March 7, 1967 B. A. ARVIDSON 3,307,846

STACKER FOR SHEETS OR BAGS

Filed Dec. 28, 1964 4 Sheets-Sheet 1

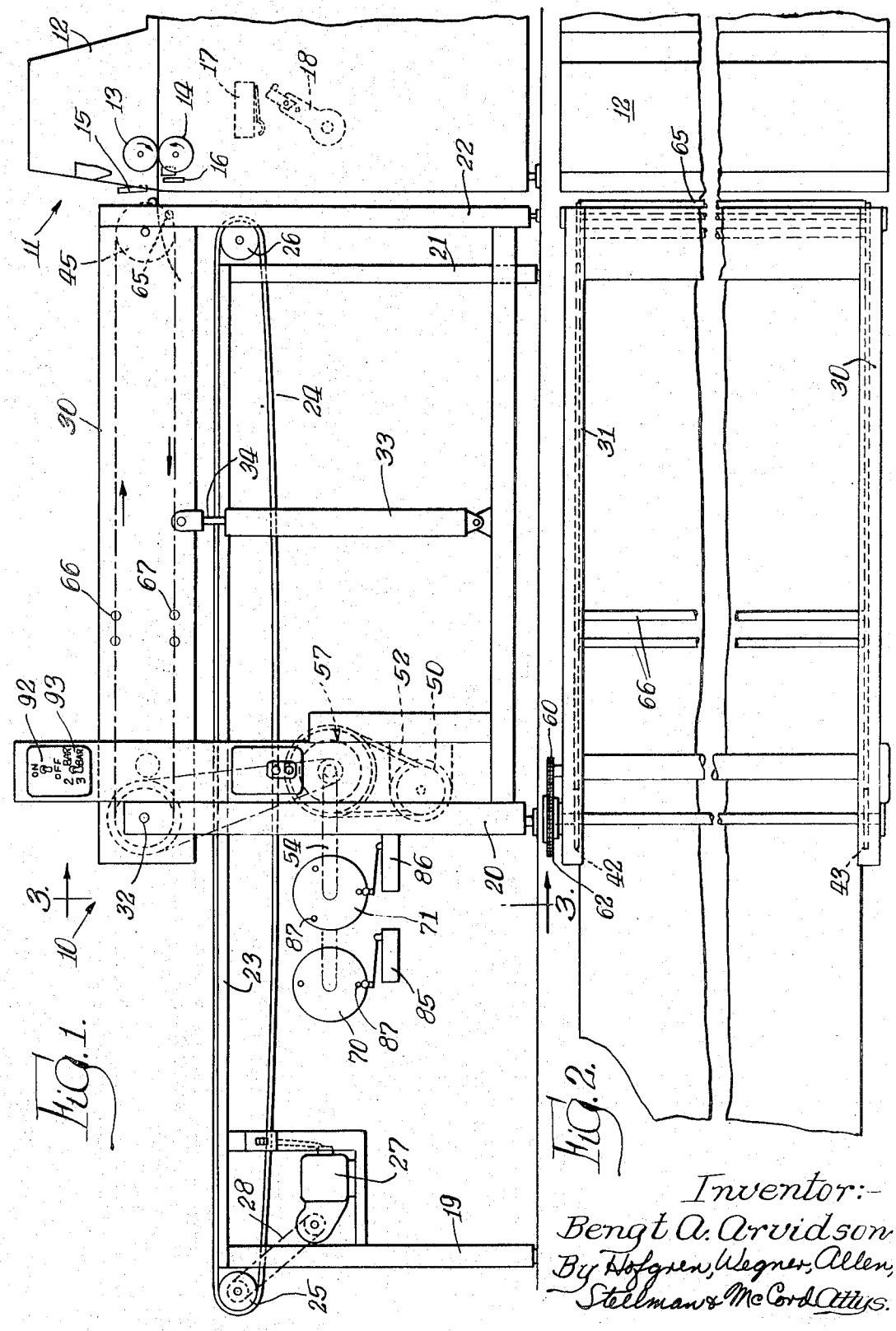



FIG. 1.

FIG. 2.

Inventor:-
Bengt A. Arvidson
By Hofgren, Wegner, Allen, Stellman & McCord Attys.

March 7, 1967 B. A. ARVIDSON 3,307,846

STACKER FOR SHEETS OR BAGS

Filed Dec. 28, 1964 4 Sheets-Sheet 2

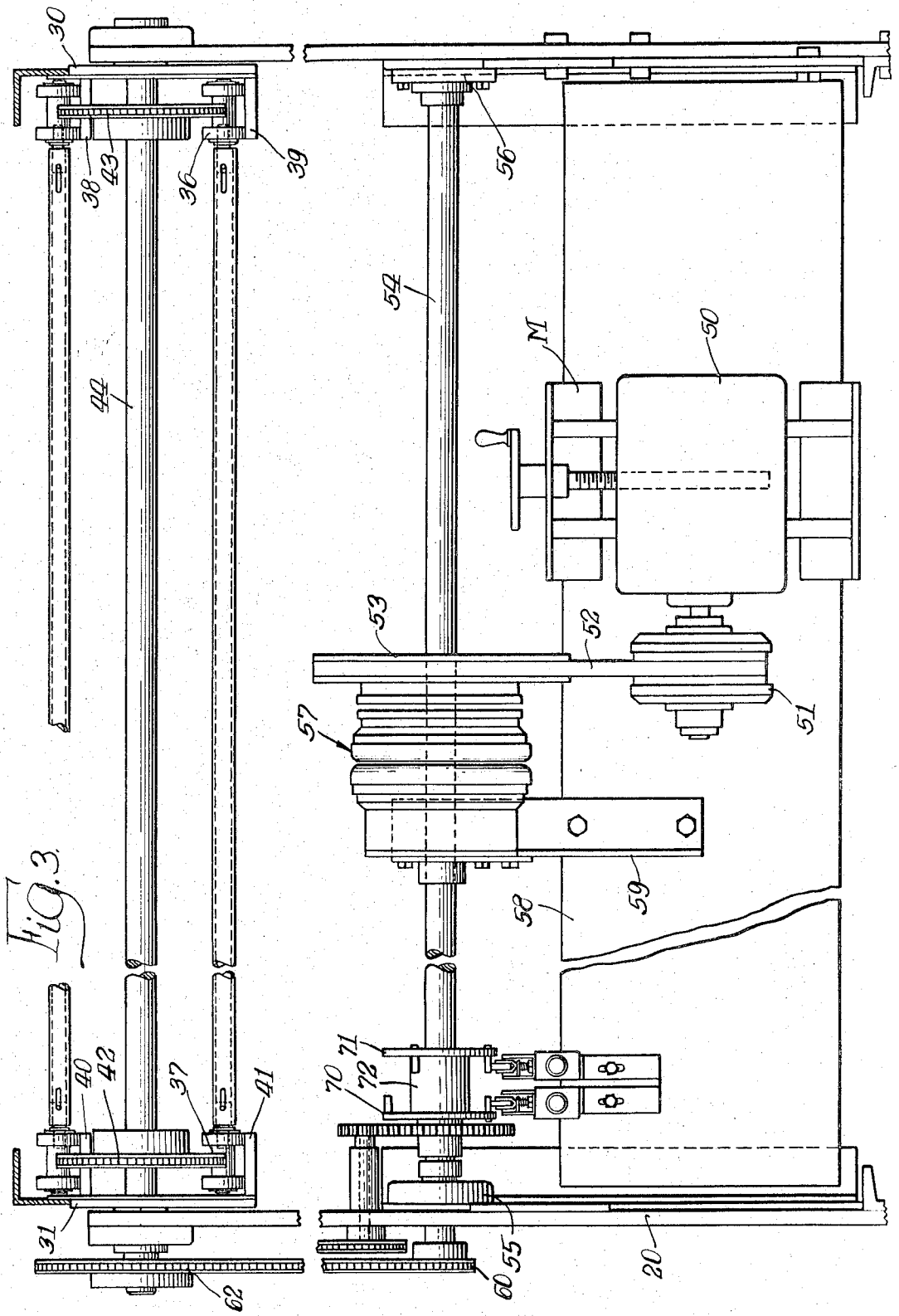



Fig. 3.

March 7, 1967 B. A. ARVIDSON 3,307,846

STACKER FOR SHEETS OR BAGS

Filed Dec. 28, 1964 4 Sheets-Sheet 3

Fig. 4.

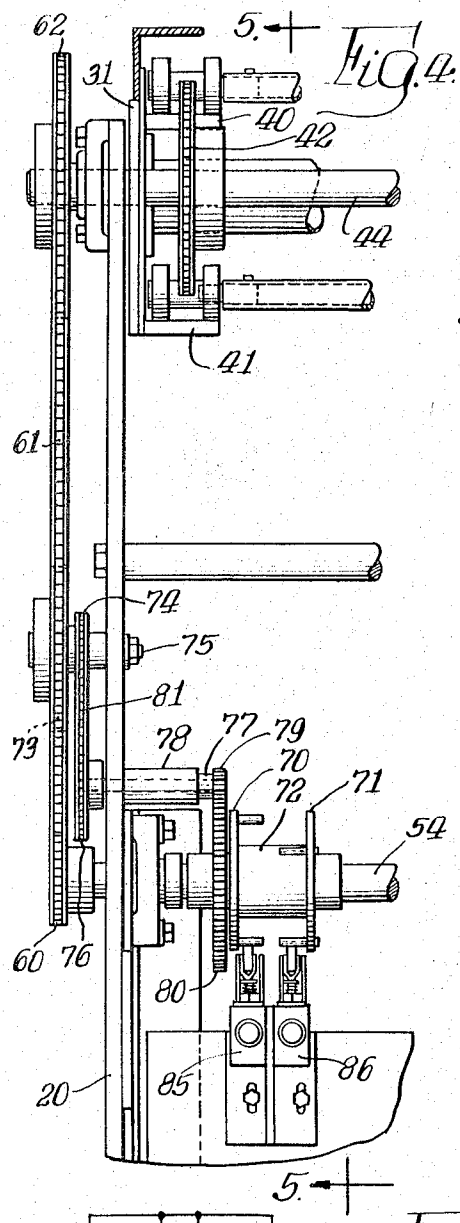



Fig. 5.

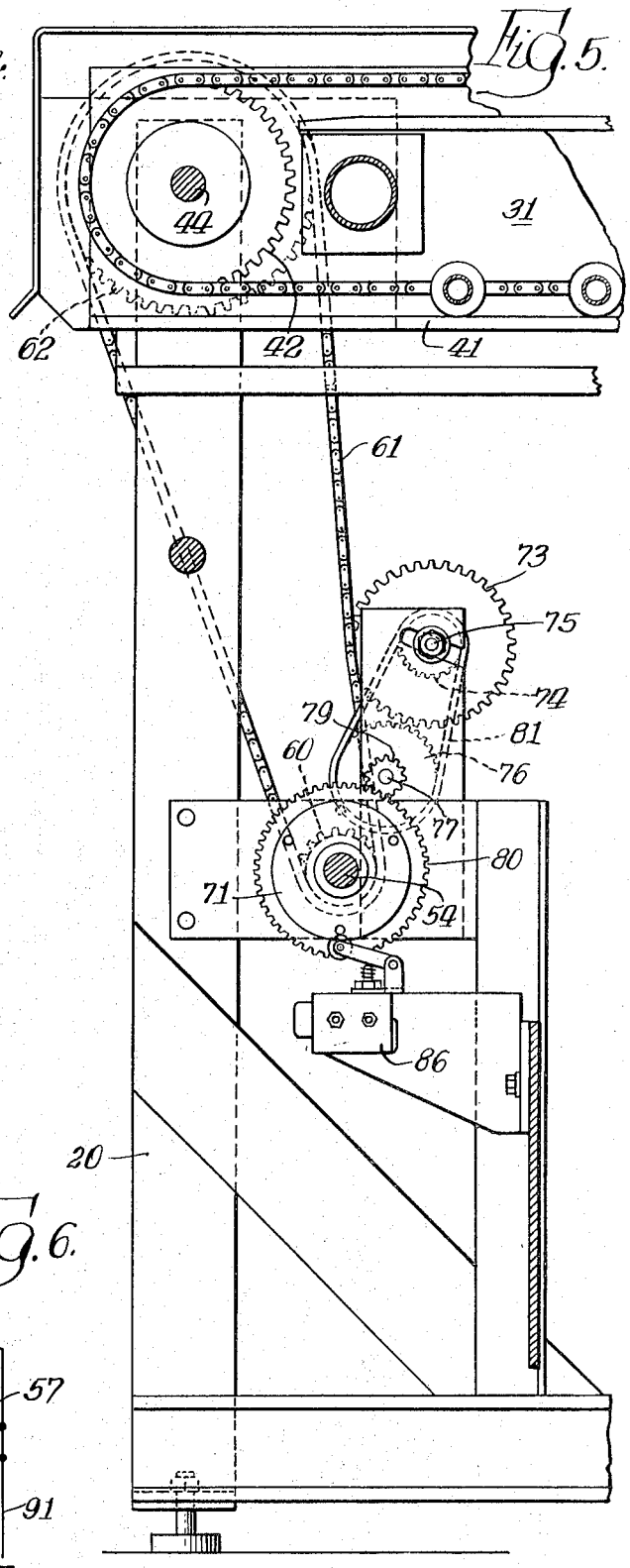
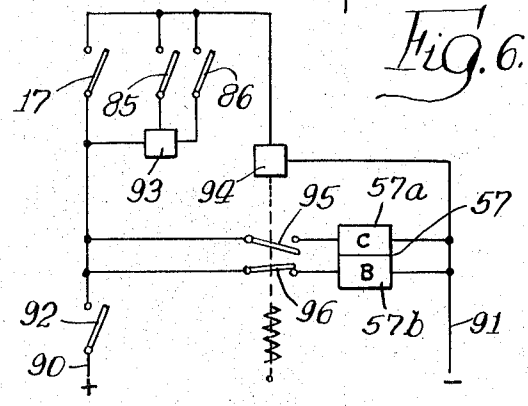



Fig. 6.



March 7, 1967 B. A. ARVIDSON 3,307,846

STACKER FOR SHEETS OR BAGS

Filed Dec. 28, 1964 4 Sheets-Sheet 4

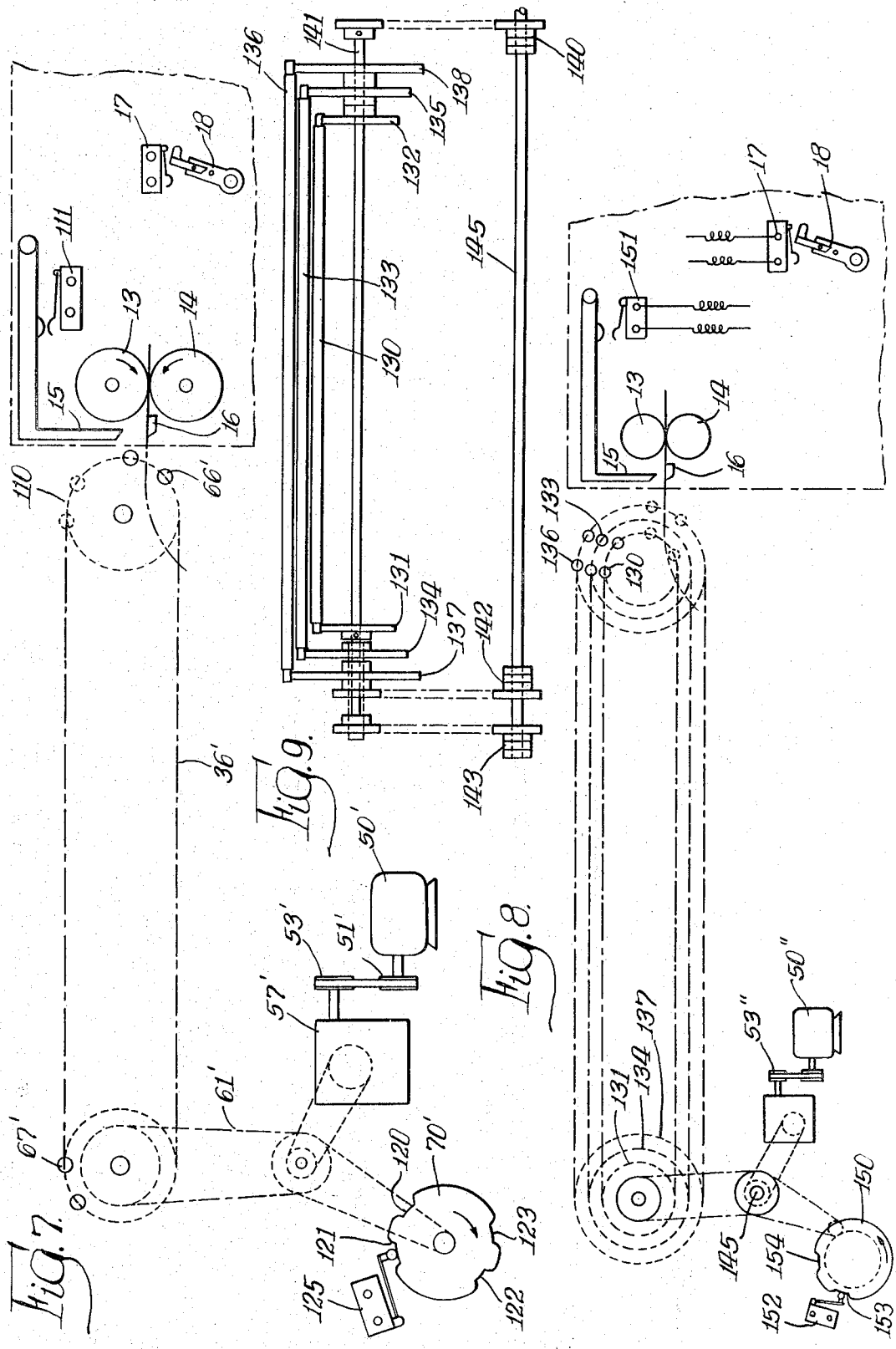



Fig. 7.

Fig. 8.

Fig. 9.

United States Patent Office 3,307,846
Patented Mar. 7, 1967



3,307,846

# STACKER FOR SHEETS OR BAGS

Bengt A. Arvidson, Villa Park, Ill., assignor to Corley-Miller, Inc., a corporation of Ohio

Filed Dec. 28, 1964, Ser. No. 421,304
2 Claims. (Cl. 271—68)

This invention relates to article stacking apparatus and, more particularly, to an apparatus for stacking limp film sheets, such as bags or the like.

At the present time, limp film is available which is frequently handled in large sheet sizes, such as coming out of a bag-making machine, where it is quite difficult to advance the leading edge of the sheet to a position on top of a stack of similar sheets. Efforts have been made to utilize mechanism which postively grips the leading edge of the sheet to advance it onto a stack. However, timing problems are critical and the operation is less than satisfactory. Additionally, stackers have been made which overcome the foregoing problem, as disclosed in Serial No. 175,915, filed February 27, 1962, now Patent No. 3,201,116, in which the leading edge of the sheet or bag is impositively held by friction and led to a stacking position. The structure disclosed in the prior application works satisfactorily, however, the construction is fairly complex and, due to the construction and continuous operation of certain parts, is not sufficiently quiet in operation.

An object of this invention is to provide a new and improved stacking device.

Another object of the invention is to provide a stacking device for limp sheets in which the stacking device operates intermittently as required by the advance of a sheet to the stacker.

Still another object of the invention is to provide a stacking device in which the stacking means operates intermittently as required and with the timing of the stacking device being directly related to the mechanism delivering the sheets whereby an advancing unit of the stacking device is ready in position upon advance of a sheet to the stacking device.

Still another object of the invention is to provide a stacking device as defined in the preceding paragraph wherein a multiplicity of advancing units are provided for advancing sheets onto the stack, with a selectively operable control for determining the number of units that will operate in sequence, whereby the stacking device can handle a variety of sheets of different lengths.

Further objects and advantages will become apparent from the following detailed description taken in connection with the accompanying drawings in which:

FIG. 1 is a side view of the stacking device shown in association with a bag-making machine and with part of the control shown out of position for clarity;

FIG. 2 is a fragmentary plan view of the structure shown in FIG. 1;

FIG. 3 is a fragmentary vertical section with parts broken away and taken generally along the line 3—3 in FIG. 1, and on an enlarged scale;

FIG. 4 is a view similar to the left-hand part of FIG. 3;

FIG. 5 is a vertical section, taken generally along the line 5—5 in FIG. 4;

FIG. 6 is a circuit diagram for the mechanism shown in FIG. 1;

FIG. 7 is a schematic view of a second embodiment of the invention;

FIG. 8 is a schematic showing of a third embodiment of the invention; and

FIG. 9 is a transverse view of a part of the structure shown in FIG. 8.

While this invention is susceptible of embodiment in



many different forms, there is shown in the drawings and will herein be described in detail an embodiment of the invention together with modifications thereof with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the embodiments illustrated. The scope of the invention will be pointed out in the appended claims.

The structure, as shown generally in FIG. 1, comprises a bag or sheet stacking device indicated generally at **10** shown in association with a bag-making machine, indicated generally at **11**. This bag-making machine may be of the type as shown in Weist patent, No. 2,882,956, in which lengths of limp film are assembled to form a bag and a bag is cut off from continuous lengths of film. For purpose of description herein, only general reference need be made to the bag-making machine **11**. This machine has a frame **12** and a pair of feed rollers **13** and **14** which are intermittently rotated to advance a bag from the machine, with cut-off knives **15** and **16** being operable in a cycle to cut off the bag from the length of film. Additionally, movement of the feed rollers **13** and **14** is indicated by a switch **17** operable upon commencement of rotation of the feed rollers by an actuating member **18** which engages and closes the switch. This structure corresponds to the operator **92** and switch **85** as disclosed in the copending application, previously referred to.

The bag stacking device **10** comprises a frame having a series of floor-engaging supports, with the supports **19**, **20**, **21** and **22** being indicated at one side of the frame in FIG. 1 and corresponding supports at the other side. A generally horizontal platform **23** extends from side to side of the stacking device between the frame members **19** and **21** for receiving a stack of sheets, such as bags. The platform is approximately twice the maximum length of sheets, whereby the initial stack may be made at the end of the platform adjacent the bag-making machine or toward the right, as viewed in FIG. 1, with a stack then being advanced to the left, as shown in FIG. 1, for further handling. This operation is facilitated by having an endless belt **24** overlie the platform. This belt passes about pulleys **25** and **26** at opposite ends of the platform, with the pulley **25** being selectively driven by a motor **27** through a drive belt **28**. An operator, upon completion of a stack, can energize the motor **27** to drive the upper reach of the belt **24** toward the left, as viewed in FIG. 1, to move a stack of sheets to the left-hand end of the platform.

The operative mechanism for stacking sheets or bags overlies the initial part of the platform **23** and, as shown in FIGS. 1 and 2 embodies a frame having laterally-spaced side members **30** and **31** pivotally mounted at one end to the supports **20** for upward pivoting of the frame in a counterclockwise direction, as viewed in FIG. 1, and also mounted on supports **22**. The frame is shown in operative position in FIG. 1, however, the counterclockwise pivoting of the frame about a pivot **32** permits elevation of the frame and associated structure to a position providing clearance to the platform, with this pivoting being accomplished by a cylinder **33** having a rod **34** connected to the frame.

A pair of endless members in the form of chains **36** and **37** laterally spaced apart and associated one with each of the frame members **30** and **31**, respectively, extend along the length of the frame. As shown in FIG. 3, the frame member **30** has support plates extending along the length thereof for support of the upper and lower reaches, respectively, of the chain with the support **38** supporting the upper reach and the support **39** supporting the lower reach. Similar support plates **40** and **41** are associated with the chain **37**. The endless chain members

ıss about sprockets, at opposite ends of the frame, with e sprockets 42 and 43 being at the end of the frame mote from the bag-making machine 11 and mounted on drive shaft 44, which defines the previously referred to vot 32. Similar sprockets are provided at the opposite ıd of the frame adjacent the bag-making machine, with ıe of these sprockets being indicated at 45 in FIG. 1 ıd these sprockets being mounted on a shaft which is tatable in the frame, similarly to the shaft 44.

The shaft 44 is the drive shaft for the chains 36 and '. The drive for this shaft is derived from a motor 50 FIGS. 1 and 3) having a variable speed pulley 51 on its ıtput shaft, whereby the speed can be varied by adstment of the motor on its adjustable mounting M. ıe variable speed pulley 51 drives a belt 52 engageable ith a pulley 53 rotatable on a shaft 54 extending transrsely of the machine and rotatably mounted in bearings ; and 56 at its opposite ends. The pulley 53 is assoted with an electric clutch and brake unit 57 for selecrely driving the shaft 54, with this unit being mounted a plate 58 on the base by a bracket 59 With the clutch ction of the unit 57 engaged, rotation of the pulley 53 om the motor 50 drives the shaft 54. The shaft 54, the outside of the support 20, has a sprocket 60 secured ereto which drives a chain 61 extending upwardly to gage a driven sprocket 62 fastened to the sprocket aft 44.

The endless chain members 36 and 37 have three pairs bars equally spaced apart along the length of the endss members with a first pair of bars 65 located in a ısition to receive the leading end of a bag shown in oken line in FIG. 1. A second pair of bars 66 is loted along the upper reach of the endless members in ısition to next advance to the position awaiting the reipt of a bag. A third pair of bars 67 is shown in posi- ın after having completed delivery of a bag to the stack ı the platform 23. The bars are removably attached their ends to the chains.

The operation of a pair of bars for advancing the leadg end of a bag is the same as disclosed in the previously ferred to copending application. Basically, the pair of rs 65 upon advance of a bag therebetween are caused move toward the left as viewed in FIG. 1 and as the rs move onto the lower reach of the travel of the endss members, the pair of bars assume a generally horizonl disposition. With this position, the bars have sufficient ctional engagement with the leading end of the bag to rry the leading end onto a stack while the trailing part the bag is further fed out by the rollers 13 and 14 of e bag-making machine. With the impositive frictional gagement of a leading end of the sheet, the bars 65 will ove off the leading end of the sheet when it is no longer d by the rollers 13 and 14 of the bag-making machine. so, the bars 65 engage the bag at a distance back from e leading end and travel at a speed faster than the rate which the bag is fed from the bag-making machine so at the bars gradually advance to the leading edge of the g and leave the bag approximately at the time that it is stacked position on the platform 23.

A control is provided for operating the pairs of bars and e endless members only as required upon delivery of sheet or bag to be stacked. This control is operated in ısitive relation with the bag stacking bars and the bagıking machine 11. The control comprises a pair of conıl cams 70 and 71 mounted on a drum 72 loosely mounton the motor-driven shaft 54. The drum 72 derives its tation from the drive for the stacking bars through a ducing gear train. This drive includes a sprocket 73 engeable with the drive chain 61 of the main drive train d having a sprocket 74 rotatable therewith. These rockets 73 and 74 are mounted on a stub shaft 75 fasıed to the frame support 20. The sprocket 74 through chain 81 drives a sprocket 76 which is attached to a tatable shaft 77 mounted in a bearing 78 fastened to the pport 20. The rotatable shaft 77 has a relatively small



gear 79 in mesh with a large gear 80 fastened to the drum 72. With this structure, the control drum 72 is rotated in timed relation with the sheet stacking bars, with one rotation of the control drum 72 equalling one complete circuit of the endless members 36 and 37.

The control cams 70 and 71 are provided for operation of a pair of switches 85 and 86, respectively, which normally close unless held open by one of the projections 87 on the cams. If the three pairs of bars 65, 66 and 67 are to be operative, the cam 71 is effective, with this cam having three equally spaced-apart pins 87. If only two pairs of bars are to be used, the cam 70 having two pins 87 is effective to control. This also requires relocation of one of the pairs of bars 66 and 67 to have them at a distance from the pair 65 equal to one-half the length of the chains 36 and 37.

In a cycle of operation, delivery of a bag or sheet to the first pair of bars awaiting receipt thereof will result in operation of switch 17 which releases the brake unit 57 and closes the clutch thereof to drive the endless members 36 and 37 for advance of a leading end of a bag onto a stack. During this time the control drum 72 is rotating and the switches 85 and 86 are closed and the cycle continues until the controlling cam opens the switch associated therewith to stop the cycle with the next pair of bars waiting in position to receive the leading end of a bag.

A simplified circuit for the control is shown in FIG. 6 in which power lines 90 and 91 are connectible to a power source. The line 90 has a main on-off switch 92 for energizing the circuit. The bag-making machine switch 17 is connected in circuit in parallel with switches 85 and 86 with a selector switch 93 operable by an operator to determine which of the control cams and associated switch is to be effective. A relay 94 having contacts 95 and 96 connected to the clutch side 57*a* and the brake side 57*b* of the clutch-brake unit 57, respectively, is provided for alternate operation of the clutch and brake. As shown in the circuit with the relay 94 deenergized, the switch 96 for the brake is closed to hold the stacking device against movement. Upon energization of the relay 94 the relation between the contacts 95 and 96 is reversed to deenergize the brake 57*b* and energize the clutch 57*a* to commence operation of the stacking bars. This operation continues until one or the other of the switches 85 and 86, dependent on selector 93, is opened by a control pin 87 on one of the cams. If only two pairs of bars are effective, the switch 85 is controlling in the circuit and will remain closed for half a revolution of the cam until opened by a pin 87. If the switch 86 is controlling, the circuit will remain operative until the control cam 71 has rotated through one-third of a revolution and then the switch 86 is opened by a control pin 87.

In the event only two of the pairs of bars are utilized, one pair must be re-located to be half-way around the chain from the other pair. The third pair can be removed or, alternatively, can remain on the chains and will move along a bag without interference. Two sets of bars are used with relatively long bags and three sets would be used for shorter bags. If desired, sets of bars in addition to three pairs could be utilized and it will be obvious that it is only necessary to provide a timing cam having a number of control pins equal in number to the pairs of stacking bars.

A second embodiment of the invention is shown diagrammatically in FIG. 7 in which parts corresponding to those shown in the embodiment of FIGS. 1 to 6 have been given the same reference numeral, with a prime affixed thereto. The primary distinction in the second embodiment over that of FIGS. 1 to 6 is in the provision for the location of a pair of stacker bars at a position slightly in advance of the bag-receiving position. The bars then move to the latter position when the bag-making machine commences operation. More specifically, two pairs of bars 66′ and 67′ are associated with the endless members and, as shown in FIG. 7, are positioned with the

leading edge of a bag passing through the pair of bars **66'**. The storage position is indicated generally at **110** for one of the pairs of bars prior to the bars moving to bag-receiving position. Thus, the pair of bars **66'** were at position **110** prior to moving to bag-receiving position, as shown in FIG. 7. This embodiment requires two modifications, with one modification being in the bag-making machine to have the cut-off knife **15** operate a switch **111** when the knives are operated to cut off a bag, with the closing of the switch **111** indicating that a pair of stacker bars should move to bag-receiving position, from the position **110**. The second modification is in the control in having a cam **70'** provided with two control sections for each pair of bars. The cam **70'** rotates one revolution for one complete cycle of travel of the stacker bars. As shown, with two pairs of bars there are two control sections for the cam **70'**. The cam **70'** has notches **120** and **121** associated with the stacker bars **66'** and notches **122** and **123** associated with the pair of bars **67'**. Thus upon closure of the switch **111** in the bag-making machine, a switch **125** associated with the cam **70'** is bypassed to start the drive with the drive continuing until the switch hits cam notch **121** to stop the drive with the stacker bars **66'** then being in bag-receiving position. The operation, once commenced, continues until the control switch **125** drops into the notch **122** with the result that the stacker bars **67'** are then at position **110**. Again, when the cut-off knives operate, the drive is started until the switch moves into notch **123**, when the stacker bars **67'** will then be in bag-receiving position.

As with the embodiment of FIGS. 1 to 6, the number of pairs of bars may be increased over two pairs with a corresponding additional number of control cams having the requisite number of control notches.

A third embodiment is shown diagrammatically in FIGS. 8 and 9 in which three pairs of stacker bars are provided and each pair is mounted on its individual endless members for cycling. In this embodiment, parts corresponding to those shown in the embodiment of FIGS. 1 to 6 are correspondingly numbered with a double prime affixed thereto.

In this embodiment, a first pair of stacker bars **130** is mounted on chains and spans the distance between sprockets **131** and **132**. A second pair of stacker bars **133** is mounted on chains passing about spaced-apart sprockets **134** and **135**. A third pair of stacker bars **136** extends between chains mounted on spaced sprockets **137** and **138**. Each of the pairs of sprockets are individually controlled, with a clutch-brake unit **140** driving a shaft **141** to which the sprockets **131** an **132** are keyed. A clutch-brake unit **142** drives the sprockets **137** and, through the chains and stacker bars, also rotates the sprockets **134** and, through the stackker bars **133**, the sprocket **135**. The three clutch-brake units **140**, **142** and **143** are mounted on a shaft **145** driven from the motor **50''**. It is impossible for the three pairs of bars to run into each other, because they each operate on a separate plane. Each of the pairs of spreader bars have their individual timing cam, with one of the cams being shown in FIG. 8 at **150**. The operation of each chain is generally similar to that referred to in the embodiment of FIG. 7 in which a switch **151** corresponding to switch **111** of the embodiment of FIG. 7 is operated by the cut-off knives to signal the end of one bag-making operation, which causes the advance of a pair of bars to bag-receiving position. Upon this operation, the switch **152** is overridden and the control cam **150** begins to rotate to move the switch out of the control notch **153**, with the movement continuing until the bars reach the bag receiving position and the switch moves into control notch **154**. Upon closure of switch **17**, the mechanism then begins to cycle and the bars are moved through one complete cycle until the control notch **153** again comes to the switch **152**.

With three pairs of bars on three different chain sets, it is necessary to select the proper set of bars to be working. This can be accomplished by mechanism (not shown) including a three-position switch which travels once around for a complete cycle of travel of a set of twin bars. Every third of a cycle, another set of bars is switched into circuit for operation. Each one of the three twin bars will then get its turn at going into action. With this arrangement, it is possible to then have two pairs of bars running at the same time with the third pair ready to go as soon as the signal is given for its operation.

I claim:

**1.** A bag stacking apparatus comprising, a pair of endless members movable intermittently along opposite sides of a support for stacked bags, a plurality of bag supports mounted on said endless members and extending therebetween, and a control system for causing the movement of the endless members a sufficient distance to advance a bag to stacked position and to leave a bag support in position to receive the next bag including a first control means usable with a first number of bag supports and a second control means usable with an increased number of bag supports with each control means causing a movement of the endless members equal to the total length of the endless members divided by the number of bag supports to be successively operative, a circuit including both of said control means, and means in said circuit for making one or the other of said control means operative.

**2.** A stacking apparatus for stacking sheets as delivered successively by a machine comprising, a platform for receiving the sheets, a pair of endless members at opposite sides of the platform having upper and lower reaches extending along the platform, a plurality of pairs of sheet advancing bars extending between said members with each pair equidistantly spaced from the others along the length of said members, intermittently operable drive means for advancing said endless members a distance sufficient to move a sheet to stacked position, means responsive to initial delivery of a sheet for starting said drive means, a first control cam movable in timed relation with said endless members and having two control positions for operating with two pairs of bars, a second control cam movable in timed relation with said endless members and having three control positions for operating with three pairs of bars, first and second switch means operable at each control position of the first and second control cams respectively for stopping the drive means and a switch in circuit with said first and second switch means for rendering one or the other of the switch means operative.

**References Cited by the Examiner**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 2,855,089 | 10/1958 | Griffin | 198—183 |
| 2,956,661 | 10/1960 | Radcliffe | 221—67 |
| 3,019,915 | 2/1962 | Long | 83—94 |
| 3,158,247 | 11/1964 | Gale | 221—67 |
| 3,201,116 | 10/1965 | Barber | 271—7 |

FOREIGN PATENTS

| | | |
|---|---|---|
| 923,596 | 4/1963 | Great Britain. |

ROBERT B. REEVES, *Primary Examiner.*

KENNETH N. LEIMER, *Examiner.*