

[54] APPARATUS FOR INDIVIDUALLY
FEEDING SHEETS, CARDS, BANKNOTES
AND THE LIKE

[75] Inventor: Konrad E. Ericsson, Stockholm,
Sweden

[73] Assignee: Arbman Development AB,
Stockholm, Sweden

[22] Filed: Feb. 14, 1972

[21] Appl. No.: 225,910

[30] Foreign Application Priority Data

May 12, 1971 Sweden..... 6143/71

[52] U.S. Cl..... 271/117, 221/188, 221/197,
271/9, 271/121, 271/162

[51] Int. Cl..... B65h 3/06

[58] Field of Search..... 271/41, 61, 44 SS, 35, 32,
271/29, 9; 221/188, 209, 197; 235/98 B

[56] References Cited

UNITED STATES PATENTS

2,820,408 1/1958 Williams..... 271/41 X

3,108,799	10/1963	Clemens et al.	271/41
3,226,110	12/1965	Greene	271/41
1,572,439	2/1926	La Bombard et al.	271/41
2,835,175	5/1958	Frey	271/44 R X
1,919,238	7/1933	McCarthy	271/41
3,214,096	10/1965	Buchholz et al.	271/36 X
2,814,919	12/1957	Jones et al.	221/188 X

Primary Examiner—Evon C. Blunk

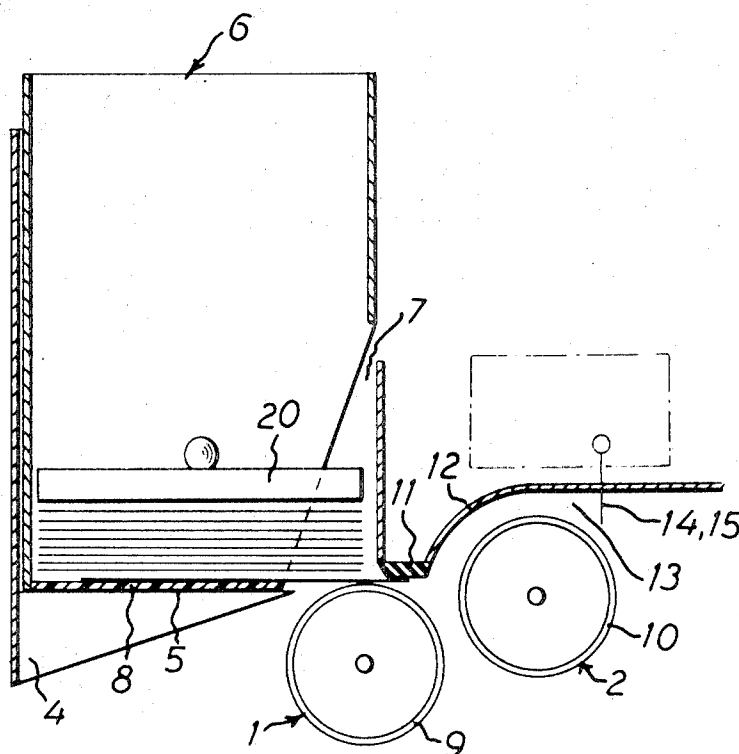
Assistant Examiner—Bruce H. Stoner, Jr.

Attorney, Agent, or Firm—Bucknam and Archer

[57] ABSTRACT

An apparatus for feeding sheets, cards, banknotes and the like from a stack comprises a rotary roll which engages the lowermost sheet, card or banknote in the stack, a further roll spaced from and preferably slightly above the first roll, and a strip having a rough coating and so arranged between the two rolls as to extend inside a plane tangent to the peripheries of the rolls.

5 Claims, 4 Drawing Figures



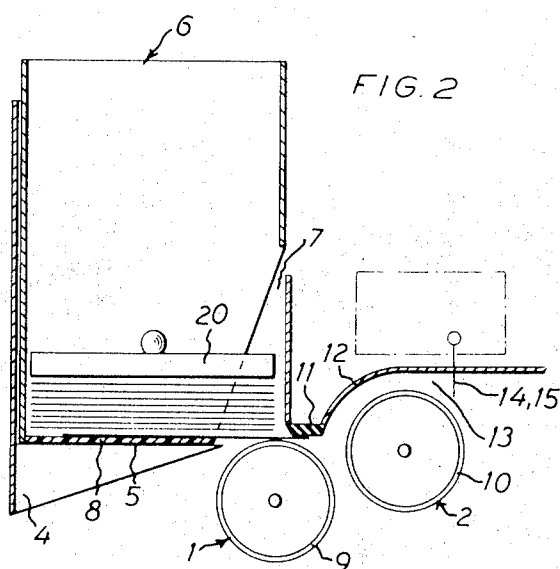
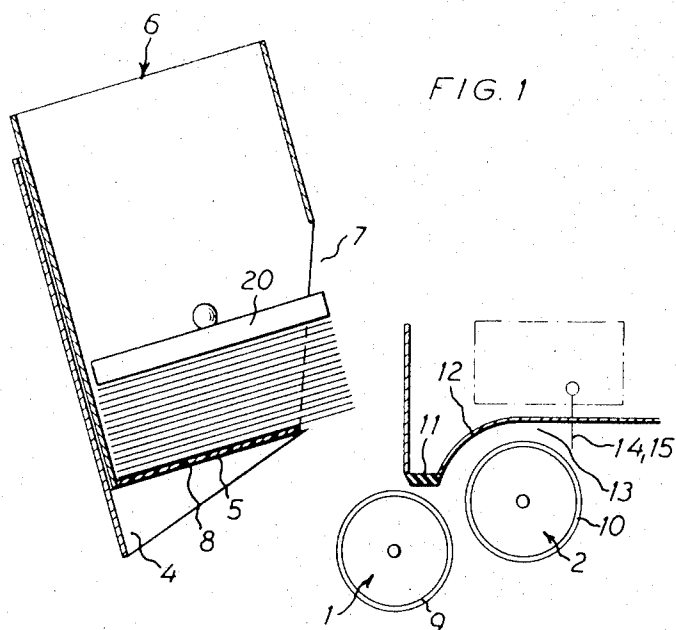


FIG. 3

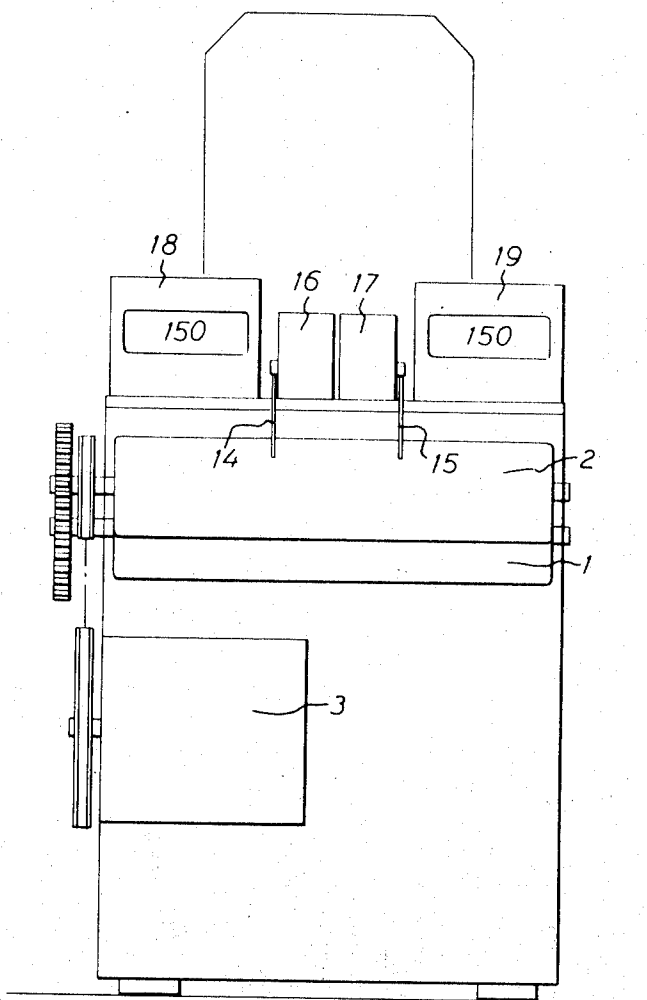
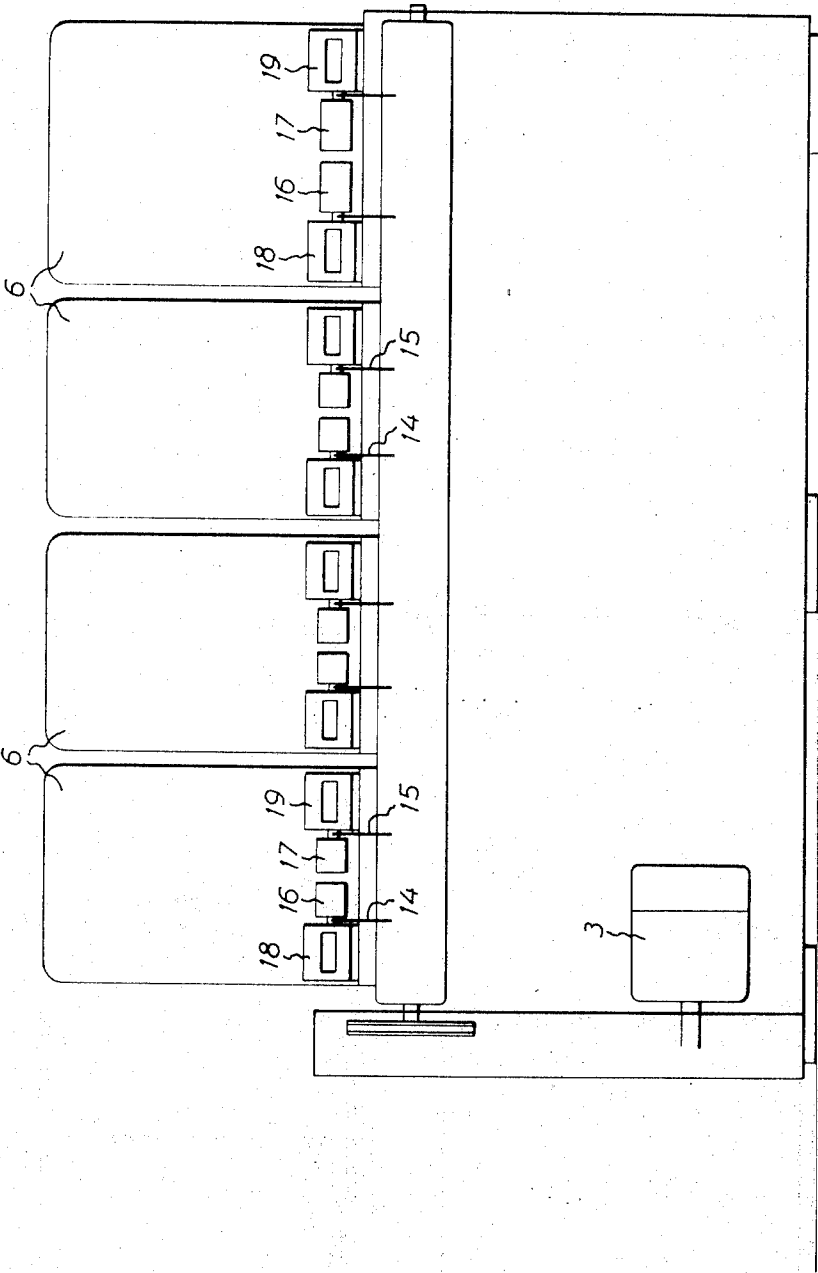


FIG. 4



APPARATUS FOR INDIVIDUALLY FEEDING SHEETS, CARDS, BANKNOTES AND THE LIKE

This invention relates to an apparatus for individually feeding sheets, cards, banknotes and the like, comprising feed rolls which feed the sheets, cards or banknotes from a stack one at a time past sensing means connected to a counter.

In prior art apparatuses of this type use has generally been made of suction means including a pneumatic device having a vacuum pump, pipelines and suction cups for separating the sheets or banknotes. The separated sheets or banknotes have operated a counter or have been conducted past other counting units. The more or less complicated construction of these prior art apparatuses has implied a very high market price. An essential disadvantage inherent in the prior art apparatuses having suction means is that when a torn banknote is encountered two banknotes may be fed simultaneously, thereby giving cause to incorrect counting.

The invention provides a machine of simplified construction whereby the prime costs and the market price are reduced considerably below those of the prior art apparatuses.

According to the invention, the apparatus includes a container for accommodating a stack of sheets, cards or banknotes to be counted, a motor-driven first feed roll having a rough coating and adapted to engage the outermost sheet of the stack and to extract it from the stack, a motor-driven second roll likewise having a rough coating and spaced from and preferably slightly above the first feed roll, a transverse strip of rough material arranged between said feed roll and so located as to lie inside a plane tangent to the peripheries of the two feed rolls, and guide means which along a portion of the periphery of the second feed roll define a passage for the sheets, cards or banknotes.

An embodiment of the apparatus according to the invention will be described hereinbelow with reference to the accompanying drawings:

FIG. 1 is a diagrammatic side view of an apparatus connected to a counter, the container for the sheets, cards or banknotes to be counted being shown in filling position,

FIG. 2 is a likewise diagrammatic side view of the apparatus in feeding position,

FIG. 3 is a front view of the apparatus, and

FIG. 4 is a view showing an assembly of several apparatuses and counters for simultaneous counting of banknotes of different values or sizes.

Parts not directly pertaining to the invention, such as frame, motor, transmission, switches and like means are only diagrammatically shown in the drawings and are not described in detail in the following specification.

First and a second feed rolls 1 and 2, respectively, are mounted in a frame. The rolls are driven at different speeds but in the same direction by a motor 3, the second roll 2 having a higher peripheral speed than the first roll 1. The first roll 1 has a slightly lower location than the second roll 2. Adjacent the first roll 1 a cradle 4 is so mounted that it can be swung from a position in which the bottom 5 thereof is sloping (FIG. 1), to a substantially horizontal position of said bottom 5 (FIG. 2). A sheet, card or banknote container 6 can be entered into the cradle. The width of the container 6

conforms to the type of sheets, cards or banknotes to be fed past the counter, and along a corner portion the container has a recess 7 facing the first feed roll 1. The bottom of the container 6 has a coating 8 of relatively rough rubber or like material. In the horizontal position of the cradle the container bottom, as will appear from FIG. 2, is on a level with the upper side of the first feed roll 1. Both feed rolls are coated with a layer 9 and 10, respectively, of relatively rough rubber or like material, and the first feed roll is so located that in the lowered position of the cradle the sheets, cards or banknotes in the container 6, which protrude through the recess 7, bear against said roll 1. A strip 11 of rough rubber or like material is disposed on the side of the first feed roll 1 opposed to the cradle and approximately on a level with the upper side of said feed roll 1, that is, beneath a plane tangent to the upper sides of the two rolls. A curved guide 12 extends from said strip 11 obliquely upward so that a passage 13 is formed between the guide 12 and the second roll 2. The passage terminates in a substantially horizontal portion. Into this portion of the passage project two tines 14, 15 which are adapted to operate micro-switches 16 and 17 each of which actuates a counter 18 and 19, respectively.

When a full container 6 has been placed in the cradle 4 and the latter is swung to the position shown in FIG. 2 a micro-switch (not shown) is operated, starting the motor 3 driving the rolls 1 and 2. The lowermost sheet in the stack placed in the container, the leading edge of which sheet rests on the first roll 1, will be carried along, sweep against the strip 11, be deflected by the guide 12 and encounter the tines 14 and 15 which operate the switches each of which delivers pulses to a counter. The sheets are adapted, beyond the second feed roll, to fall into a compartment or a container located in proximity therewith. As soon as the lowermost sheet is extracted from the stack, the superimposed sheet will get in contact with the rough coating at the container bottom, against which it is pressed by a weight 20 placed on the stack, and as a rule will not be extracted together with the lowermost sheet. Actually, the friction between the second sheet and the rubber coating will gradually increase and mostly is larger than the friction between the two lowermost sheets. Should, however, the second sheet happen to be carried along it will immediately encounter the rough strip 11, and also at this point the friction between the strip 11 and the sheet will be greater than the friction between the sheets. The second sheet will thus be retained in contact with the strip until the first sheet in its entirety has passed the strip. This will prevent a double feed of sheets. Experiments have shown that in feeding banknotes it is of no importance whether the banknotes are new or used or whether they are mixed. The arrangement of two sensing tines and two counters in the embodiment illustrated provides a safety mechanism which rapidly indicates whether a folded banknote or half a banknote has been counted.

FIG. 4 shows how several counters have been built together to provide an assembly in which a large number of banknotes of various types or of the same types can be counted.

It should be mentioned that the apparatus may be arranged in such a way that several kinds of sheets, cards or banknotes can be counted with it. This is made possible by conforming the width of the rollers and the

3

passage to the width of the largest sheets, cards or banknotes and by the cradle accommodating various types of containers. It is also possible to combine the apparatus with batch feeding means in which case the feed is interrupted when a predetermined number of sheets, cards or banknotes in such a batch have passed the counter. The apparatus can also be combined with central counters.

What we claim and desire to secure by Letters Patent is:

1. An apparatus for individually feeding sheets, one at a time, to a delivery zone, which comprises a pair of feed rolls disposed in spaced apart relation and rotatably driven, said feed rolls having rough friction surfaces; a container adapted to hold a stack of sheets to be fed to the delivery zone, said container having an opening positioned to accommodate with-drawal of each successive lowermost sheet in the stack, said container being positioned to present said opening to the first of said feed rolls for contact of said lowermost sheet therewith whereby rotation of said first feed roll advances the lowermost sheet out of the container to the second feed roll, said second feed roll being operable to contact said sheet to advance same to including delivery zone; means disposed to support said container, said support means being adjustable from a position in which the lowermost is presented to said first feed roll for feeding sheets, to a withdrawn position away from said first feed roll; and a transverse strip of rough friction material positioned between said feed rolls and extending beyond a common plane tangent

4

to said feed rolls, said transverse strip being disposed to exert frictional forces on the next overlying sheet in the container greater than the friction force between said next sheet and the sheet being fed to the delivery station to retain said next sheet in the container until the lowermost sheet being fed to the delivery zone has been completely withdrawn from the container; and guide means positioned in juxtaposition to said transverse strip and feed rolls to define a passage directing the sheets to the delivery zone.

2. An apparatus according to claim 1 wherein said container has a bottom surface with a rough friction coating disposed to engage the lowermost sheet in the stack and including means disposed to press against the uppermost sheet in the stack to increase the friction force load on the lowermost sheet by said bottom coating.

3. An apparatus according to claim 1 including a plurality of containers each adapted to hold a stack of sheets to be fed to a corresponding delivery zone, said containers being arranged in spaced apart relation along the axial direction of said feed rolls and said transverse strip of rough frictional material being elongated along said axial direction.

4. An apparatus according to claim 1 including sensing means disposed for actuation by sheets advanced by said feed rolls to the delivery zone.

5. An apparatus according to claim 1 including means for rotatably driving said second feed roll at a higher peripheral speed than the first feed roll.

* * * * *

35

40

45

50

55

60

65