Jan. 9, 1934. A. K. TAYLOR 1,942,988

SHEET EDGE CRIMPING APPARATUS

Filed July 10, 1930 3 Sheets-Sheet 1

Fig. 1.

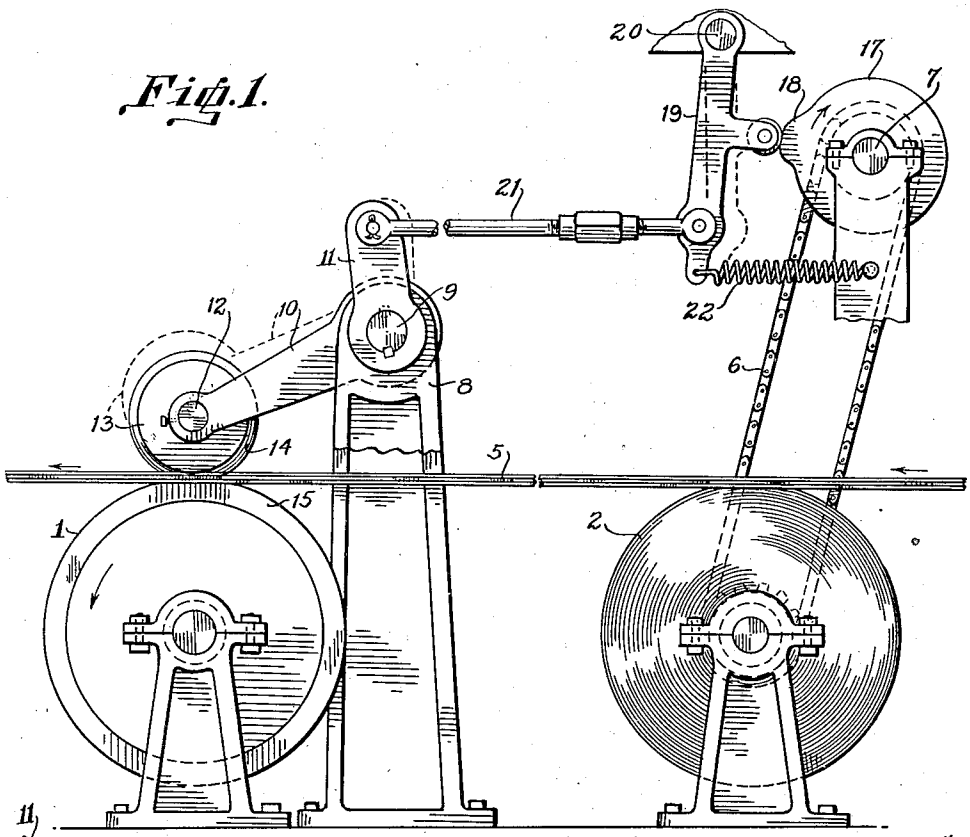


Fig. 2.

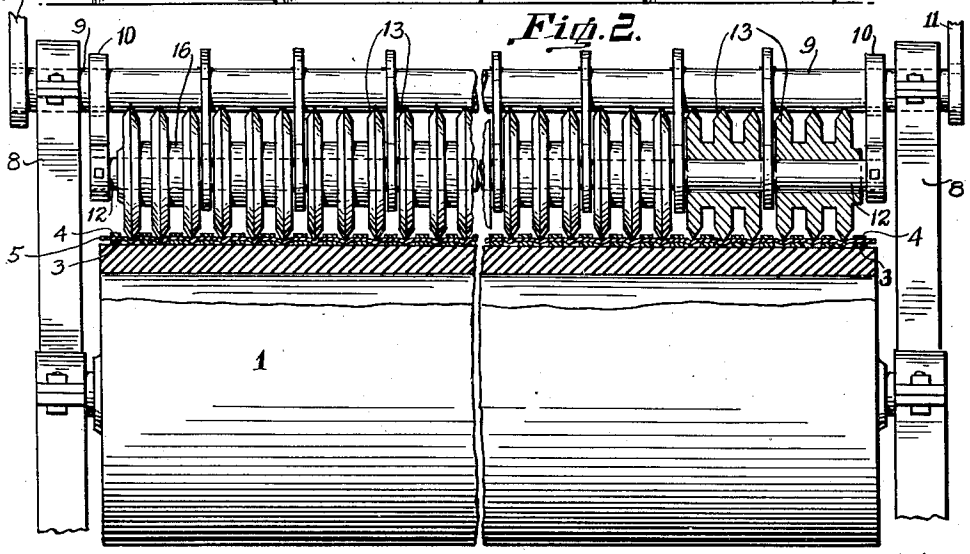


Fig. 3.



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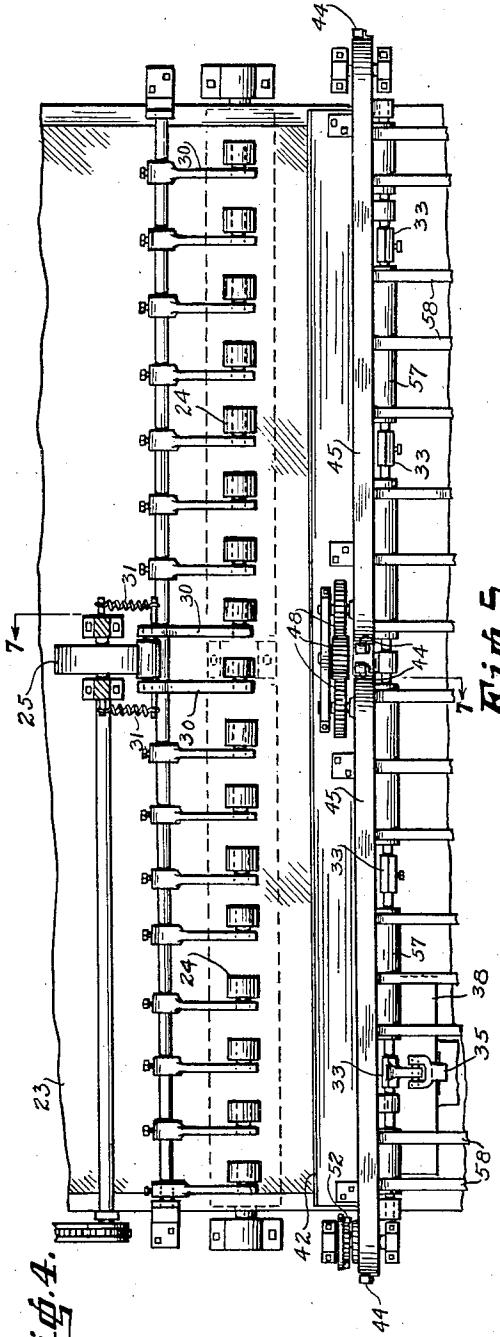


Fig. 4.

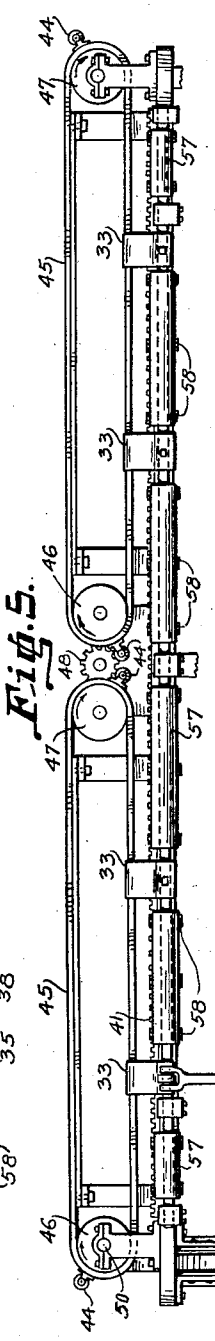


Fig. 5.

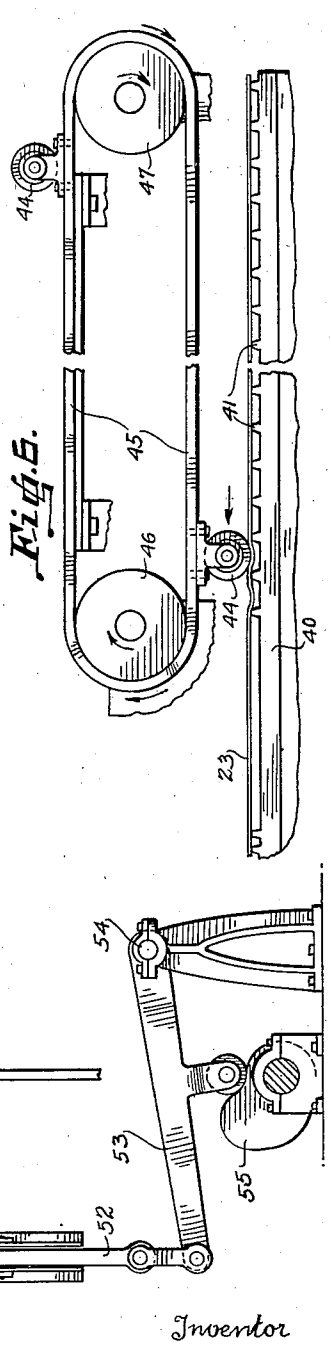


Fig. 6.

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Fig. 7.

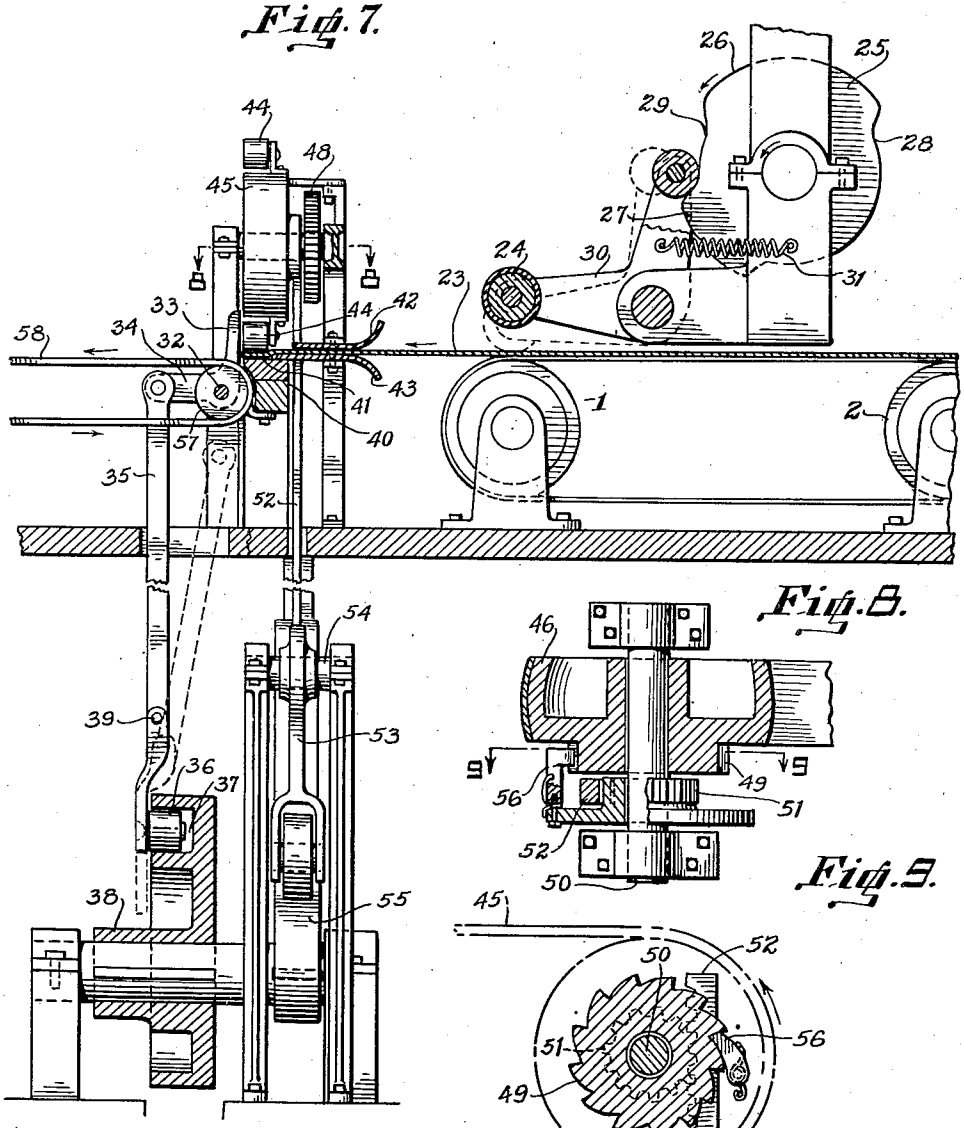
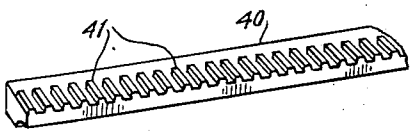


Fig. 8.

Fig. 9.

Fig. 10.



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UNITED STATES PATENT OFFICE

1,942,988

SHEET EDGE CRIMPING APPARATUS

Arthur K. Taylor, Baltimore, Md., assignor to The United States Printing and Lithograph Co., Baltimore, Md., a corporation of Ohio

Application July 10, 1930. Serial No. 467,106

14 Claims. (Cl. 93—1)

This invention relates to sheet edge crimping attachments for presses and has for its object the provision of means for crimping the edges of paper sheets prior to feeding the same to printing presses.

It is generally known that, due to its hydroscopic character, paper is very prone to curl under varying moisture conditions in the surrounding air. This is particularly the case with coated paper, where one side of the sheet is protected to a certain extent by the coating, the reverse side being more exposed to the moisture in the air, the fibers in the paper taking in this moisture swell in diameter to a greater extent than do the fibers next to the coating or the coating itself and this swelling curls the paper.

As this curling is most noticeable at the edges, this condition causes difficulties in feeding the sheets to the guides used mainly for the operations incident to printing.

The purpose of crimping the guide edge of the sheet is to stiffen it by imparting a multiplicity of corrugations at right angles to the edge and extending for a short distance from the edge.

Other objects of the invention will appear as the following description of a preferred and an alternative embodiment of the invention proceeds.

The following specification of the invention is illustrated by drawings in which the same characters of reference have been employed throughout the several figures to designate identical parts.

In the drawings:

Figure 1 is a side elevation of the principal elements involved in carrying out the preferred form of my invention;

Figure 2 is an elevation, partly in vertical section of the apparatus shown in Figure 1, parts being omitted;

Figure 3 is a perspective view showing in an exaggerated manner the crimped edge of a sheet;

Figure 4 is a plan view partly in section of the essential parts of an alternative form of the invention;

Figure 5 is a front elevation of the same;

Figure 6 is a vertical section on an enlarged scale showing the crimping elements in the alternative form acting upon a sheet of paper;

Figure 7 is a section taken along the line 7—7 of Figure 4;

Figure 8 is a section taken along the line 8—8 of Figure 7;

Figure 9 is a section taken along the line 9—9 of Figure 8;

Figure 10 is a perspective view of a fragment of the crimping plate which under-lies the advance edge of a sheet of paper when the latter is at the crimping point of the machine.

Referring now in detail to the several figures, and first adverting to that form of the invention shown in Figures 1 to 3, inclusive, the numerals 1 and 2 represent supporting rolls over which pass a system of parallel strips of under-lying and over-lying tape or ribbon belting 3 and 4, between which the sheets of paper 5 are brought singly and in succession to the apparatus. The belting passes over suitable rollers well known in the art and not shown.

Although the invention does not involve the construction or operation of the supporting rolls, it may be stated that it may be desirable to drive certain or all of the supporting rolls in order to assist in the propulsion of the belting, and for this purpose a driving chain 6 is shown operatively connected to sprockets on the roll 2 and power shaft 7. It is to be understood that the chain and sprockets are merely illustrative and that any known drive means may be substituted therefor without in the least affecting the nature of the invention. The invention concerns itself particularly with what takes place at the top of the roll 1, for at this point is provided the crimping means which stiffens the edge of the sheet.

A pair of standards or other supports 8 are provided affording a bearing for a bell crank conveniently constituted by a shaft 9 having arms 10 and 11 at each end keyed thereto at a suitable angle. The arms 10 at their free ends afford bearings for a shaft 12 upon which are mounted disks 13 having bevelled peripheral edges 14. The bell crank can be swung so as to bring the disks 13 into close relation to the supporting roll 1, the latter being preferably constructed with a rubber tread 15 against which said disks may be lightly and yieldingly impinged. The disks are so spaced, for instance upon hubs 16, that the bevelled edges locate themselves when the device is in crimping position between the belting strips 3 and 4.

It is apparent from Figure 2 that the disks depress those parts of the sheet which bridge the space between adjacent belting strips below the general plane of the paper so as to form the corrugations or crimps. It is to be understood that the edge only of each sheet is to be crimped and that the disks are lowered into crimping relation to the sheets in timed relation to the feed-

ing of the sheets so that the crimp is made only at the advance edge of each sheet.

Figure 1 shows typical operating means for the crimping mechanism, comprising a cam 17 on the drive shaft 7 having an elevation 18 which rocks a lever 19 pivoted as at 20 to any suitable support. The opposite end of the lever 19 is connected to the arm 11 of the bell crank by a suitable connecting rod 21, the latter being preferably adjustable as to length. The lever 19 is normally held against the cam by means such as the spring 22.

Since the drive shaft 7 is presumed to be connected by positive mechanism with the mechanism that feeds the sheets, it is clear that the cam can be so positioned as to cause the lowering of the disks 13 exactly at the moment when a sheet comes into position with its advance edge in the path of the descending mechanism.

That form of the invention which has been just described crimps the edge of the sheet by making contact therewith simultaneously at a plurality of points in a line transversely of the direction of travel of the sheets and consequently, it is not necessary to stop the movement of the sheets at the moment of crimping.

The alternative form of the invention comprises a construction in which the crimping is not made simultaneously along the entire width of the sheet, but progressively from one side to the other or to an intermediate point from both sides.

In Figure 7 the supporting rolls 1 and 2 are shown, which, in this instance, carry the ribbon belting and in addition, support the sheet direct, the sheet being indicated at 23. The sheet is assumed to be fed onto the supporting roll 2 in any suitable manner by mechanical means or by hand, and to pass between the power driven roll 1 and the friction roller 24.

It will be seen that contact of the friction roller 24 with the sheet is intermittent so that the feed of the sheet likewise proceeds step by step. The intermittent feed is produced by a power driven cam 25 suitably supported having elevations 26 and 27 with alternate depressions 28 and 29. The cam cooperates with a bell crank 30, the free end of which carries the friction roller 24.

When the bell cranks ride over the elevations of the cam, the friction rollers 24 bears against the sheet causing it to be driven forward by the roll. When the bell crank falls into the depressions in the cam, the friction roller 24 is raised from contact with the sheet, through the urge of the spring 31. The cam 25 is timed in its movements, relative to the crimping mechanism, so that the sheet is always stopped in position to be acted upon by the crimper.

As a further assurance of the halting of the sheet at a definite point, a shaft 32 is provided having a plurality of stops 33 capable of assuming an erect position as shown in Figure 7 or a supine position. The shaft 32 is oscillated by an arm 34 driven by a link 35, the lower end of which is constituted by a roller 36 operating in a cam groove 37 formed in a cam 38 suitably driven from the machine. It is clear from Figure 7 that in the oscillatory movement of the shaft 32, the link 35 moves angularly with respect to the plane of rotation of the cam 38, so that a suitable articulation 39 is provided in said link.

When the stops 33 are elevated they form an abutment for the advance edge of the sheet and even if the drive means should tend to move it farther, the excess movement of the sheet is inhibited through the presence of the stops. At the same time the friction roller 24 is depressed to contact with the sheets and stops 33 are moved to their supine position so that the sheet is free to advance. In the meantime, the crimping operation has taken place.

The crimping mechanism is constituted by a rack bar 40 having teeth 41, best shown in Figure 10, the top face of which teeth lie in the plane of the lower face of the sheet. Guide plates 42 and 43 form a flared opening into which the advance edge of the sheet enters and through which the sheet passes on its way to the crimper, the guide plates guiding the sheet so that it slides just above the top face of the teeth 41.

A crimping roller 44 cooperates with the teeth 41, said roller being preferably made of yielding substance such as rubber. The roller 44 is carried by a belt 45, mounted transversely with respect to the direction of movement of the sheet and carried by pulleys 46 and 47, at least one of which is suitably driven.

There are two rollers 44 on the belt 45, only one of which is operative at a time so that for each revolution of the belt 45, two crimping operations will have taken place. Figure 5 shows that there are two such belts 45, placed end to end and suitably driven through a common driving train 48. The use of two belts permits the simultaneous operation of a roller 44 on each belt, each roller therefore, having to traverse one-half the width of the sheet and, therefore, cutting the time in which the sheet must remain stationary to a minimum.

A practical drive for the belts 45 is shown in full in Figure 6 and in detail in Figures 8 and 9, from which figures it will be noted that one of the pulleys, for instance, the pulley 46, or gear 48, is provided on one side with a ratchet wheel 49. The pulley is loosely mounted upon a shaft 50 to which shaft a gear 51 is suitably secured. The gear 51 is actuated by a rack bar 52 which is reciprocated through a rocking lever 53 having a fulcrum 54 and rocked by means of a cam 55. It is obvious that the gear 51 and together with the shaft 50, rotates in reverse directions with the reciprocatory movements of the rack bar 52.

Uni-directional intermittent motion is imparted to the pulley 46 and thus to the belts 45, by means of a pawl 56 secured to the gear 51 and acting upon the ratchet teeth 49 with which the pulley is provided. In one direction of rotation of the gear 51, the pawl engages the abrupt shoulders of the teeth rotating the pulley. In the opposite direction of rotation of the gear 51, the pawl, which is resilient, rides over the face of the ratchet teeth 49 and during this phase of rotation, the pulley remains stationary.

The gear ratio between the gear 51 and the pulley 46 is such that for the rotary movement of the gear, the belt and with it the crimping roller 44 moves a distance approximately one-half the width of the sheet. The action of the crimping is better illustrated in Figure 6 from which figure it will be noted that the crimping roller presses the paper between the teeth on the rack bar 41, producing the desired undulatory crimp in said sheet.

It will be observed from Figures 5 and 6 that the crimping is discontinuous adjacent the middle of the edge of the sheet, leaving an uncrimped space of narrow width. This space is not sufficiently wide to interfere with the result accomplished by the crimping.

It is to be understood that all of the operating

parts are commonly driven and in such sequence that at the moment the friction roller 24 breaks contact with the sheet above the roll 1, the advance edge of the sheet has reached crimping position and makes contact with the stops 33 which have in the meantime risen to block the free progress of the sheet, and at the same time the rack bar 52 has begun to execute a reciprocatory movement in that direction which causes rotation of the belt 45 carrying with it the crimping roller 44. When the rack bar 52 reciprocates on its opposite stroke, the stops 33 return to their supine position, the crimping rollers 44 leave the sheet at the opposite sides thereof, and the friction roller 24 comes down against the sheet promoting its further advance beyond the point of crimping. The shaft 32 affords a bearing for certain pulleys 57 carrying narrow belting 58, the upper stretches of which are traveling away from the crimping mechanism and on which rides the sheet, after crimping, delivered by the continued action of the feed roll 1 and the friction roller 24.

While I have, of course, endeavored in describing the invention to define it in terms of such structural elements as are practical and simple as to construction, it is to be understood that the details of construction are altogether illustrative, and in no wise to be considered limitative in their bearing upon the invention.

What I claim is:

1. Sheet edge crimping apparatus comprising a sheet support having alternate elevations and depressions on its sheet supporting face, the latter being substantially planar, crimping means co-acting with the elevations and depressions on said support, and means for periodically moving said crimping means into inter-engaging relation with said elevations and depressions and upon an intervening sheet of paper.

2. Sheet edge crimping apparatus comprising a sheet support having alternate elevations and depressions on its sheet supporting face, the latter being substantially planar, crimping means co-acting with the elevations and depressions on said support, said crimping means including an element interdigitating with the elevations and depressions between the elevations on said support, and means for periodically moving said crimping means into inter-engaging relation with said support and upon an intervening sheet of paper.

3. Sheet edge crimping apparatus comprising a supporting roller, means for feeding sheets to said roller, a crimping roller having spaced crimping edges, normally spaced above said supporting roller, and means operable for engaging said crimping roller with said supporting roller simultaneously with the feeding of a sheet to a position in which the edge to be crimped lies between the engaged portions of said crimping and supporting rollers.

4. Sheet edge crimping apparatus comprising a supporting roller, means for feeding sheets to said roller, a crimping roller having spaced crimping edges, normally spaced above said supporting roller, and means operable for engaging said crimping roller with said supporting roller simultaneously with the feeding of a sheet to a position in which the edge to be crimped lies between the engaged portions of said crimping and supporting rollers, the surface of the latter being of yielding material.

5. Sheet edge crimping apparatus comprising a supporting roller, means for feeding sheets to said roller, a crimping roller having spaced crimping edges, normally spaced from said supporting roller, pivotally mounted bell cranks by which said crimping roller is carried, and means for oscillating said bell cranks to bring said crimping roller into engagement with said supporting roller, said oscillating means being operable so as to cause the engagement of said rollers simultaneously with the feeding of a sheet to a position in which the edge to be crimped lies between the engaged portions of said crimping and supporting rollers.

6. Sheet edge crimping apparatus comprising a supporting roller, means for feeding sheets to said roller, an oscillatably mounted crimping roller having spaced crimping edges, and normally spaced from said supporting roller, means for oscillating said crimping roller comprising a cam and linkage between said cam and crimping roller, said cam being operable so as to bring said crimping roller into engagement with said supporting roller simultaneously with the feeding of a sheet to a position in which the edge to be crimped lies between the engaged portions of said crimping and supporting rollers.

7. Sheet edge crimping apparatus comprising a supporting roller, means for feeding sheets to said roller, an oscillatably mounted crimping roller having spaced crimping edges, and normally spaced from said supporting roller, means for oscillating said crimping roller comprising a cam and linkage between said cam and crimping roller, said cam being operable so as to bring said crimping roller into engagement with said supporting roller simultaneously with the feeding of a sheet to a position in which the edge to be crimped lies between the engaged portions of said crimping and supporting rollers, the surface of the supporting roller being of yielding material.

8. Sheet edge crimping apparatus comprising a support, means for intermittently feeding sheets to said support and stopping said sheets with the edge to be crimped in operative position upon said support, a crimping roller, means for moving said crimping roller axially of said support, said moving means being so synchronized with the said feeding means as to cause the crimping roller to traverse said support in a path occupied by said edge of said sheet when the latter is stationary.

9. Sheet edge crimping apparatus comprising a support, means for intermittently feeding sheets to said support and stopping said sheets with the edge to be crimped in operative position upon said support, a belt mounted to travel axially of said support, a crimping roller carried by said belt, means for operating said belt, said means being so synchronized with the sheet feeding means that said crimping roller traverses said support along a path occupied by the edge of said sheet to be crimped, when said sheet is stationary.

10. Sheet edge crimping apparatus comprising a transverse support, means for intermittently feeding sheets to said support, means synchronized with said feeding means to release the sheets when the latter are in operative position on said support, means also synchronized with said feeding means for simultaneously positively stopping said sheets when the latter have reached said operative position, a belt mounted lengthwise of said support, a crimping roller carried by said belt traversing said support, and means for operating said belt, said operating means being synchronized with said sheet feeding and stopping means so as to cause said

crimping roller to transverse said support when said feeding means is in released position and said stopping means is in said stopping position.

11. Sheet edge crimping apparatus comprising a corrugated transverse support, means for intermittently feeding sheets to said support, means synchronized with said feeding means to release the sheets when the latter are in operative position on said support, means also synchronized with said feeding means for simultaneously positively stopping said sheets when the latter have reached said operative position, a belt mounted lengthwise of said support, a crimping roller carried by said belt traversing said support, and means for operating said belt, said operating means being synchronized with said sheet feeding and stopping means so as to cause said crimping roller to traverse said support when said feeding means is in released position and said stopping means is in said stopping position.

12. Sheet edge crimping apparatus comprising a transverse support, means for intermittently feeding sheets to said support, means synchronized with said feeding means to release the sheets when the latter are in operative position on said support, means also synchronized with said feeding means for simultaneously positively stopping said sheets when the latter have reached said operative position, said stopping means comprising a shaft adjacent said support, arms on said shaft normally out of the path of said sheets, means for oscillating said shaft to bring said arms into stopping relation to said sheets, a belt mounted lengthwise of said support, a crimping roller carried by said belt traversing said support, and means for operating said belt, said operating means being synchronized with said sheet feeding and stopping means so as to cause said crimping roller to traverse said support when said feeding means is in released position and said stopping means is in said stopping position.

13. Sheet edge crimping apparatus comprising a transverse support, means for intermittently feeding sheets to said support, means synchronized with said feeding means to release the sheets when the latter are in operative position on said support, means also synchronized with said feeding means for simultaneously positively stopping said sheets when the latter have reached said operative position, a belt mounted lengthwise of said support, a crimping roller carried by said belt traversing said support, and means for operating said belt comprising a shaft, a belt pulley operatively related to said shaft transmitting power to said belt, a one-way ratchet on said shaft, a rack engaging said ratchet, and a cam for reciprocating said ratchet to impart intermittent movement to said shaft and belt, said belt operating means being synchronized with said sheet feeding and stopping means so as to cause said crimping roller to traverse said support when said feeding means is in released position and said stopping means is in said stopping position.

14. Sheet edge crimping apparatus comprising a corrugated transverse support, means for intermittently feeding sheets to said support, means synchronized with said feeding means to release the sheets when the latter are in operative position on said support, means also synchronized with said feeding means for simultaneously positively stopping said sheets when the latter have reached said operative position, a pair of belts mounted rectilinearly lengthwise of said support, a crimping roller carried by each belt, and traversing said support from a point adjacent the center to the edge thereof, and means for operating said belts, comprising a shaft, belt pulleys transmitting power to the adjacent ends of said belts through gearing between said pulleys, a one-way ratchet on said shaft, a rack engaging said ratchet, and a cam for reciprocating said ratchet to impart intermittent movement to said shaft and to said belts, said belt operating means being synchronized with said sheet feeding and stopping means so as to cause said crimping roller to traverse said support when said feeding means is in released position and said stopping means is in stopping position.

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