March 15, 1938. G. W. SWIFT, JR 2,110,980

PRINTER SLOTTER FEEDING MECHANISM

Filed Aug. 8, 1935

Fig. 1.

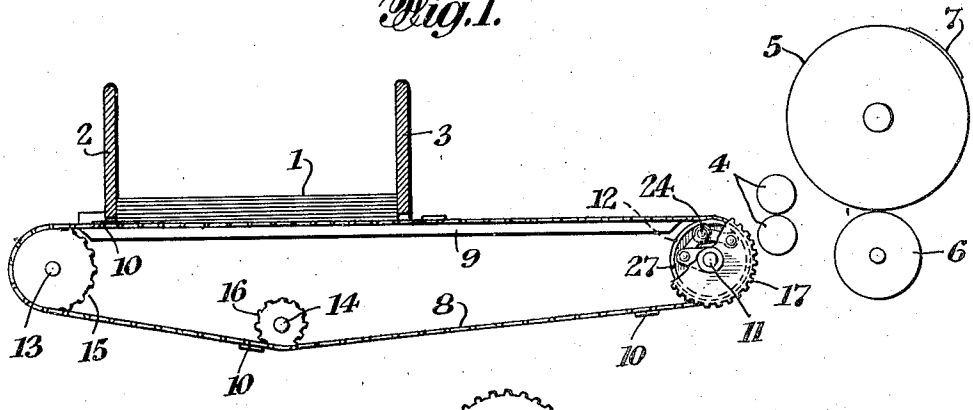


Fig. 1a

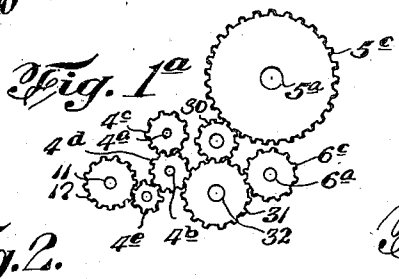


Fig. 2.

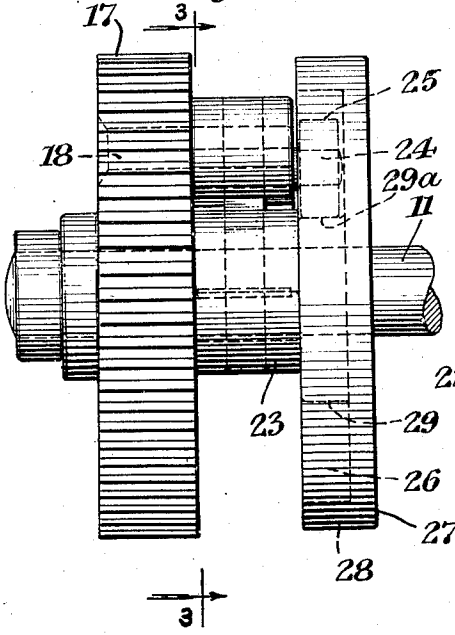
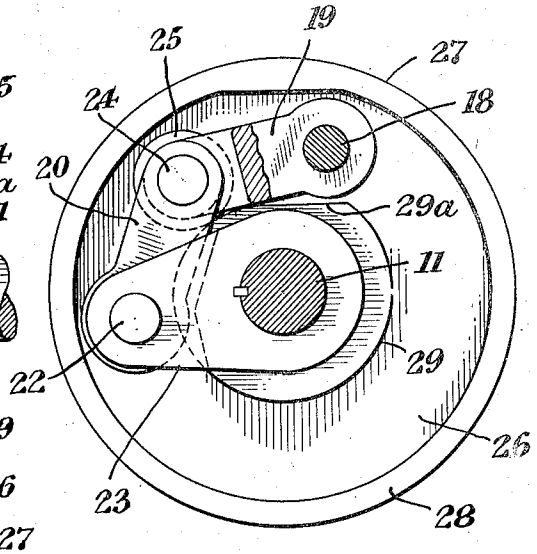


Fig. 3.



INVENTOR
George W. Swift, Jr.
BY
Wood Crosby & Neal
ATTORNEYS

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PRINTER-SLOTTER FEEDING MECHANISM

George W. Swift, Jr., Bordentown, N. J., assignor to George W. Smith, Jr. Inc., Bordentown, N. J., a corporation of New Jersey

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4 Claims. (Cl. 271—53)

The invention aims primarily to provide a blank feeding mechanism which will feed the blanks very precisely under the special conditions and requirements existing in connection with machines used for performing printing and/or slotting operations upon corrugated paperboard and fiberboard box blanks. It is frequently required that the printed matter and/or the slots be quite accurately positioned on the blanks and efforts have been made to improve the operation of the machines in these respects by providing special adjustments of the printing dies or the cutters which cut out the slots. The accuracy of operation however is dependent as well upon the degree of precision with which the blanks are fed to the printing cylinders and/or slotting heads, and it is objectionable from the standpoint of injury to the corrugated paper board to apply a high pressure to the blanks in feeding them to the machine. In the feeding of corrugated paper board and fiberboard box blanks, it is customary to employ feed rolls having relatively soft yieldable surfaces engaging the blanks; these surfaces also tend to create irregularities in the feed which it is the object of the present invention to overcome. The blanks should be fed to the operating parts of the machine by feed rolls which apply only a relatively light frictional pressure and accordingly inaccuracies in the positioning of the printed matter or slots may result as well from slippage in the feed as from inaccurate positioning of the printing dies or cutters; or with given settings of the main operating parts of the machine, variations in the position of the printed matter or slots on the blank may result solely from inaccurate feed. The above difficulties become accentuated under modern requirements of high speed operation.

The blanks are fed to the machine successively from the bottom of a stack of blanks, and heretofore it has been the practice to employ a device such as a chain or knocker feed mechanism which periodically pushes the bottom blank partially out from under the stack into engagement with the feed rolls above mentioned, with the result that the feed rolls drew the blank the rest of the way out from under the stack, against the frictional pressure of the stack on the blank being fed. This pressure varies substantially during operation, depending on the weight of the stack and size of blank, and using the relatively light frictional pressure which it is feasible to apply to the blank by the feed rolls the variable frictional resistance applied by the stack as aforesaid has been an important factor in producing slippage of feed which resulted in accurately positioned printed matter or slots.

The present invention aims to provide a blank feeding mechanism of simple and practical construction which will eliminate the above mentioned inaccuracies of feed. In one of its more specific aspects, the invention also aims to relieve the blanks from injury by the feeding mechanism when operating at high speeds. Further objects and advantages of the invention will be in part obvious and in part specifically referred to in the description hereinafter contained which, taken in conjunction with the accompanying drawing, discloses a preferred embodiment thereof; such embodiment, however, is to be considered merely as illustrative of the principles of the invention.

In the drawing:—

Fig. 1 is a side view in simple diagrammatic form, of a printer-slotter feeding mechanism constructed to operate in accordance with the invention.

Fig. 1*a* is a diagrammatic side elevation showing a gear train suitable for driving the operating parts of the machine in proper relation to each other.

Fig. 2 is a side view showing detached from the machine, a form of variable motion transmission device which is suitable for driving the chain feed mechanism.

Fig. 3 is a section taken on line 3—3 of Fig. 2 looking in the direction of the arrows.

The invention is illustrated as applied to the feeding of a stack of paperboard blanks 1 from a hopper having guide walls 2 and 3 (which may be regarded as of suitable specific construction well known in the art) to the feed rolls 4 of a printer-slotter. The printer-slotter also will not be illustrated or described in detail, since machines of this character are well known in the art. Fig. 1 shows merely a pair of cylinders 5 and 6 of such a machine, the cylinder 5 carrying a type-plate 7 which operates on the blanks. Or the member 7 may be regarded as a slotting blade for operating on the blanks, reference to printer-slotters herein being understood as designating machines which perform either printing or slotting operations on the blanks, or both.

The blanks are fed from the hopper to the main feed rolls 4 of the machine, by a chain feed mechanism consisting of a suitable number of chains 8 disposed side by side and with their upper passes operating over a fixed table 9. Pusher members 10 located at intervals along the chain, successively engage behind the bot-

tom blank of stack 1 and advance the latter into engagement with feed rolls 4, it being understood that the chain 8 is suitably driven in timed relation to the feed rolls 4 and cylinders 5 and 6, all as is well known in the art and not described or illustrated in detail herein. As shown the above chain feed mechanism is driven from a shaft 11 at its end adjacent feed rolls 4, and the shaft is provided with suitable sprockets 12. Idler shafts 13 and 14 may also be provided carrying sprockets 15 and 16 respectively.

Machines of the above character are customarily arranged so as to accommodate blanks over a substantial range of sizes, and in accordance with one feature of the invention, the wall 3 of the hopper is spaced from the feed rolls 4, a distance at least as great as the length of the largest size of blank which the machine is to accommodate. Therefore, under all conditions of operation, it will be insured that the lowermost blanks as fed from stack 1 are entirely moved out from under the stack before being engaged with feed rolls 4, and thus the feed rolls 4 may feed the blanks frictionally forward under the necessarily light pressure which is feasible, without having to operate against the variable frictional resistance which heretofore has been imposed on the blank being fed, by the stack of blanks above it.

In a broader aspect of the invention, the mechanism above described may suffice to feed the blanks, but I prefer to employ in connection with the chain feed mechanism, a device for reducing the speed differential between the pusher members 10 and blanks, at the time when the pusher members come into engagement with the blanks. Such a feature is particularly useful where the machine is to be operated at high speeds, in that the rapidly moving pusher members otherwise may mash the edges of the sheet which they engage. In the illustrated form of the invention I employ a variable motion transmitting device for driving the shaft 11, this device acting to retard the movement of the pusher members 10 in the phases of the cycle at which they come into engagement with the blanks. As shown (Fig. 2) the shaft 11 is driven from a gear 17 loose thereon, and provided with a stud 18 connected to the first of a pair of toggle links 19 and 20. The link 20 is pivoted by pin 22 (Fig. 3) to the end of a radial dog 23 keyed to shaft 11. The adjacent ends of links 19 and 20 are pivotally connected by a stud 24 which projects beyond the links to support roller 25 which works in the track 26 of a stationary cam 27 having an annular flange 28 and a central hub 29. Normally, with the gear 17 and stud 18 rotating in a clockwise direction, as shown in Fig. 3, the toggle links 19 and 20 keep the roller 25 in engagement with hub 29, causing the drive shaft 11 to be rotated at uniform speed so long as the roller 25 engages the parts of hub 29 which are concentric with shaft 11. Every time a pusher member 10 is just about to engage behind one of the blanks however, the roller 24 engages a portion 29*a* of the cam surface of hub 29 which permits the stud 24 to move radially inward to spread the links of the toggle and thereby retard the rotary motion of shaft 11 with respect to its driving gear 17. After the low spot 29*a* of the cam has been passed by roller 25, the toggle constituted by links 19 and 20 becomes restored to its original position, whereby the chain mechanism 8 again operates at its normal speed, which is substantially equal to the speed of feed of rolls 4. Thus for a short period when the pusher members 10 first engage the blanks, the speed of the chain feed is reduced, but such speed always is restored to normal by the time the pusher members 10 have moved the corresponding blank into engagement with rolls 4, and the chain feed mechanism is kept in step with the operations to be performed by the main machine. The above toggle mechanism is to be regarded as merely typical of some suitable device for relieving the speed differential between the pusher members 10 and the blanks at the time of engagement, to avoid undue impact of the pusher members against the blanks and consequent injury to the latter.

In Fig. 1*a* a power transmitting gearing for the cylinders 5 and 6, feed rolls 4 and chains 8, is shown as consisting of a spur gear 31 on the power input shaft 32, the gear 31 meshing with an intermediate gear 30 which in turn meshes with a gear 5*c* on shaft 5*a* which may be understood as driving the upper cylinder 5 of Fig. 1. Gear 31 also meshes with a gear 6*c* on shaft 6*a*, which shaft may be understood as driving the lower cylinder 6 of Fig. 1. The gear 31 also meshes with a gear 4*d* on shaft 4*b*, which latter may be understood as driving the lower feed roll 4 of Fig. 1, the gear 4*d* in turn meshing with a gear 4*c* on shaft 4*a*, which latter may be understood as driving the upper feed roll 4 of Fig. 1. The gear 4*d* also meshes with an intermediate gear 4*e* which in turn drives the gear 17 mounted loosely on shaft 11 and operating as above described. The train of gears as above described in connection with Fig. 1*a* should be regarded as merely illustrative or typical of suitable gearing for driving the feed rolls 4 and chain feed 8 in timed relation to the cylinder 5.

While a specific embodiment of the invention has been described it should be understood that many changes may be made therein without departing from the invention in its broader aspects, within the scope of the appended claims.

I claim:

1. A mechanism for feeding blanks to a paper board printer-slotter machine, having frictional main blank feeding rolls, means for driving said rolls in timed relation to the parts of the machine which perform the desired operations on the blank, said main blank feeding rolls being constructed and arranged to engage frictionally the forward edges of successively fed blanks and determine the longitudinal registration thereof with respect to the aforesaid parts of the machine, a hopper for supporting a stack of blanks to be fed, said hopper being spaced from the feeding rolls a distance at least equal to the maximum length of blank accommodated by the machine, a chain feed mechanism underlying the hopper and extending between the hopper and feeding rolls, said chain feed mechanism carrying pusher members adapted to engage successively behind the bottom blank of the stack and move it out from under the stack into engagement with the feed rolls, the length of the chain mechanism between the hopper and feed rolls being such that all blanks will be entirely moved clear of the stack before being engaged with the feed rolls.

2. A mechanism for feeding blanks to a paper board printer-slotter machine, having frictional main blank feeding rolls, means for driving said rolls in timed relation to the parts of the machine which perform the desired operations on the blank, said main blank feeding rolls being constructed and arranged to engage frictionally the forward edges of successively fed blanks and determine the longitudinal registration thereof

with respect to the aforesaid parts of the machine, a hopper for supporting a stack of blanks to be fed, said hopper being spaced from the feeding rolls a distance at least equal to the maximum length of blank accommodated by the machine, a chain feed mechanism underlying the hopper and extending between the hopper and feeding rolls, said chain feed mechanism carrying pusher members adapted to engage successively behind the bottom blank of the stack and move it out from under the stack into engagement with the feed rolls, the length of the chain mechanism between the hopper and feed rolls being such that all blanks will be entirely moved clear of the stack before being engaged with the feed rolls, and means for reducing the speed differential between the pusher members and blanks at the times when the pusher members come into engagement with the blanks.

3. A mechanism for feeding blanks to a paper board printer-slotter machine, having frictional main blank feeding rolls, means for driving said rolls in timed relation to the parts of the machine which perform the desired operations on the blank, said main blank feeding rolls being constructed and arranged to engage frictionally the forward edges of successively fed blanks and determine the longitudinal registration thereof with respect to the aforesaid parts of the machine, a hopper for supporting a stack of blanks to be fed, said hopper being spaced from the feeding rolls a distance at least equal to the maximum length of blank accommodated by the machine, a chain feed mechanism underlying the hopper and extending between the hopper and feeding rolls, said chain feed mechanism carrying pusher members adapted to engage successively behind the bottom blank of the stack and move it out from under the stack into engagement with the feed rolls, the length of the chain mechanism between the hopper and feed rolls being such that all blanks will be entirely moved clear of the stack before being engaged with the feed rolls, and a variable motion transmitting device for driving said chain mechanism, adapted to reduce the speed differential between the pusher members and blanks at the times when the members come into engagement with the blanks.

4. A mechanism for feeding blanks to a paper board printer-slotter machine, having frictional main blank feeding rolls, means for driving said rolls in timed relation to the parts of the machine which perform the desired operations on the blank, said main blank feeding rolls being constructed and arranged to engage frictionally the forward edges of successively fed blanks and determine the longitudinal registration thereof with respect to the aforesaid parts of the machine, a hopper for supporting a stack of blanks to be fed, a chain feed mechanism underlying the hopper and extending toward the feed rolls, said chain feed mechanism carrying pusher members adapted to engage successively behind the bottom blank of the stack while stationary, and a variable motion transmitting device for retarding the movement of said chain feed mechanism at the times when said pusher members come into engagement with the blanks as aforesaid.

GEORGE W. SWIFT, JR.