H. INMAN.

PAPER FEEDING MECHANISM FOR PAPER BOX MACHINES.

APPLICATION FILED JAN. 16, 1906.

1,030,183.

Patented June 18, 1912.

4 SHEETS—SHEET 1.

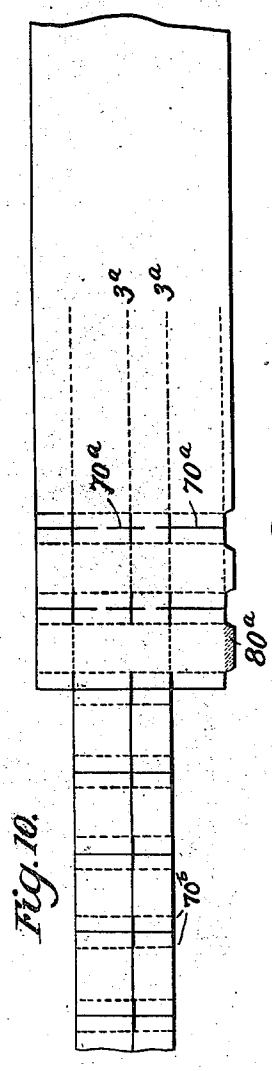

Fig. 10.

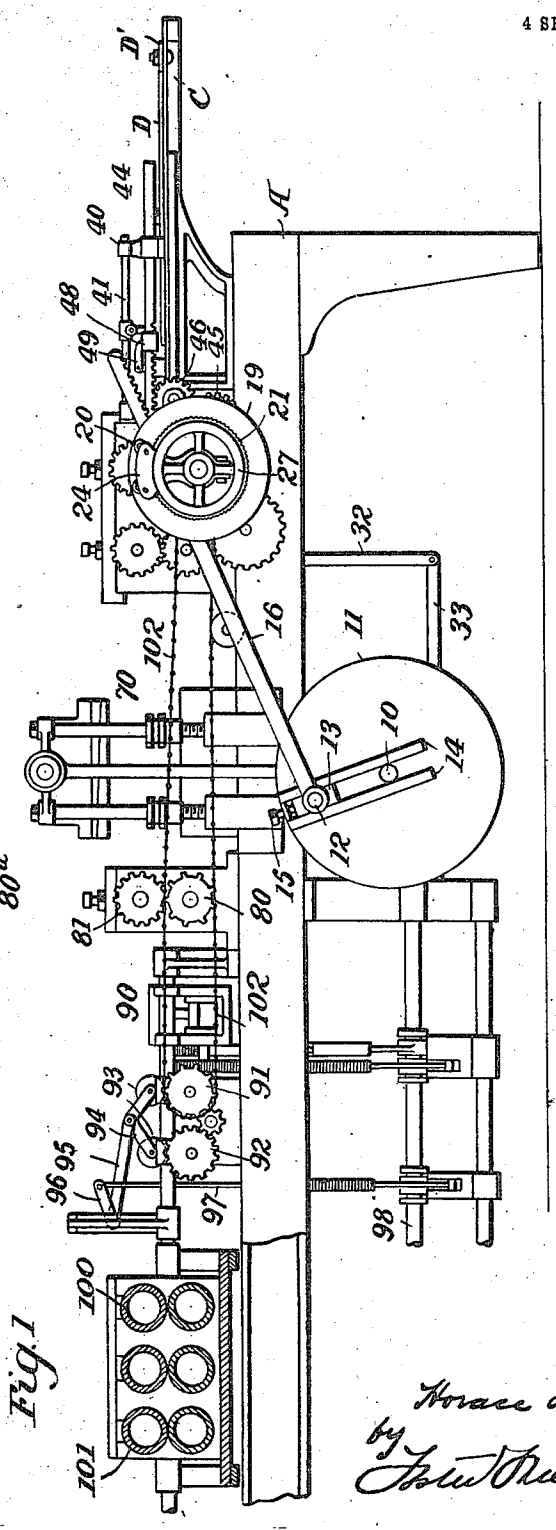

Fig. 1

Witnesses

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4 SHEETS—SHEET 2.

Fig. 2.

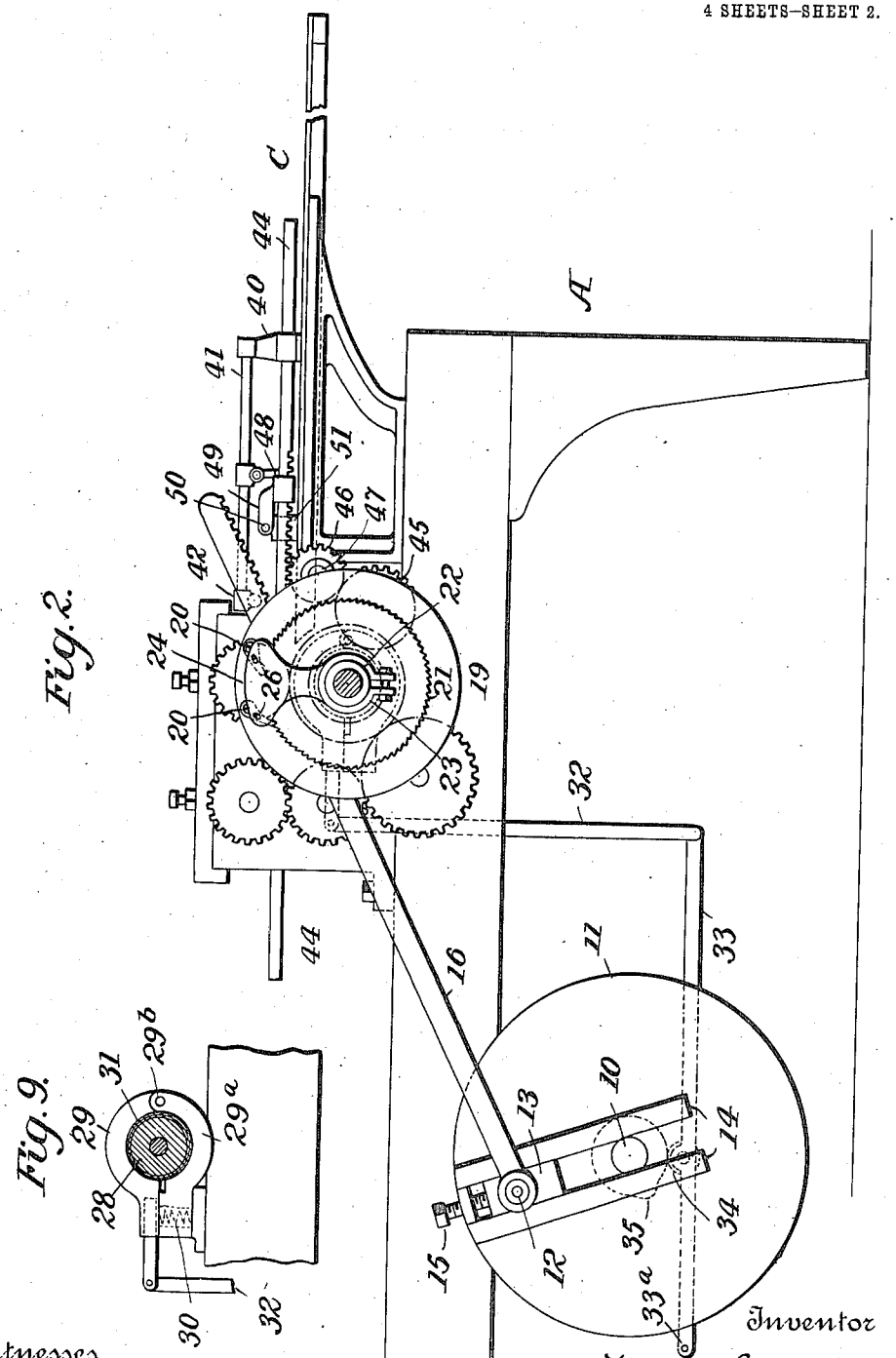

Fig. 9.

Witnesses

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4 SHEETS—SHEET 3.

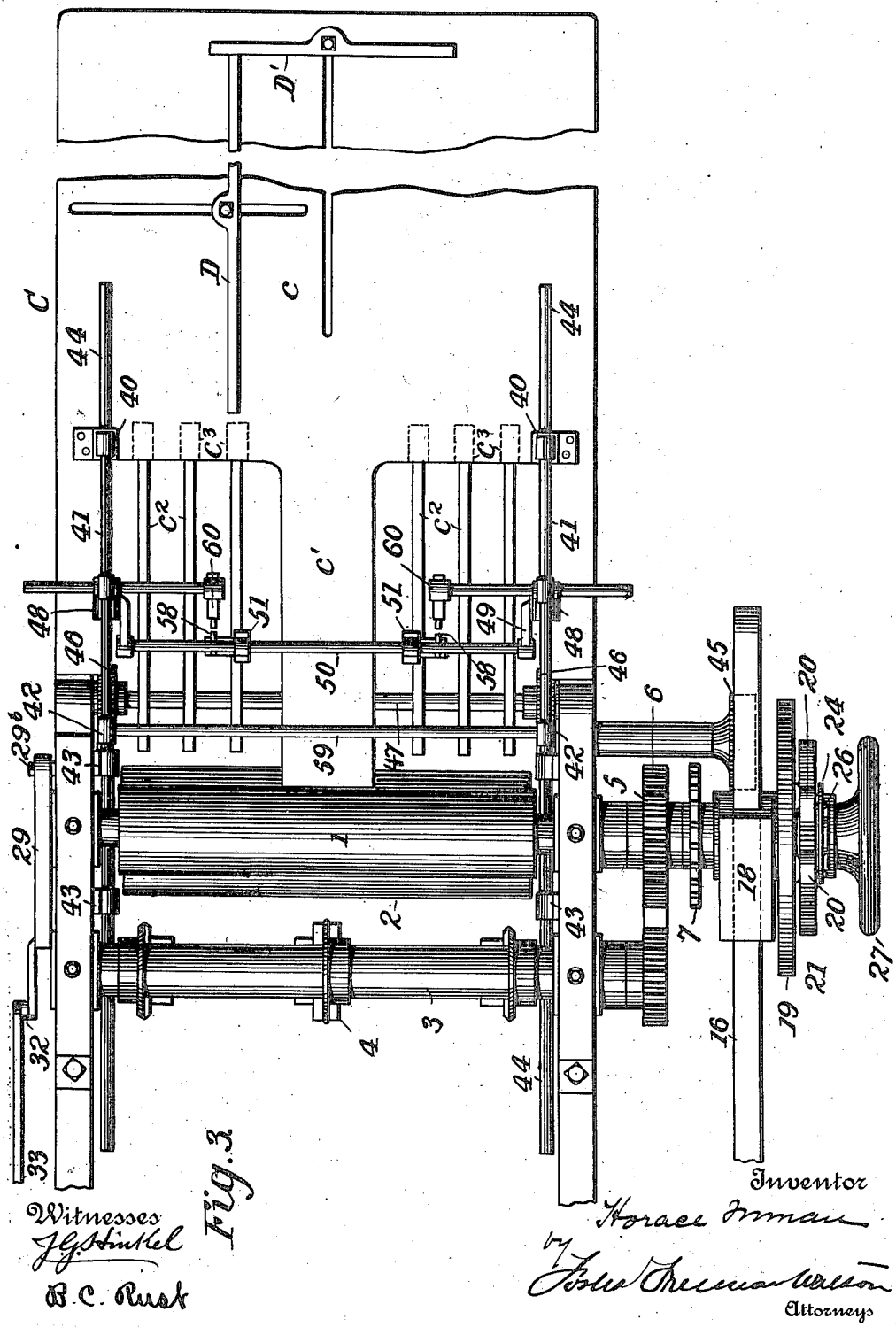

Fig. 3.

Witnesses
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4 SHEETS—SHEET 4.

Fig. 4.

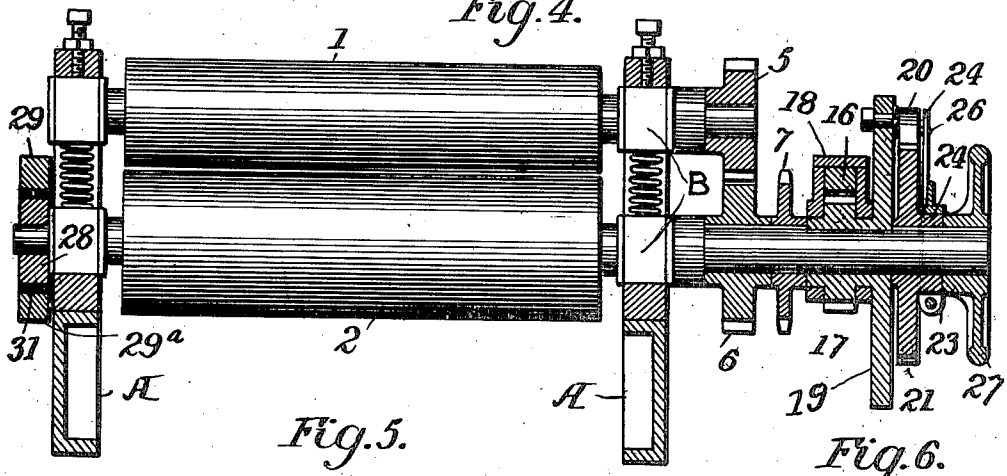


Fig. 5.

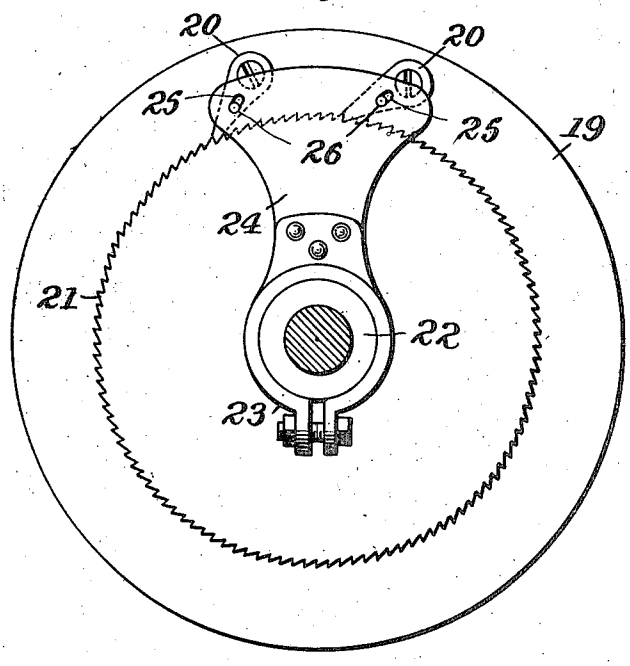


Fig. 6.

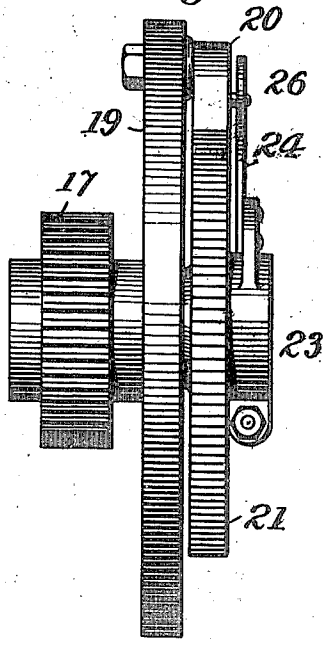


Fig. 7.

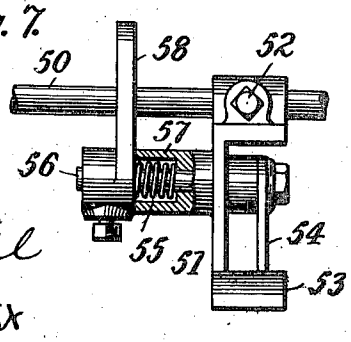
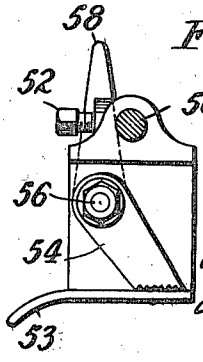


Fig. 8.



Witnesses

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UNITED STATES PATENT OFFICE.

HORACE INMAN, OF AMSTERDAM, NEW YORK.

PAPER-FEEDING MECHANISM FOR PAPER-BOX MACHINES.

1,030,183. Specification of Letters Patent. Patented June 18, 1912.

Application filed January 16, 1906. Serial No. 296,305.

To all whom it may concern:

Be it known that I, HORACE INMAN, a citizen of the United States, residing at Amsterdam, in the county of Montgomery, State of New York, have invented certain new and useful Improvements in Paper-Feeding Mechanism for Paper-Box Machines, of which the following is a specification.

My invention relates to machines for making paper boxes and more particularly does my present invention relate to means for feeding the web or blanks for boxes through the machine in order to subject them to the various manipulations in forming the boxes.

The object of my present invention is to provide improved and efficient means to accomplish this feeding in a thorough and accurate manner in connection with the other manipulations, and to these ends my invention consists in the various features of construction and arrangement of parts cooperating together to produce the results substantially as hereinafter more particularly pointed out.

Referring to the accompanying drawings in which I have illustrated a practical embodiment of my invention sufficient to enable those skilled in the art to make and use the same—Figure 1 is a side view, partly in section, of a machine embodying the invention; Fig. 2 is an enlarged side view showing the intermittent feed devices; Fig. 3 is a plan view of the same; Fig. 4 is a transverse section through the first set of feed rolls; Fig. 5 is an enlarged view of the clutch device; Fig. 6 is a side view of the same; Fig. 7 is an edge view, partly in section, and Fig. 8 a side view of the grippers; Fig. 9 is a detail showing the brake device, and Fig. 10 is a plan view of one form of blank or web, indicating the different operations in forming the box.

While my invention may be used in many and various relations and in connection with paper box machines differing in details of construction and arrangement of parts, depending upon the particular character of the articles made in any particular instance, my invention can be used in connection with a paper box machine substantially such as is disclosed in my Patent No. 712,068, granted October 28, 1902, and it may be said in a general way to be an improvement on such a machine or class of machines. Some of the details illustrated in the drawings are substantially such as are shown in said patent and for that reason will not be described with as much detail as they might otherwise be, but they will be described sufficiently to illustrate how my present invention can be used in connection with such general features as specifically illustrated in said patent or in other similar connections.

A machine of this general character is especially adapted for making paper boxes, and in the patent referred to, the boxes were made from a continuous web of paper which was fed intermittently through the machine and subjected to the various operations necessary to perfect the boxes, and while my present invention may be utilized in making articles from a continuous web, it may also be utilized in making the articles from sheets of various sizes and these sheets may include material for one or more complete articles, generally from four to six. While there are advantages in some instances in making the articles from a continuous web which may be printed as a part of the continuous operation of forming the articles, in other instances it is advantageous to use separate sheets, especially where articles are to be printed in various colors, requiring relatively considerable time for the ink to properly set before the material is further manipulated in forming the articles.

In the advance of the art it is essential where the material is printed or otherwise ornamented, that the feeding of the material to receive the further manipulation shall be accurate and exact so that the subsequent manipulations shall be in proper relative position with relation to the printing or ornamentation of the articles, or, in other words, that proper register shall be maintained in the various operations in making the completed article.

In a machine of this general character it is desirable to have several feeding devices operating upon the material at different stages of its manipulation, and I will first describe my improvements in what may be termed the preliminary feed of the box-forming apparatus, it being assumed that either the web or the sheets have been properly printed or ornamented, either in the same machine or otherwise, and that they are to be further manipulated in forming the articles.

Thus A will represent a suitable frame supporting the apparatus. Mounted in

suitable bearings or boxes B are two feed rollers 1, 2, and in the present instance in the same boxes or bearings are mounted the cutting or scoring rollers 3, 4, the latter being provided with suitable cutters driven by suitable gears, as indicated and in a manner well understood. The rollers 1 and 2 are connected together by the gears 5, 6, so that the surfaces of the rollers will rotate together in unison. Mounted on the shaft of the roller 2 is a sprocket wheel 7, the purpose of which will appear hereafter. These feed rollers 1 and 2 are intermittently operated to feed the material along step by step the desired distance, and it is exceedingly desirable that these feed rollers should move in a manner to feed the material the exact distance, no more and no less, at each operation, and one part of my invention relates to means for accomplishing this. This will be apparent when it is understood that the interlocking end portions of the box are formed in the material between two succeeding body portions of the box, and the opposite ends of the two succeeding boxes are cut at the same movement of the cutting apparatus. Further it is manifest that these feeding rollers have to operate to feed the material a greater or less distance at each intermittent movement according to the size of the articles to be made.

Upon a shaft 10 is mounted a crank disk 11 on which is mounted an adjustable crank pin 12, it being shown as connected to a gib piece 13 sliding in corresponding gibs or ribs 14 extending radially across the face of the crank disk and adjustable therein by means of the screw 15 or any other suitable means, and adapted to be secured and held in adjustment by the usual means. Connected to this crank pin is a rack-bar 16, shown as having teeth on its under side, and these teeth engage a pinion 17 loosely mounted on the shaft of the feed roller 2. In order to keep said rack-bar and pinion in engagement, I provide some suitable means such as the strap 18. Connected to this pinion 17, so as to rotate therewith, and also loose on the shaft of the roller 2, is a disk 19, upon which disk are mounted one or more dogs or pawls 20, which pawls or dogs are adapted to engage the toothed wheel 21 which is fast on the shaft of the roller 2. Frictionally mounted upon the hub 22 of the toothed wheel 21 by means of the adjustable clamp 23 is a plate 24 having in the present instance an angularly arranged slot or slots 25, each engaging a pin 26 on a dog or pawl 20 and operating in the manner hereinafter described to cause the dogs or pawls to engage or disengage the toothed wheel 21. A hand wheel 27 may also be attached to the shaft so as to adjust the roller by hand when desired. Also connected with the feed rollers 1 and 2 is a suitable brake device, and in the present instance I have shown mounted on the shaft of the roller 2 a brake wheel 28 with a two-part clamping-brake 29 embracing the same. This is best shown in Fig. 9, where the part 29^a is fixed on the frame of the machine and the upper part 29 is hinged thereto, as at 29^b, and these parts of the clamping-brake are preferably normally held apart by some suitable device, as a spring 30, and are operated by suitable connections. I preferably provide some friction material between the brake wheel and clamping-brake, as for instance a strip of leather 31. In the present instance the part 29 of the clamping-brake is connected by a rod 32 hinged to a bar 33 pivotally mounted to the frame of the machine, as at 33^a. This bar is provided in the present instance with a friction roller 34 coöperating with a cam 35 on the shaft 10. This cam is of such a shape and so adjusted that at the moment the feed rollers have fed the material the proper distance the brake is progressively operated to stop the movement of the rollers, and while the cam may vary in shape, it is preferably so formed that this braking movement will be of relatively short duration, so that as soon as the rollers have actually stopped they will be released ready to be operated again.

The operation of this feeding device will now be largely understood from what has been stated before, and it will be seen that as the crank disk rotates, the rack-bar 16 is reciprocated and operates the pinion 17, moving it forward or backward, and moving with this is the disk 19 carrying the dogs or pawls 20. It will be remembered that this pinion and disk are loose upon the roller shaft and that the toothed wheel 21 is fast on the shaft. It will thus be seen that as the disk 19 moves backward, for instance, the pins 26 on the pawls 20, working in the slots 25 of the plate 24, cause the pawls to rise out of engagement with the toothed wheel 21. When, however, the disk 19 moves in the opposite direction, the pawls will immediately engage the toothed wheel and through it operate the feeding rollers. The plate 24 is frictionally mounted upon the hub 22 of the toothed wheel 21 and is held thereon frictionally. This friction is accurately adjusted so that when the disk 19 is first moved the pins 26 will move in the slots 25 without moving the plate 24, until the pins reach the end of the slots, when the plate 24 will partake of the further movement of the pawls and disk 19. It will further be seen that when the disk 19 moves backward in the manner first described, the pawls will be thrown out of engagement with the toothed wheel 21 and held out of engagement during this backward movement, but as soon as the movement is reversed so that the disk 19 moves

forward, owing to the frictional connection of the plate 24, the pins 26 will move downward in the slots 25 and the pawl or pawls will be brought into engagement with the toothed wheel, and then the parts will move forward together and in unison and operate the feeding rollers the required distance.

The above described action results in lifting the dogs away from the ratchet wheel so as not to wear the teeth of the latter when the same are swung to the right Fig. 5, and, owing to the frictional connection of the plate 24 with the hub 22, this action results whatever may be the radial position of the said plate in respect to the shaft and to the disk 19. Owing to the varying throw of the rack bar 16, and the varying feed imparted to the roller 2, the plate 24 will be carried to different positions radially at different times of the operation and hence it cannot be rigidly secured to the said hub, but, in order that it may to a certain extent resist the movements of the pins 25 until the latter reach the ends of the slots, the plate has a frictional connection with the hub.

It is preferable of course to have a plurality of pawls and the teeth so arranged that one or the other of the pawls will engage at once. As the rolls are fed forward the required distance the brake device is adjusted to operate to stop the further movement of the feed rollers and take up their inertia, and this is accomplished by properly adjusting the cam 35 in relation to the other operating parts heretofore described. With this apparatus I have found that the material can be fed intermittently the required distance at a very rapid rate and with great accuracy, it being well known that the slightest error in feeding is multiplied many times in the rapid operation of a machine. It is evident that this feeding apparatus thus described can operate either in connection with a continuous web or separate sheets, provided the latter are presented to the feed rollers at proper times. In order to present the separate sheets, when used, to these rollers at the proper time, I provide a reciprocating feed apparatus which I will now describe. Mounted on the frame A is a table C, and this is preferably formed substantially as indicated, having a body portion c and a central extension or tongue c', being cut away on either side of this extension as shown. Adjustably mounted on the body portion c are a series of rods or fingers c^2 and they are secured to the body portion c in the present instance by being mounted in sockets c^3 so that they are removable, but when in place their upper surfaces are on the plane of the upper surface of the table. Arranged to reciprocate over this table are a number of grippers, arranged to grip the paper on its edges and feed it forward and then release the paper when it has been presented to the grip of the feed rollers 1 and 2. While these grippers may be variously constructed and arranged, I have shown an exceedingly successful embodiment and arrangement thereof which I will now describe.

Mounted on the frame A are standards 40, and mounted in the upper portions of these standards are rods 41, the other ends of which are supported in brackets 42 on the frame. Arranged to reciprocate in the standards 40 and also supported in brackets 43 are rack-bars 44, and these rack-bars are arranged to be reciprocated in unison with the reciprocations of the pinion 17 and rack-bar 16. As shown in the drawings, this is accomplished by means of an idler gear 45 meshing with the pinion 17 and a gear 46 engaging the rack-bar 44. This gear 46 is on a shaft 47 extending across the machine and provided with a similar gear 46 engaging the rack-bar 44 on that side of the machine. Mounted on the rack-bars 44 are adjustable sleeves 48 having projecting arms 49 supporting a shaft 50 extending practically across the machine. Adjustably mounted on this shaft 50 are the grippers 51. These grippers are preferably made rights and lefts and are adjustable so as to engage the edges of the material being fed. As shown, more particularly in Figs. 7 and 8, the grippers are mounted on the shaft 50, as by a set screw 52. Each gripper has a lower lip 53 adapted to move under the material being fed and a gripping jaw 54 preferably provided with teeth at its lower end adapted to bear on said lip or the material above it. This jaw is preferably under spring tension, and I have shown a spring 55 on the rod 56 to which the jaw is pivoted, and the spring and rod are mounted in an extension 57 of the gripper frame. Also mounted on the rod 56 is an adjustable toe 58 by means of which the gripper jaw can be operated. While different means may be used for operating the jaw, I have shown a bar 59 which is adjustably mounted on the rods 41, and I have also shown adjustable trippers 60 mounted on the same rods 41.

From this description the operation of these grippers will be largely understood, and it will be seen that when the rack-bar 16 is operated in one direction and turns the pinion 17 backward, the feed rollers 1 and 2 are at rest and the shaft 50 supporting the grippers is carried backward, the gripper jaws 54 sliding freely over the edges of the paper until just at the end of the reciprocation the toes 58 come in contact with the trippers 60 which force the jaws on to the material so as to positively grip it and press it on to the lips 53. Then as the rack-bar 16 moves in the opposite direction, the feed rollers 1 and 2 are rotated

and the grippers are fed forward, delivering the forward edge of the material to the bite of the rollers. When the grippers reach the end of their excursion the toes 58 come in contact with the bar 59 and the jaws are quickly and positively released. While it is manifest that after the material is within the bite of the rollers 1 and 2 it is not necessary to still continue to feed it forward by the gripper jaws, I have found it convenient to do so, and in this way the jaws are always ready to grasp a new portion of the material and feed it forward at the proper time. This is especially true when sheets of material are fed to the machine, and when this is done I provide a feeding gage, as indicated at D, D', adjustable on the table, at which the rear and one side edge of the blanks are placed ready to be grasped by the grippers.

The peculiar construction of the grippers shown enables the jaws to be positively pressed into the material so as to prevent any liability of slipping thereon, and also enables them to be quickly and accurately raised when the material is released. With this arrangement of the combined reciprocating feeding grippers and the feeding rollers, I am enabled to get exceedingly good register of the operating parts on the material fed, and it will be seen that these two feeding devices operate in unison and from the same source of power.

The material having been once fed to the first set of feed rollers in accurate position, it is of course necessary that it be accurately fed through the machine wherein it is subjected to the different operations. In the construction shown in Fig. 1, which is substantially that illustrated in my former patent above referred to, a series of operations are performed which will be generally described, and they are indicated in Fig. 10.

After passing the feed rollers 1 and 2, the material passes between the scoring rolls 3 and 4, wherein the material is scored on the lines 3^a, for instance. It next passes to the cutting and scoring dies which are operated by the reciprocating cross-head 70, wherein the material is cut and scored in various places, indicated by heavy lines 70^a and dotted lines 70^b in Fig. 10, in the manner substantially as indicated in my former patent. Thence it passes to the pasting rollers indicated in Fig. 1 by the gears 80 and 81, wherein the material receives paste, for instance, on the under side of the box blank, as at 80^a, Fig. 10. Thence it passes to the folding devices 90 which are indicated as being practically the same as those disclosed in my former patent and which fold over parts of the blank, as indicated in Fig. 10. Next the material passes between feed rollers indicated by the gears 91 and 92 and the rollers 93 mounted in the frame 94 connected to an arm 95 operated by an arm 96 and pitman 97 which in turn is operated from the shaft 98 running longitudinally of the machine and connected to operate the folders and other devices substantially as indicated in my former patent. These rollers 93 are raised and lowered by the pitman 97 and connections, and act as pressing rollers as well as feeding rollers to press the material together on the pasted line after the parts have been folded. Thence the paper passes to the final pressing and feeding rolls 100, whereby the box is finally pressed and severed from the blank or web, the final rolls 101 traveling at a little higher rate of speed than the others.

The various feeding devices are connected together so as to operate in unison. I have shown how the feed rolls 1 and 2 are operated, and extending from the sprocket wheel 7 on the shaft of the roller 2 is a sprocket chain 102 which engages the sprocket wheel 80 on the shaft of one of the paste rollers and the sprocket wheel 91 on the shaft of one of the feed rollers, so that all these rollers will operate in unison. The rollers 93 are raised and lowered at proper intervals, and operate to compress the pasted portions of the boxes and to aid in feeding the web or blank through the machine.

It will be seen that the rack that operates the pinion 17 is of such a length that the said pinion may be turned a complete rotation or more where it is required to secure an extended feed by the complete rotation or more of the roll 2, and consequently the disk 19 is capable of a complete rotation or more than a complete rotation at any one movement, a result which cannot be secured where the pawl or dog is carried by a swinging arm.

What I claim is:—

1. In a machine of the character described, the combination with feeding rollers, of a reciprocating pinion, a rack constructed to reciprocate the pinion throughout a complete rotation, a toothed wheel connected to said feeding rollers, a pawl connected to be operated in accordance with the reciprocations of the pinion to engage said toothed wheel, and frictionally-held adjustable means for throwing said pawl into and out of engagement with said wheel.

2. In a machine of the character described, the combination with the feed rollers, of a reciprocating pinion, and means for rotating it throughout a complete rotation or less as desired, a disk moving with the pinion, a pawl mounted on the disk, a toothed wheel connected with the rollers and having a hub, a plate frictionally clamped to the wheel hub and having an elongated slot, and a pin on the pawl engaging the slot and controlling the engagement and disengagement of the toothed wheel, substantially as described.

3. In a machine of the character described, the combination with feed rollers, of a ratchet connected thereto and having a hub, a pawl engaging said ratchet, a movable pawl carrier, and a plate frictionally clamped on said hub and constructed to govern the position of the pawl with respect to the ratchet.

4. In a machine of the character described, the combination with a feed roller shaft, of a driving pinion loosely mounted thereon, a rack engaging said pinion, a toothed wheel connected to said shaft, a pawl connected to said pinion and engaging said wheel, a plate on said shaft constructed to move said pawl into and out of engagement with said wheel, and a hand wheel on the end of said shaft.

5. In a machine of the character described, the combination with the feed rollers, and a reciprocating disk carrying a pawl and adapted to be rotated to the extent of a complete rotation in either direction, of a toothed wheel connected with the rollers, a plate frictionally mounted on said toothed wheel, the plate having an elongated axially-inclined slot, and a pin on the pawl engaging said slot, substantially as described.

6. In a machine of the character described, the combination with the feed rollers and reciprocating feed devices, of a reciprocating pinion, connections between the pinion and feed rollers, and connections between the pinion and reciprocating feed devices whereby the feed rollers and reciprocating feed devices are driven by the pinion and simultaneously operated, substantially as described.

7. In a machine of the character described, the combination with the feed rollers, and means for intermittently operating them, of reciprocating feed devices comprising rack-bars, grippers connected with the rack-bars to move in the same direction therewith and connections between the rack-bars and the means for intermittently operating the feed rollers, substantially as described.

8. In a machine of the character described, the combination with the feed rollers, of a reciprocating pinion, connections between said pinion and said feed rollers, reciprocating feeding devices, and connections between the pinion and reciprocating feeding devices whereby the feed rollers and reciprocating feeding devices are driven by the pinion and operated simultaneously and concurrently with the movements of said pinion, substantially as described.

9. In a machine of the character described, the combination with the feed rollers, and means for intermittently operating them, of reciprocating gripper feed devices adapted to grip and move a sheet in the same direction as the feed rollers and deliver it to said rollers, and a single element actuating the roller operating means and reciprocating the feed devices, substantially as described.

10. In a machine of the character described, the combination with the intermittently operated feed rollers, of a continuously operating shaft, connections between the shaft and feed rollers to intermittently operate the same, a brake device for said feed rollers, and means connected with said shaft for operating the brake device at the time the feed rollers are stopped, substantially as described.

11. In a machine of the character described, the combination with the intermittently operated feed rollers, of a continuously rotating shaft, a crank disk carried thereby, a rack-bar connected therewith, a reciprocating pinion, connections between the pinion and feed rollers, a brake for said feed rollers, devices for operating the brake, and a cam on the drive shaft operating said brake devices, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HORACE INMAN.

Witnesses:

CHAS. W. CLARK,

G. F. PAGE.