supporting platforms **59** by bolts **60**. The platform is provided with sleeves or collars **61** into which the ends of the vertical guide shafts **62** extend. Preferably two of such shafts **62** constructions are provided.

Also suitably supported on the frame are a pair of belt rolls **70** and **71** respectively at the rear and forward end in the machine. These rolls **70** and **71** are suitably supported at their ends between the side members of the frame. These rolls carry a belt **73** which has an upper surface adapted to move from the rear to the forward end of the machine. The belt **73** has a width which is less than the distance between the aligned ends of the opposite fingers **52** so that these fingers may be moved from a position below the belts when in a retracted position to a position above the belts as illustrated in FIG. 2. The belt **73** is adapted to move continuously except when stopped by suitably located microswitch **110**.

A pair of spaced parallel longitudinal plates **81** are provided, each with a series of fingers **81A** between which fingers **52** may be moved upwardly and between which belt **73** may also move. These plates **81** are suitably secured to cross beam members **83** which in turn are secured at their ends to the side frame members. Hold down bar **84** spans the top of the belt toward the forward end of the machine. The belt moves underneath this hold down bar **84**.

Plate **57** is adapted to be moved vertically by cam follower **88** which is suitably secured at its upper end to the plate **57**. The follower wheel **91** and cam follower **88** engages cam **92** at the lower end of the cam follower. Cam **92** is fixed to the drive shaft **93** for rotation therewith. The cam follower **88** projects through support plate **110A**, in turn supported on plate **111**. Plate **111** is in turn secured to the frame by cross braces **112**. Journal members **113** supported on the braces **112** engage and guide the cam follower **88**. The plate **57** is normally tensioned downwardly by spring **115** (FIG. 2) which is secured at its upper end to the plate **57** and at its lower end to a bracket connected to the plate **110A**.

A pusher arm, shown in exploded perspective, is positioned at the rear end of the machine. This pusher arm includes a carriage **120** comprising a cross member **121** having supports **122** at each end with rollers or other suitable means **123** for sliding in the channels formed by the bars **12** and **13**. A pusher **124** is centrally secured to and moved by the carriage **120**. This pusher **124** includes a boss **125** interconnecting rearwardly extending leg **126** to which is secured downwardly extending leg **130**. The L-shaped member **127** comprised of integral connected vertical leg **128** and horizontal leg **129** is pivotally secured to the lower end of leg **130**. This pivotal interconnection may be provided by a rearwardly extending tongue **132** pivotally engaged to the lower end of leg **130** by pin **131**. The carriage **120** is reciprocated forwardly and rearwardly the length of the stacker by the lever mechanism **135**. The mechanism includes an L-shaped lever arm formed of legs **138** and **141** pivotally supported to the frame of the machine at their adjacent ends **140** by suitable means **141**. Link **136** pivotally interconnects end **139** of leg **138** with the carriage through a stud **137** centrally located on cross member **121**. End **142** of leg **141** is pivotally secured to the yoke **143** by pin **143A**. Yoke **143** is secured to the plunger arm of air cylinder **144**. Air cylinder **144** is in turn pivotally supported at its other end to the frame at aligned ears **145** by pin **146**. The air cylinder is controlled by conventional means which may be actuated by microswitch **110** through a suitable and conventional counter whereby the air cylinder will be actuated to reciprocate carriage **120** periodically, as for example once every twenty-five actuations of microswitch **110** (or rotations of shaft **93**).

In the operation of this invention individually folded napkins or other small articles are fed from the folding machine onto the rear end of belt **73**. The folded napkin is carried forward by this belt until its leading edge strikes microswitch **110** at the forward end of the machine. On actuation of microswitch **110** to shaft **93** is caused by suitable means, as for example by a clutch engagement with a motor source to rotate once. This causes a sequential operation of the stacker cradle and elevator mechanism **50**. First, the cradle pivots open to the position shown in FIG. 2 on rotation of shafts **17**, through elements **100**, **101**, **102**, **42** and **40**. Immediately subsequently the elevator mechanism **50** is raised. This raises the folded napkin upwardly above the fingers **24** of the cradle. The cradle then returns to its original position engaging the delivered napkin from underneath to complete the cycle. In subsequent cycles the napkins already positioned in the cradle are dropped onto subsequently delivered napkins so as to form a pile.

When a pile or stack of napkins of suitable number have been positioned in the cradle the pusher mechanism is actuated. This pusher may be automatically actuated or alternately manually controlled to push the stack of napkins from the cradle while fingers **24** are in a horizontal position. The stack is pushed onto a suitable table or receiving conveyor which may be aligned with the fingers **24** while in a horizontal position. As the carriage moves forwardly the vertical leg **128** of the L-shaped member engages the rear ends of the stack of napkins. As the leg **128** comes into firm engagement with these rear ends it pivots from a normal position in which its upper end is tilted forwardly to a substantially vertical position. This causes the horizontal leg **129** to pivot upwardly engaging the rear end of the lowermost napkin, thereby lifting the rear end of the stack from engagement with the fingers **24** of the cradle, as the pile or stack of napkins is being pushed forwardly from the cradle.

I claim:

1. A stacker mechanism for a plurality of folded sheets comprising,

belt means for successively delivering sheets to a first position,

elevator means for raising said successively delivered sheets to a second position above said first position,

cradle means for engaging and supporting said successively delivered sheets in a stack in said second position with each later delivered sheet positioned below the earlier delivered sheets, and means for forwardly moving said stack at selected intervals comprising

a carriage, means for forwardly moving said carriage,

a pusher means supported on said carriage for forward movement and including means for engaging the bottom rear edges of said stack and means for lifting only the rear end of said stack from said cradle as said pusher initially engages and pushes said stack forwardly.

2. A stacker mechanism as set forth in claim **1** wherein said pusher means comprises a pair of arms with one arm adapted to engage the rear edges of said stacked sheets and the other is adapted to engage the underside of the lowermost sheet positioned in said cradle means and raise said stack at the rear end thereof.

3. A stacker mechanism as set forth in claim **2**

wherein said pair of arms are integrally connected together at adjacent ends to form an L-shaped member.

4. A stacker mechhanism as set forth in claim **3**,

means pivotally supporting said L-shaped member on said carriage whereby engagement of said one arm with the rear edges of said sheets on forward movement of said carriage causes said other arm to pivot upwardly into lifting engagement with the rear end of said stack of sheets.

5. A stacker mechanism for a plurality of folded sheets comprising, belt means for successively delivering sheets to a first position, elevator means adapted to move upwardly for raising said successively delivered sheets to a second position above said first position and adapted thereafter to move downwardly, cradle means for engag-

ing and supporting said successively delivered sheets in a stack in said second position with each later-delivered sheet positioned below the earlier-delivered sheets, means for moving said cradle means from a position supporting said stack as said elevator means raises a sheet and for moving said cradle means into supporting engagement with said stack as said elevator moves downwardly, means for forwardly moving said stack at selected intervals comprising a carriage, means for forwardly moving said carriage, a pusher means supported on said carriage for forward movement and including means for engaging the rear edges of said stack and side plate means adapted to engage the sides of said stack of sheets supported on said cradle, means resiliently tensioning said side plate means toward said stack of sheets to limit lateral movement of said stack as said stack is moved forwardly, a forward plate adapted to engage the forward edge of said stack of sheets, and means hinging said forward plate to said cradle.

6. A stacker mechanism as set forth in claim **5** wherein said pusher means includes means for engaging and raising the rear end of said stack.

7. A stacker mechanism as set forth in claim **6** wherein said pusher means comprises

a pair of integrally connected arms in an L-shape with one arm adapted to engage the rear edges of said stacked sheets and the other is adapted to engage the underside of the lowermost sheet positioned in said cradle means.

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U.S. Cl. X.R.

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