(No Model.) 2 Sheets—Sheet 1.

L. C. CROWELL.

SHEET ASSOCIATING MECHANISM.

No. 373,224. Patented Nov. 15, 1887.

Fig. 1.

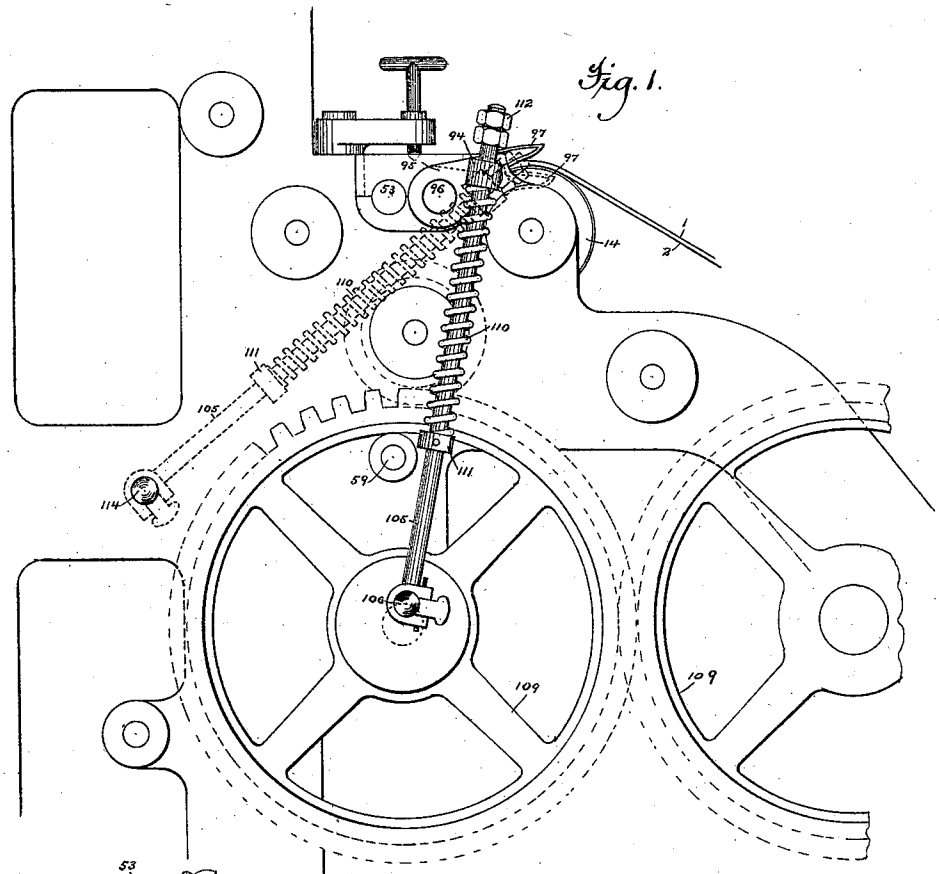


Fig. 2.

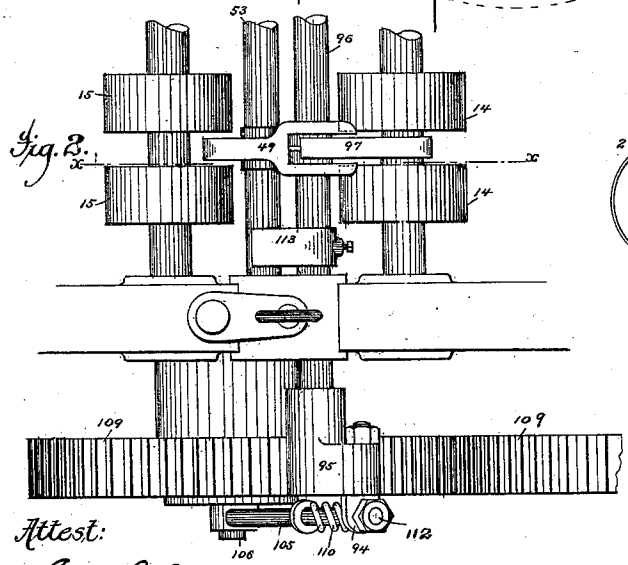
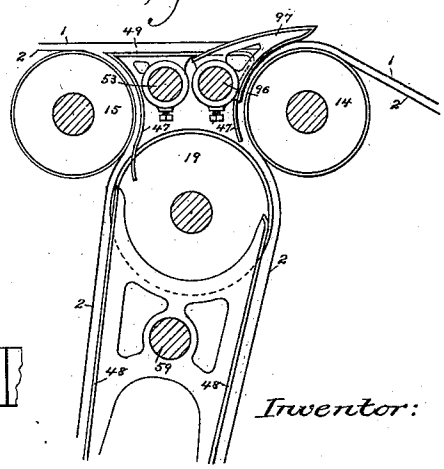


Fig. 3.



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by Munn & Philipp

Attys.

N. PETERS. Photo-Lithographer, Washington, D. C.

(No Model.) 2 Sheets—Sheet 2.

L. C. CROWELL.

SHEET ASSOCIATING MECHANISM.

No. 373,224. Patented Nov. 15, 1887.

Fig. 4.

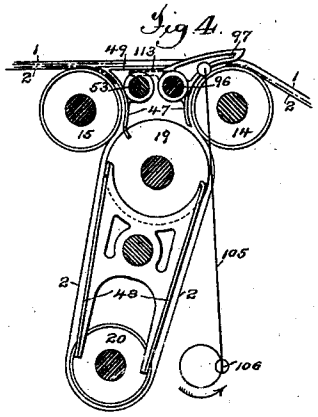


Fig. 5.

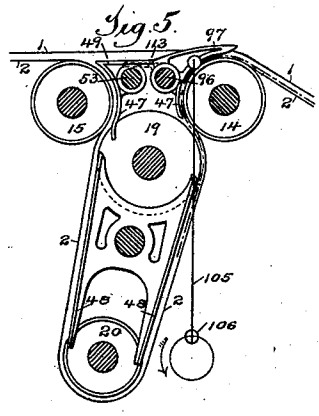


Fig. 6.

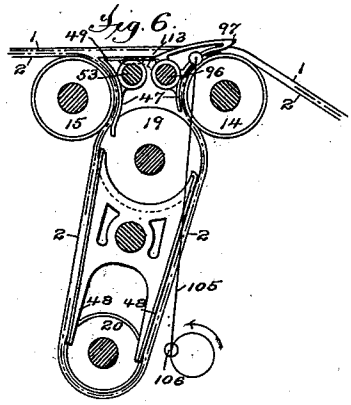


Fig. 7.

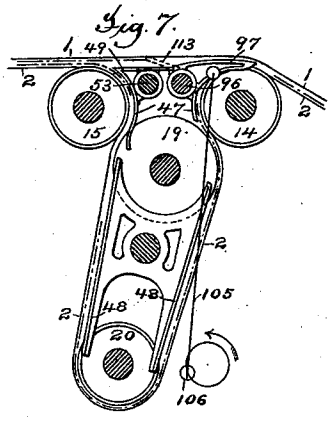


Fig. 8.

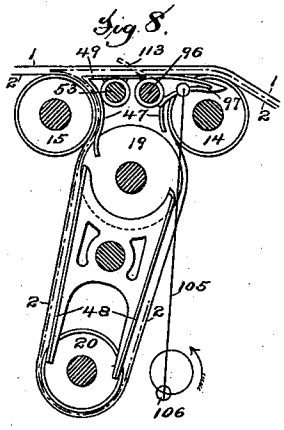


Fig. 9.

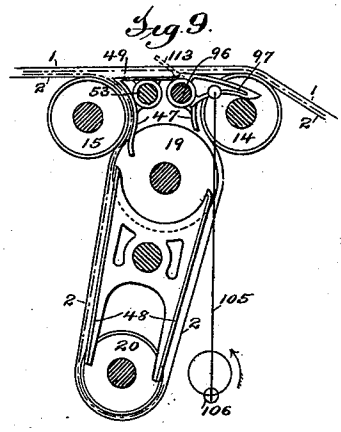


Fig. 10.

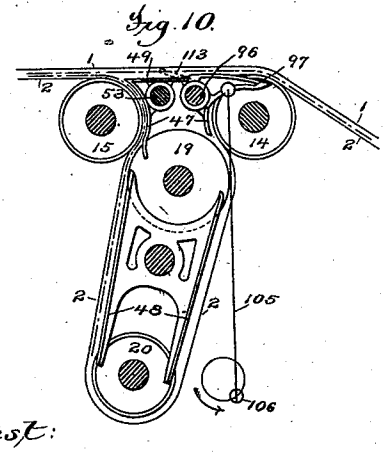
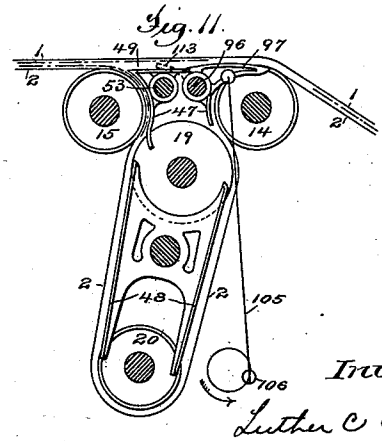


Fig. 11.



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UNITED STATES PATENT OFFICE.

LUTHER C. CROWELL, OF BROOKLYN, NEW YORK.

SHEET-ASSOCIATING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 373,224, dated November 15, 1887.

Application filed February 3, 1887. Serial No. 226,337. (No model.)

To all whom it may concern:

Be it known that I, LUTHER C. CROWELL, a citizen of the United States, residing at Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Sheet-Associating Mechanisms, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to the delivery of sheets issuing from a web printing or severing mechanism, and particularly to that general method of delivery by which two or more of the successively-produced sheets are associated to form a single product. This association of sheets in a delivery mechanism has heretofore been accomplished in a variety of ways or by a variety of mechanisms. Among the most desirable of the mechanisms which have been devised for this purpose is what is known as the "long" and "short" paths, which mechanism is shown and described in United States Letters Patent No. 131,217, granted September 10, 1872, to Hoe and Tucker. This mechanism, briefly stated, consists of two sheet-conveying channels or pathways, the longer of which is formed by what may be termed a "loop," which branches from the shorter pathway at one end and reunites with it at the other end, the relative lengths of the two pathways between the point at which they separate and that at which they again unite being such that if the first of two sheets which are following each other is directed into the longer pathway and the second into the shorter pathway the two sheets will arrive at the point where the pathways unite simultaneously, so as to become associated and pass forward together.

In this class of sheet-associating mechanisms as heretofore constructed the interior member of the longer of the two pathways has been formed of moving tapes, which are stretched around rolls or pulleys and co-operate with the tapes which form the exterior member of the pathway. This construction has been found to some extent objectionable in practice, because the internal tapes were liable to stretch and become slack by use, and when this occurred it was difficult to tighten them, except by cutting them apart and rejoining their ends. The same difficulty was experienced if it was desired to change the length of the pathway.

One feature of the present invention is designed to overcome this difficulty, and this is accomplished by employing stationary guides in place of tapes for the interior member of the longer pathway.

Another feature of the present invention relates to the means for operating the switches which control the entrance to the long and short pathways, the object being to avoid the use of a cam for this purpose, and to thereby give a more easy movement to the switches and avoid the sudden jar and strain incident to the use of a cam.

As a full understanding of the invention can be best given by an illustration and a detailed description of the devices embodying the same, all further preliminary description will be omitted and a full description given, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of so much of a sheet-delivery mechanism as is necessary to illustrate the present invention. Fig. 2 is a partial plan view of the same. Fig. 3 is a vertical section taken on the line *x x* of Fig. 2; and Figs. 4 to 11 are similar views upon a reduced scale, illustrating the operation of the mechanism.

Referring to said drawings, it is to be understood that 1 2 are two series or sets of sheet-conveying tapes arranged to form a pathway into which the sheets which are to be associated are directed from some previous mechanism, so as to pass forward one after another until they arrive at the roll or series of pulleys 14, at which point the long and short pathways forming the associating mechanism branch from the pathway formed by the tapes 1 2. From the pulleys 14 the tapes 1 pass directly forward above a second roll or series of pulleys, 15, while the tapes 2 pass downward around the pulleys 14, thence past a roll or series of pulleys, 19, and around a roll or series of pulleys, 20, and thence upward past the opposite sides of the pulleys 19 and over the pulleys 15, where they reunite with the tapes 1, thus forming what may be termed a "loop." The shorter pathway of the associating mechanism extends from the pulleys 14 to the pulleys 15, and is formed by the tapes 1 and a series of stationary guides, 49, which bridge the space between the pulleys and co-operate with the tapes.

The guides 49 are supported upon a rod, 53, which extends transversely across the machine between the pulleys. The loop or longer pathway of the associating mechanism extends from the pulleys 14 around the pulleys 20 to the pulleys 15, and is formed by the tapes 2 and series of stationary guides 47 48. The guides 47 depend from the ends of the guides 49, and are curved to conform to the shape of the pulleys 14 15, and bridge the spaces between the tapes 1 and the pulleys 19, and co-operate with the tape 2 to conduct the sheets downward around the pulleys 14 and upward around the pulleys 15. The guides 48 are supported upon a transverse rod, 59, and bridge the spaces between the pulleys 19 20, and co-operate with the tapes 2 to conduct the sheets from the pulleys 19 to the pulleys 20 and back to the pulleys 19. The pathway formed by the tapes 1 2 after they reunite at the pulleys 15 extends forward to any point in the delivery mechanism where the associated sheets are to be delivered to other mechanisms. In the associating mechanisms of this class which have been heretofore constructed the interior member of the loop or longer pathway has been formed of moving tapes which passed around rolls or pulleys corresponding to the pulleys 19 20; but I have found that by making the interior member of this pathway of the guides 48 as just described the trouble incident to the employment of the tapes, which has been hereinbefore explained, is entirely avoided. Any slack in the tapes 2, which form the exterior member of the pathway, can of course be readily taken up by the use of stretching-pulleys.

The length of the longer pathway can be readily varied by simply adjusting the pulleys 20 up or down, the tapes 2 being correspondingly shortened or lengthened by ordinary stretching-pulleys.

The entrances to the two pathways forming the associating mechanism are controlled by a series of vibrating switches, 97, which are mounted upon a transverse rock-shaft, 96, one end of which is provided with an arm, 95, having a swiveled collar, 94, through which passes a rod, 105, the end of which is connected to a crank, 106, by which the switches are vibrated, so as to direct one sheet into the longer pathway and the next into the shorter pathway, and so on. The crank 106 may be formed upon one of the gears 109, through which motion is communicated from the printing to the delivery mechanism, or it may be driven in any other suitable manner.

It will readily be seen that in order to direct alternate sheets into different pathways it is necessary that the switches 97 should be so timed in their movements that the entrance to the pathway into which a sheet has been directed will remain open until the rear end of the sheet has passed the switches, and that the entrance to that pathway will then be closed and the entrance to the other pathway opened before the leading end of the next sheet arrives at the switches. This, of course, cannot be done if the sheets follow each other in close succession, and it is therefore necessary to separate the sheets from each other in their line of travel a sufficient distance to provide working-spaces between them within which the switches can act. This is usually done by means of what are known as "accelerated tapes," and may be done before the sheets pass into the control of the tapes 1 2, or the tapes 1 2 may be sufficiently accelerated to provide the necessary working-spaces between the sheets before they arrive at the pulleys 14. In any case, however, it is desirable that the working-spaces between the sheets should be reduced to the minimum, and this in turn makes it necessary that the switches should be operated quickly. In order to secure this quick movement of the switches it has heretofore been customary to operate them by means of a comparatively abrupt cam; but this means has been found objectionable, because of the sudden jar and strain, which is trying upon the mechanism and sometimes causes the parts to get out of order. I have found, however, that the proper vibration of the switches can readily be effected by the simple crank movement shown, thereby making the movements of the switches perfectly smooth and easy and avoiding all the objections due to the employment of a cam for this purpose.

It will be observed that if the arm 95 were connected directly to the crank 106 the switches 97 would be caused to continue their movement throughout the whole revolution of the crank, and this would give to the switches a greater range of movement than is necessary. This would not, however, in most cases be objectionable; but it may be readily avoided by providing for a certain amount of lost motion between the crank 106 and the arm 95. For this purpose the shaft 96, upon which the switches are mounted, is provided with a stop-arm, 113, which is arranged to come into contact with the rod 53 and arrest the shaft 96 after the switches have been raised to the proper point. To allow of this the rod 105 is arranged to move freely in the collar 94, and is provided with a spring, 110, which surrounds the rod and is interposed between the collar 94 and a collar, 111, which is fixed upon the rod, and which acts to normally hold the collar 94 against the nut or head 112 upon the end of the rod. From this arrangement it results that when the switches have been raised to the proper extent and arrested by the stop 113 the rod 105 will complete its upward movement idly by compressing the spring 110 and sliding through the collar 94.

The operation of the sheet-associating mechanism thus organized is as follows: The sheets will pass forward one behind another between the tapes 1 2 until they arrive at the pulleys 14. The parts will be so timed that as the leading edge of the first sheet arrives at the pulleys 14 the crank 106 will be upon its upward movement and in or about the position indicated in Fig. 4, and the switches 97 will

consequently be raised, so as to direct the sheet into the longer pathway. As the crank 106 continues its revolution, the switches will be arrested in their upward movement by the stop 113, and the rod 105 will move idly through the collar 94 until the crank-pin arrives at the limit of its upward movement, as indicated in Fig. 5. As the crank passes the limit of its upward movement and commences its downward movement, the rod 105 will move back idly through the collar 94 until the crank is at the position indicated in Fig. 6, after which the switches 97 will begin to move downward, and by the time the parts have arrived in the position indicated in Fig. 7 the rear end of the first sheet will have passed into the longer pathway and the leading end of the second sheet will have arrived in close proximity to the pulleys 14. Directly after this the continued downward movement of the crank 106 will carry the points of the switches 97 downward below the peripheries of the pulleys 14, so as to direct the second sheet forward into the shorter pathway of the associating mechanism, as shown in Fig. 8. As the second sheet passes forward in this pathway its leading end will arrive at the pulleys 15 just in time to meet and join with the leading end of the first sheet, which has in the meantime been carried downward by the tapes 2 around the pulleys 20 and upward to the pulleys 15, so that the two sheets will be associated and pass forward together. The crank 106 then continues its downward movement until the switches arrive in the position shown in Fig. 9, after which, as the crank passes the limit of its downward movement, they will commence to move upward, as shown in Fig. 10. This upward movement will continue, and by the time the rear end of the second sheet has arrived at the pulleys 14 the switches will have arrived in the position shown in Fig. 11, and as they continue to move upward their points will pass through the working-space between the two sheets and arrive again at the position shown in Fig. 4 in time to direct the leading end of the third sheet downward into the longer pathway, and so the operation will continue to be repeated. If the stop 113 is omitted, the operation will be the same, except that the switches, instead of being arrested, will continue their upward movement during the whole upward movement of the crank.

It is to be remarked that the shaft 96 may, if preferred, be provided with a second stop-arm similar to the arm 113, which will act to arrest the switches before they have reached the limit of their downward movement, and in such case the rod 105 will be extended and will be provided with a second spring above the collar 94, so as to permit lost motion between the rod and the arm 95 as the rod moves in both directions. When the switches are arrested upon their downward movement in this manner, the guides 49 may be formed by the tails of the switches.

When it is desired to produce a product consisting of only a single sheet, or what will usually be a four-page paper, the rod 105 will be detached from the crank 106 and swung to one side and secured to a stationary pin, 114, as shown by dotted lines in Fig. 1. This will allow the switches 97 to remain permanently in or substantially in the position shown in Fig. 10, so that all the sheets will pass forward, one after another, through the shorter pathway of the associating mechanism.

What I claim is—

1. In a sheet-associating mechanism consisting of a short path and a long path formed by a loop which branches from one end of said short path and reunites with said path at its other end, the combination, with the tapes forming the exterior members of said short path and said loop, of stationary guides arranged to co-operate with said tapes to form the interior members of said short path and said loop or long path, substantially as described.

2. In a sheet-associating mechanism consisting of a long and a short path, the combination, with the switches for controlling the entrances to the pathways, of the rod 105, connected to an arm upon the shaft of said switches by a yielding connection and to the crank 106, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

LUTHER C. CROWELL.

Witnesses:
J. A. HOVEY,
JAS. J. KENNEDY.