As improved drive arrangement for side engaging members of a banknote centering mechanism uses a rack and pinion combination. A low torque motor drives a spur gear that engages opposed rack gears of the side engaging members. This power transfer from the motor to the side engaging member is cost effective and provides good precision.
ABSTRACT

As improved drive arrangement for side engaging members of a banknote centering mechanism uses a rack and pinion combination. A low torque motor drives a spur gear that engages opposed rack gears of the side engaging members. This power transfer from the motor to the side engaging member is cost effective and provides good precision.
TITLE: IMPROVED DRIVE FOR BANKNOTE CENTERING MECHANISM

FIELD OF THE INVENTION

The present application is directed to a banknote centering mechanism and in particular, to an improved drive arrangement for the banknote centering mechanism.

BACKGROUND OF THE INVENTION

Our earlier United States Patent 6,149,150 discloses a banknote centering mechanism having a banknote slot of a size for receiving banknotes of different widths and allowing the banknotes to pass through the slot to a banknote centering mechanism. The banknote centering mechanism has a pair of opposed side engaging members which are movable towards one another and allow centering of the banknote between the two side members. The drive arrangement for moving the banknote from the banknote slot to the centering mechanism effectively releases the banknote within the centering mechanism allowing the banknote to float and thereafter be centered by the side engaging members.

The side engaging members are driven by a common drive arrangement which moves the side engaging members together until such time as the banknote is centered and effectively opposes further inward movement of the side engaging members. This creates a stall condition and thus banknotes of different widths can be effectively centered.

Also disclosed in our earlier patent is the use of a worm drive arrangement for moving of the side members towards one another, as well as a particular sequence for assessing the amount of power necessary for centering a banknote effectively. This sequence includes cycling of the side members towards one another to access changing
frictional forces which may occur in the banknote centering mechanism from time to time. With this measure as a base, the additional power for centering is set.

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SUMMARY OF THE INVENTION

The present invention provides an improved drive arrangement for the side engaging members of the centering mechanism where the drive arrangement includes a rack and pinion power transfer mechanism for controlling the position of the side engaging members. This drive arrangement provides an effective power transfer mechanism and provides improved control of the side engaging members. Improved precision in setting the power for centering or assessing the stall condition is realized as there is less variation in the power transfer due to the rack and pinion drive arrangement.

20 BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the invention are shown in the drawings, wherein:

Figure 1 is a top view showing the two side engaging members and a rack and pinion drive arrangement;

Figure 2 is a sectional view of the rack and pinion drive arrangement for the side engaging members taking along line A-A; and

Figure 3 is a sectional view taking along line B-B of Figure 1.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in our earlier patent, a banknote centering mechanism is provided in front of a banknote validator to effectively center the banknote for processing by the validator. The banknote centering mechanism provides advantages with respect to the validator, particularly in countries or regions where the
currency provided to the device is of different widths. By effectively centering each banknote prior to processing by the validator, the evaluation of the authenticity of the banknote is greatly simplified.

Furthermore, precision in locating of the center line of the banknote also allows improvements in the processing of the data and/or reduced processing time.

The banknote centering mechanism 2 includes opposed side members 4 and 6 which move towards one another in a controlled manner determined by the centering banknote drive 8. Each of the side members 4 and 6 include a rack gear 14 04 16 which cooperates with the spur gear 12 of the centering banknote drive 8. The spur gear 12 is driven by the motor 10.

Each of the opposed side members 4 and 6 are slidable along shafts or guides to allow the movement of the side engaging members towards or away from one another, controlled by the centering banknote drive 8. This banknote centering mechanism works in a similar manner to our earlier U.S. Patent 6,149,150 with the centering banknote drive 8 replacing the former worm gear drive. Various shaft arrangements for controlling sliding of the side members can be used. It has been found that the spur gear and rack drive arrangement provides excellent control and movement of the side engaging members towards one another. This allows accurate coordination of the stall condition with the buckling force provided by a banknote as it is centered by the side engaging members. Also this drive arrangement is quite cost effective.

As disclosed in our earlier application, motor 10 is a low torque motor that can be controlled in a manner to vary the stall condition. Typically the centering mechanism will go through a number of cycles to assess the general condition of the centering mechanism without
a banknote present to form the basis for setting of the
motor parameters to produce the desired stall condition
created by the resistance of the banknote when centered.

Figure 3 generally shows a banknote inlet 30, the
banknote path 32 through the centering mechanism, the
initial drive roller arrangement including the triangular
drive 26 and the idler roller 27, and the exiting drive
roller 24 and its associated idler roller 25.

The triangular roller includes a number of sensing
positions to allow determination of when a banknote is
not effectively engaged by the roller. This condition
allows for centering of the banknote as the banknote is
free to move and be centered by the side engaging
members.

The banknote drive 20 effectively allows movement
of the banknote to the centering position releasing of
the banknote to allow centering and the subsequent re-
engagement and movement of the banknote out of the
centering mechanism. Other drive arrangements for
releasing of the banknote between the side engaging
members are possible.

Although various preferred embodiments of the
present invention have been described herein in detail,
it will be appreciated by those skilled in the art, that
variations may be made thereto without departing from the
spirit of the invention or the scope of the appended
claims.
THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. In a banknote centering mechanism comprising opposed side members movable towards one another and controlled by a drive mechanism, said drive mechanism comprising a rack and pinion drive arrangement powered by a low torque motor and controlled by a control arrangement that adjusts the power of the motor such that a buckling force produced by a centered banknote and exerted on said opposed side members stalls said low torque motor and stops further inward movement of said side engaging members.