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Hannon et al.

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[54] **AUXILIARY STIFF SHEET FEEDER FOR NEWSPAPER SECTION COLLATING MACHINE**

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[52] **U.S. Cl.** **271/115**, 271/118

[51] **Int. Cl.** **B65h 1/06**

[58] **Field of Search** 271/41, 51, 23

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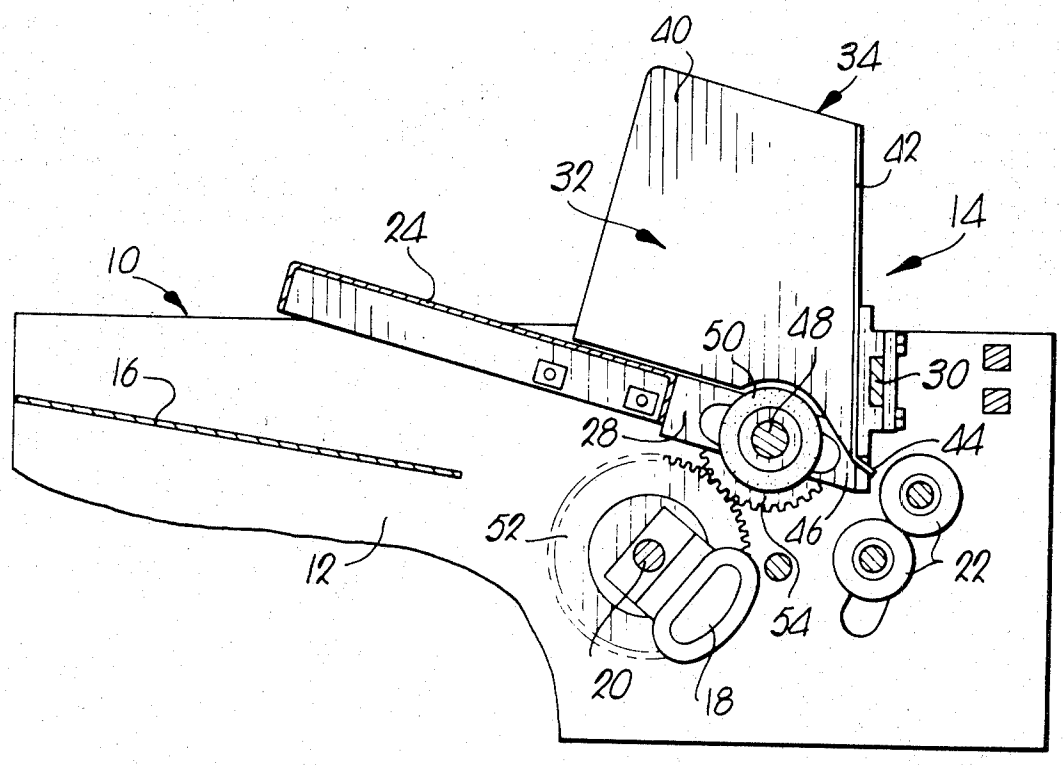
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[57] **ABSTRACT**

A vertical stack of stiff sheets is received by the hopper of the feeder with the sheets in a forwardly inclined condition and is supported beneath its lowermost sheet by a series of gripping rollers which are driven by a common shaft. A one-way clutch coupling the shaft with an oscillatory drive element causes the rollers to be driven only during one stroke of the element, at which time the leading end of the lowermost sheet is forced against the front of the hopper to bend the sheet and direct the same down and out the hopper outlet for introduction between a pair of rapidly rotating delivery rollers. The delivery rollers pull the sheet from the gripping rollers at an increased speed, and a friction clutch associated with the gripping rollers retards the free-wheeling tendencies of the gripping rollers during this period. A retaining member having an abrasive or irregular outer surface projects into the hopper outlet to prevent more than one of the sheets from being fed at the same time.

2 Claims, 7 Drawing Figures



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SHEET 1 OF 2

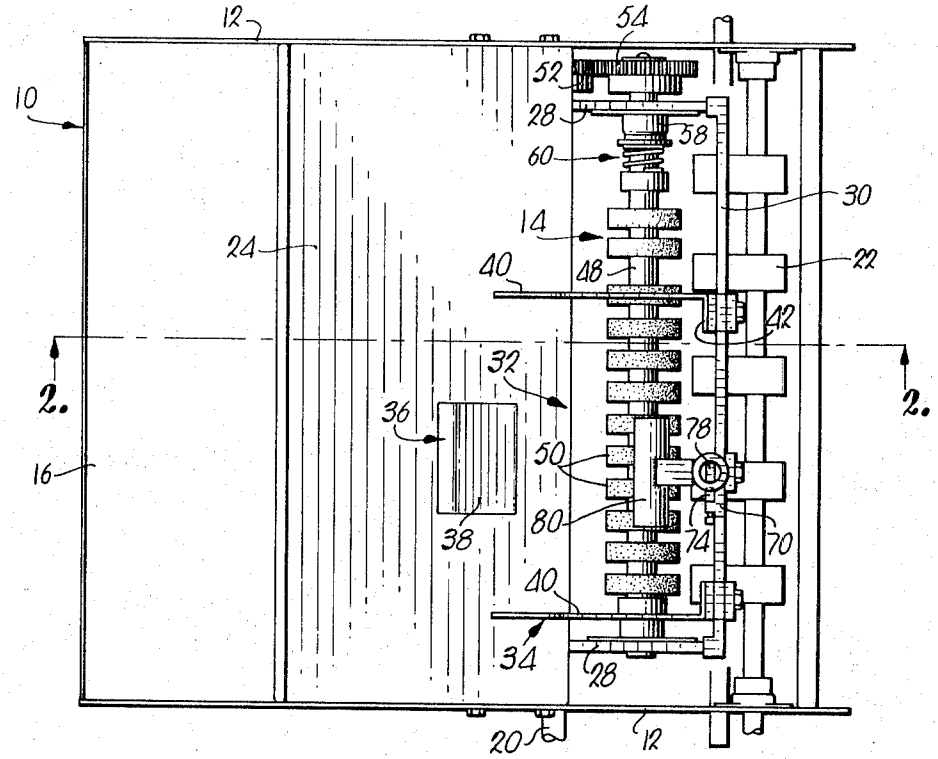
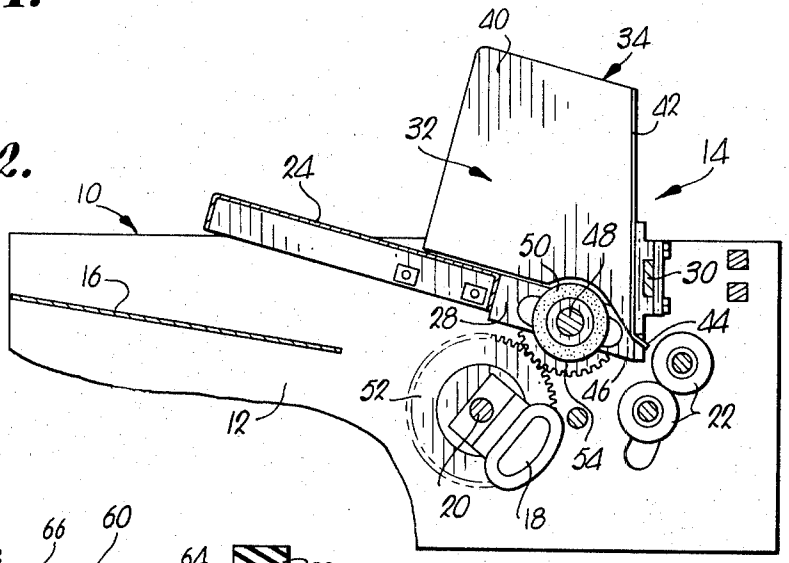


Fig. 1.

Fig. 2.



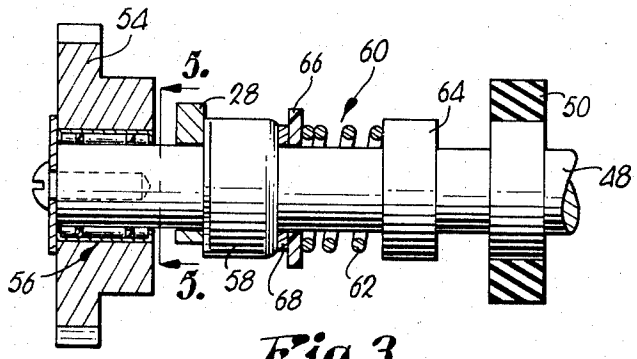
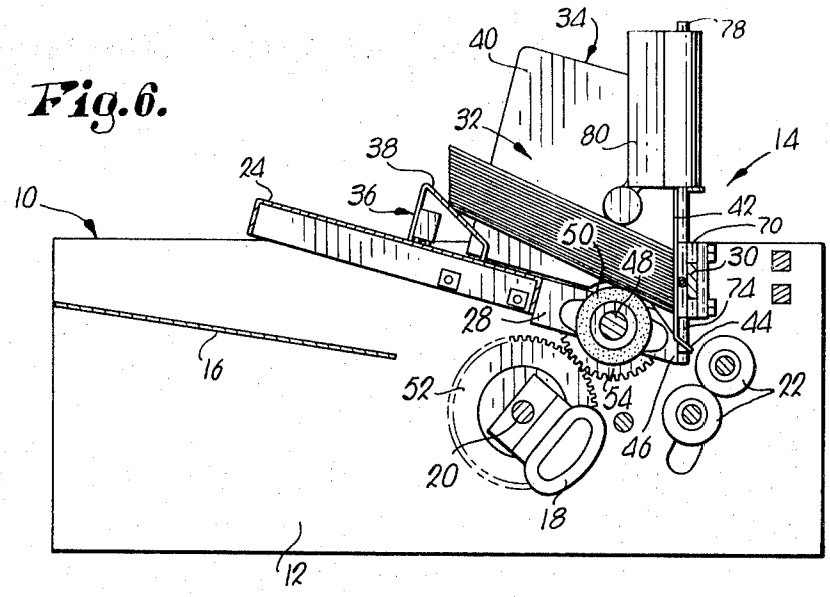


Fig. 3.

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Fig.6.



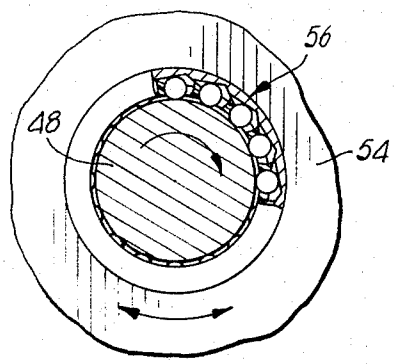


Fig.5.

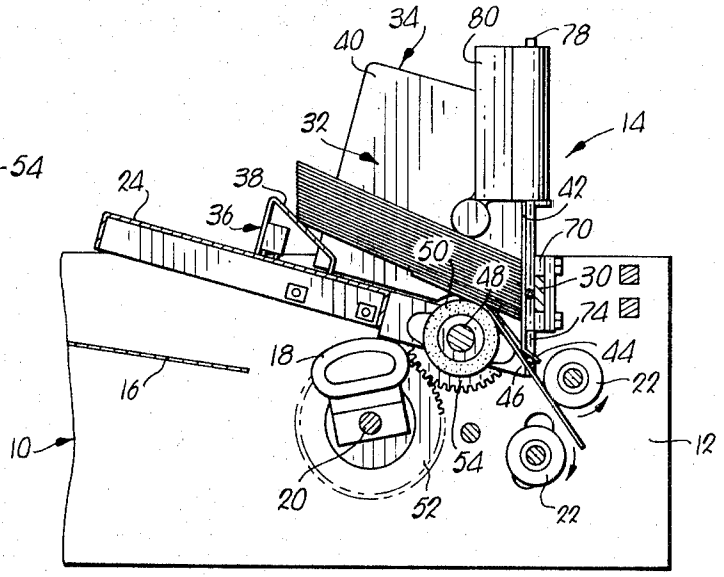


Fig.4.

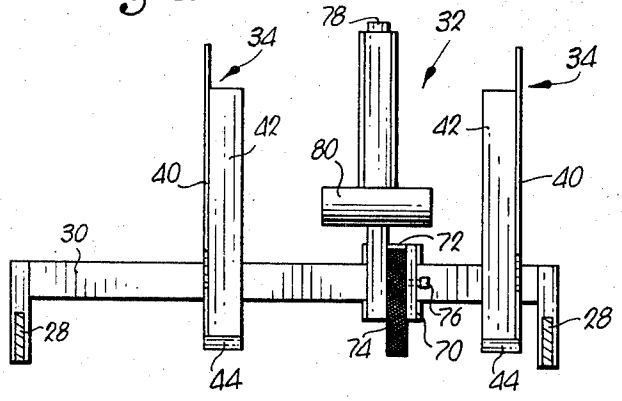


Fig.7.

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AUXILIARY STIFF SHEET FEEDER FOR NEWSPAPER SECTION COLLATING MACHINE

This invention relates broadly to the field of newspaper handling equipment and, more particularly, to apparatus for successively feeding relatively stiff sheet inserts or the like to a preselected point of delivery.

Modern metropolitan newspapers are finding it increasingly profitable to include single-sheet advertisement flyers within a complete newspaper edition normally comprising a number of separate sections, this being especially true with regard to a Sunday edition. Such flyers are normally smaller than the corresponding sections with which they are associated and, for the most part, are printed on sheet articles which are inherently relatively stiff, at least to the point of being essentially self-sustaining when positioned in an upright, standing-on-edge condition.

In order to eliminate costly manual stuffing of the flyers it is, of course, extremely desirable to provide suitable machinery to carry out this function. However, as is the case with newspapers in general, the relatively thin and somewhat porous flyer inserts are difficult to handle, thus presenting problems in designing equipment which is capable of feeding the inserts both rapidly and reliably. Thus, the primary goal of the present invention is to provide apparatus which will successfully accomplish the successive delivery of all of the relatively stiff sheet inserts in a stack thereof without encountering any of the serious drawbacks and disadvantages inherent in equipment heretofore available for carrying out the same purpose.

More particularly, an important aim of the instant invention is to provide a stiff sheet feeder as aforesaid which is adapted to be coupled with, and thereby derive its operating power from the newspaper section feeding apparatus shown and disclosed in our U. S. Letters Patent No. 3,608,891 issued Sept. 28, 1971 and entitled "Mechanism For Successively Delivering Sheet Articles From A Stack Thereof To A Folding Machine."

The above-mentioned patent discloses a bottom-delivery feeder having an oscillating gripper pad which crumples the lowermost section in the stack during the backstroke of the pad to thereby remove the leading portion of the section from a supporting shelf and then, during its forward stroke, introduces the released leading portion to a pair of rapidly rotating delivery rollers which complete withdrawal of the section from the stack. Thus, in an effort to lower capital costs and prevent the unnecessary duplication of basic operating equipment, it is an important object of the present invention to couple the gripping rollers of the present feeder with the oscillatory drive structure for the gripper of the above-referenced application by means of a one-way clutch and bearing assembly which would thereby permit driving of the rollers in one direction only and at periodic, timed intervals.

A further important object of the present invention is to provide an improved feeder which takes advantage of the inherently stiff nature of the sheets being fed by successively driving the leading edge of each sheet against a deflector to thereby bend or buckle the sheet and direct the same out of the hopper which contains the stack of sections.

Yet another important object of our invention is the provision of a retaining member which projects into the outlet of the hopper and has an abrasive outer surface which engages the leading edges of the sheets as they are buckled to thereby prevent delivery of more than one sheet at a time through the outlet.

In the drawings:

FIG. 1 is a fragmentary, top plan view of the newspaper section feeder of our above-mentioned patent having the stiff sheet feeding apparatus of the present invention mounted in place thereon;

FIG. 2 is a fragmentary, vertical, cross-sectional view taken along line 2—2 of FIG. 1;

FIG. 3 is an enlarged, fragmentary detailed view of the gripping assembly of the feeder with parts shown in cross section and in elevation for clarity;

FIG. 4 is a vertical, cross-sectional view of the feeder from the rear thereof with the gripping assembly removed for clarity;

FIG. 5 is a cross-sectional view taken along line 5—5 of FIG. 3 illustrating in detail the one-way clutch bearing;

FIG. 6 is a view similar to FIG. 2 showing a stack of stiff sheets within the hopper of the feeder in preparation for feeding thereof; and

FIG. 7 is a view similar to FIG. 6 showing the condition of the components of the feeder when the feeding cycle is half completed.

The newspaper section feeding apparatus disclosed in our above-mentioned patent is denoted broadly by the numeral **10** and includes a pair of upstanding sidewalls **12** between which the stiff sheet feeding unit **14** is positioned as shown most clearly in FIG. **1**. The apparatus **10** also includes a slightly inclined shelf **16** at the rear of the apparatus which is normally used to support the newspaper sections being delivered, a gripper **18** which is affixed to and oscillates with a horizontally extending drive shaft **20**, and a set of oppositely driven delivery rollers **22** at the front of the apparatus **20**, the lower set of delivery rollers **22** being supported for movement toward and away from the upper set of rollers **22** in timed relationship with the oscillation of the shaft **20** and the gripper **18**.

The stiff sheet feeder **14** includes an inclined table **24** which is bolted at opposite ends thereof to the walls **12** of apparatus **10** and has a U-shaped frame affixed thereto which comprises a pair of forwardly extending arms **28** and a front cross member **30** which spans the distance therebetween. The unit **14** is also provided with a sheet-receiving hopper **32** which is formed by a pair of L-shaped, upstanding side guides **34** slidably supported by the member **30** for movement therealong, and an inverted, U-shaped support **36** which is magnetically secured to the surface of table **24** and has an uppermost inclined surface **38**. Thus, the long legs **40** of the guides **34** form the sides of the hopper **32**, while the short legs **42** thereof and the inclined surface **38** of support **36** form the front and rear, respectively, of the hopper **32**. The lowermost ends **44** of the guide legs **42** are bent back at approximately a 45° angle with respect to the remainder of the legs **42** to present an outlet area **46** for the hopper **32**.

The arms **28** support therebetween a horizontally extending drive shaft **48** which has a number of friction-type gripping rollers **50** secured thereto at spaced intervals therealong for rotation with the shaft **48**. The upper periphery of each of the rollers **50** projects into the hopper **32** thereabove and is disposed considerably above the outlet **46** and slightly above the surface of table **24** as shown best in FIG. **2** of the drawings.

In order to adapt the unit **14** to be driven by the drive shaft **20** of apparatus **10**, a large gear **52** is affixed to one end of the latter and meshes with a smaller gear **54** on the corresponding end of shaft **48**. The gear **54** is provided with a central bore within which a one-way roller clutch **56** is provided, as shown in FIG. **3**, which receives the end of the shaft **48**. The clutch bearing **56** may take the form of the cup roller clutch produced by The Torrington Company which is disclosed in any one or more of the following U.S. Pats.:

No. 3,184,020 No. 3,241,641

No. 3,194,368 No. 3,260,333

As shown in detail in FIG. **5**, the clutch **56** is oriented such that the shaft **48** is immediately seized by clutch **56** when the gear **54** is rotated in a clockwise direction, yet is released to freewheel in the same direction when the gear **54** remains stationary or is rotated in a counterclockwise direction. Thus, in any event, the shaft **48** is allowed to rotate only in a clockwise direction, whether in a freewheeling manner or by means of a driving force applied to the gear **54**.

Each of the arms **28** has a bearing **58** secured thereto which journals the shaft **48** for rotation, and one end of the shaft **48**, as shown in detail in FIG. **3**, has a friction clutch **60** associated therewith to retard the freewheeling tendencies of the shaft **48** during operation. Clutch **60** includes a coil spring **62** which is interposed between a collar **64** rigid to the shaft **48**, and a nylon washer **66** which bears against another washer **68** on the proximal end of the bearing **58**.

A block **70** on the front cross member **30** between the side guides **34** has a vertically extending slot **72** which receives an elongated retainer **74**, as shown best in FIG. **4**, in the nature of a file or similar object having an abrasive or irregular outer surface. The outer surface of the retainer **74** is disposed behind the surfaces of the legs **42** of guides **34** and a setscrew **76** on the block **70** permits vertical adjustment of the retainer **74** within slot **72**, normally holding the retainer **74** in a position wherein the lower end thereof extends downwardly into the hopper outlet **46**. Thus, the only portion of the retainer **74** that is presented for engagement with the sheets in the hopper **32** is that portion which extends into the outlet **46**. An upstanding rod **78** secured to the block **70** slidably receives a weight **80** which maintains downward pressure upon the sheets in the stack during operation of the unit **14**.

OPERATION

When the apparatus **10** is to be utilized in conjunction with the stiff sheet unit **14** rather than as a feeder for folded sections, little, if any, modification of the apparatus **10** is necessary in preparation for the unit **14**. Of course, it is to be understood that when the stiff sheet feeder unit **14** is used, no newspaper sections at all will be delivered by the apparatus **10**; instead, the apparatus **10** will be utilized solely for the delivery of stiff sheets through the unit **14**.

Once the unit **14** has been secured in place, a stack of the stiff sheets may be placed in the hopper **32** with the guides **34** adjusted appropriately and the support **36** shifted into a position as shown in FIG. **6** beneath the rear of the stack. The gripping rollers **50** support the front of the stack and, because the upper periphery of each of the rollers **50** is disposed below the inclined surface **38** of support **36**, the sheets in the stack are inclined downwardly with the leading ends thereof tipped toward the hopper outlet **46**. Manifestly, further adjustment of the support **36** toward and away from the front cross member **30** will vary the inclination of the sheets in the stack. Once the stack is properly disposed, the weight **80** may be placed upon the rod **78** to assure continued downward pressure upon the sheet in the stack.

Actuation of power mechanism (not shown) operates to oscillate the drive shaft **20** of the apparatus **10** at one speed, while the delivery rollers **22** are driven at a much greater speed and open and close as the shaft **20** oscillates. It is contemplated that such power mechanism may take the form of the mechanism shown and described in our earlier mentioned copending application and, accordingly, at this juncture said application is hereby incorporated by reference into the present application for a full and complete understanding of the nature and operation of the power mechanism.

Initially, the components of the apparatus **10** and unit **14** are in the condition illustrated in FIG. **6** with the gripper **18** in a 4:00 o'clock position with the delivery rollers **22** disposed together. As the shaft **20** is rotated in a counter-clockwise direction moving the gripper **18** in its backstroke toward the 11:00 o'clock position illustrated in FIG. **7**, the gear **52** drives the smaller gear **54** in a clockwise direction thereby imparting the same type of rotation to the clutch **56**. Clutch **56** thereby seizes the shaft **48** and rotates the same in a clockwise direction to impart similar rotation to the gripping rollers **50**. This causes the leading end of the lowermost sheet in the stack to be driven against the legs **42** of guides **34**, which thereupon serve as deflectors and cause the sheet to bend or buckle intermediate its ends. Continued rotation of the rollers **50** causes the leading end of the lowermost sheet to slide downwardly along the legs **42** until it reaches the outlet **46**, by which time the delivery rollers **22** have separated almost to the extent shown in FIG. **7**. Further rotation of the gripping rollers **50** introduces the leading end of the lowermost sheet between the separated delivery rollers **22**, at which time the latter close about the sheet and, since they are rotating at a higher speed than the rollers **50**, pull the sheet from the rollers **50** to complete withdrawal of the sheet from the stack.

As the shaft **20** is driven in the opposite direction, returning the gripper **18** in a forward stroke toward its FIG. **6** position, the small gear **54** is rotated in a counterclockwise direction. Normally, this action would also cause the shaft **48** to rotate in the same direction. However, because of the clutch **56**, shaft **48** is precluded from rotating in a counterclockwise direction and, in fact, continues to rotate in a clockwise direction during this time because of the friction between the gripping rollers **50** and the section thereabove being rapidly withdrawn by the delivery rollers **22**. Once the sheet being removed is completely withdrawn from the stack, the shaft **48** would tend to freewheel in a clockwise direction were it not for the presence of the friction clutch **60** which prevents such action. Therefore, once the trailing end of the sheet has left the rollers **50**, the latter are in condition for feeding the next sheet. The above cycle is then repeated until the supply of sheets in the hopper **32** is depleted.

In certain instances, especially where the sheets being fed are thinner than average, rotation of the gripping rollers **50** against the lowermost sheet in the stack, causes several of the other sheets disposed immediately

thereabove to be deflected by the front guide legs **42** and directed toward the outlet **46.** However, as the leading ends of the deflected sheets reach the outlet **46,** they engage the retainer **74** which precludes further movement of all but the lowermost sheet — that is, at this point, the driving force of the rollers **50** is sufficient to remove only the lowermost sheet from the retainer **74,** while the remaining sheets are left behind for the succeeding cycle. Therefore, the retainer **74** assures that only one of the sheets will be fed during each operating cycle.

It is contemplated that the feeder **14** may be used as an integral component of a newspaper edition collating machine which may be formed by placing a number of the section feeders of our earlier mentioned patent (one for each section of the edition) in a line above a moving conveyor. By timing the operation of the aligned section feeders, the sections of the edition may be deposited one on top of the other as the conveyor advances. A stiff advertising sheet may then be added to the edition by the present invention at the end of the line or anywhere between the opposite ends thereof by simply placing the stiff sheet feeder in the proper location.

It may, therefore, be appreciated that the stiff sheet feeder as hereinabovve described, is capable of successfully carrying out the objects initially set forth in this application and provides a means of delivering stiff sheets which is highly reliable. Not only may the feeder be quickly and easily installed and prepared for operation as an auxiliary feeding device, but full advantage is taken of the inherently stiff nature of the sheets to deflect and direct the same out of the hopper **32** for delivery. Moreover, the provision of the retainer **74** guarantees that no more sheets than is absolutely necessary will be delivered, thereby holding down the overall cost of adding the sheets to complete newspaper editions.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In combination with a newspaper feeding machine having open bottom hopper means and a rotary gripping assembly beneath the hopper means oscillatable up into the latter from alternate, opposite directions to first buckle the lowermost newspaper of a stack thereof within the hopper means to pull a leading edge of the newspaper free from the stack and to then unbuckle the newspaper to displace the leading edge forwardly, an auxiliary insert article feeder mounted within said hopper means in lieu of the newspapers comprising:

a frame;

an insert article hopper secured to said frame for receiving a stack of the articles;

an article gripper rotatably mounted on said frame in disposition for engaging and feeding from the article hopper the lowermost article of the stack; and

one-way clutch mechanism operably coupling said article gripper with said gripping-assembly of the newspaper feeding machine for intermittently driving the gripper in a feeding direction during oscillation of said assembly to successively feed the articles from the article hopper.

2. The article feeder as claimed in claim **1,**

said newspaper feeding machine further having means for removing each article from the gripper at a faster rate than the article is shifted by the gripper,

said clutch permitting the gripper to freewheel in said direction about an axis extending transversely of the stack in response to removal of the article by said removal means; and

a friction clutch associated with said gripper for retarding freewheeling thereof as the article is being removed.

* * * * *