

L. C. CROWELL.

COUNTING MECHANISM FOR SHEET DELIVERY APPARATUS.

No. 331,282.

Patented Dec. 1, 1885.

Fig. 1.

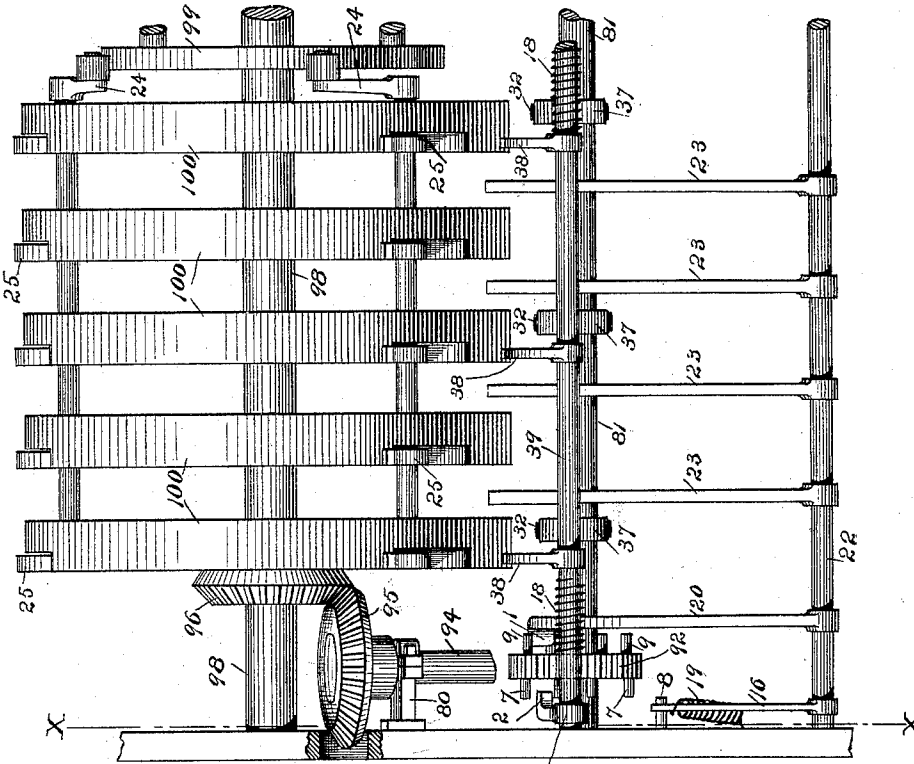
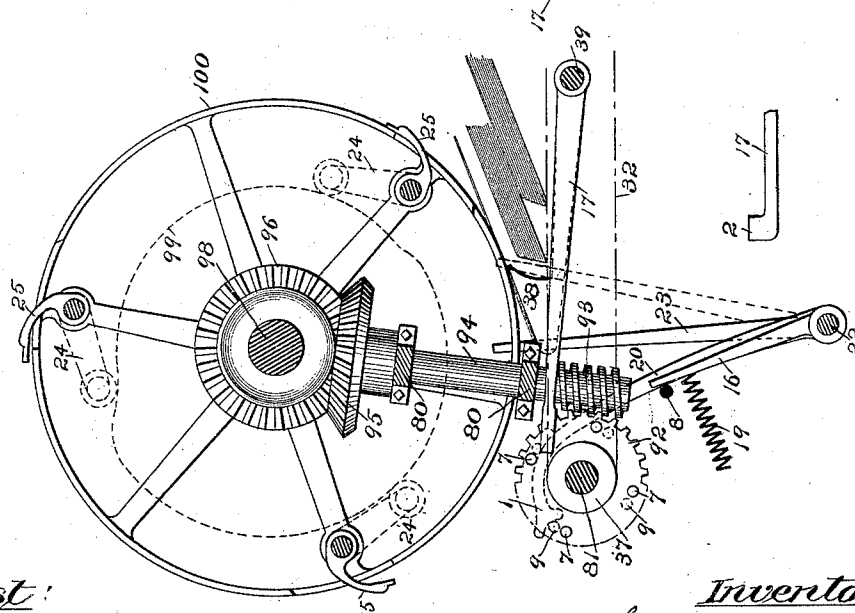


Fig. 2.



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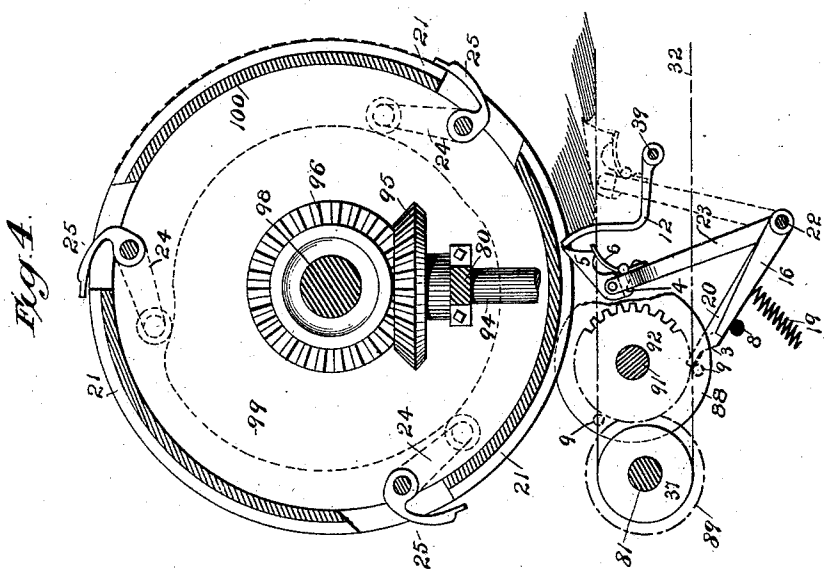
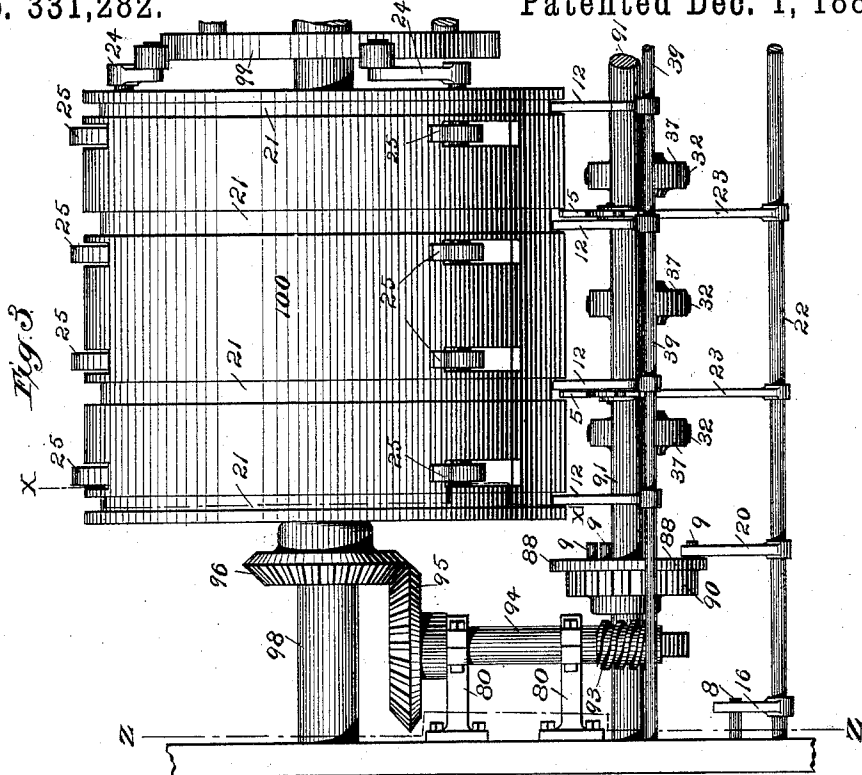
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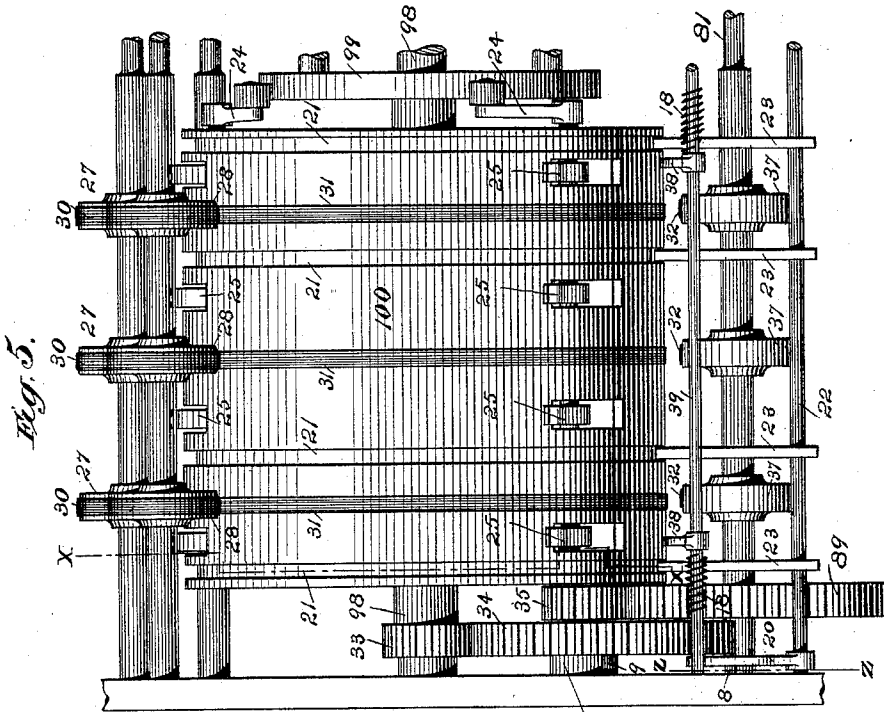


Fig. 5.

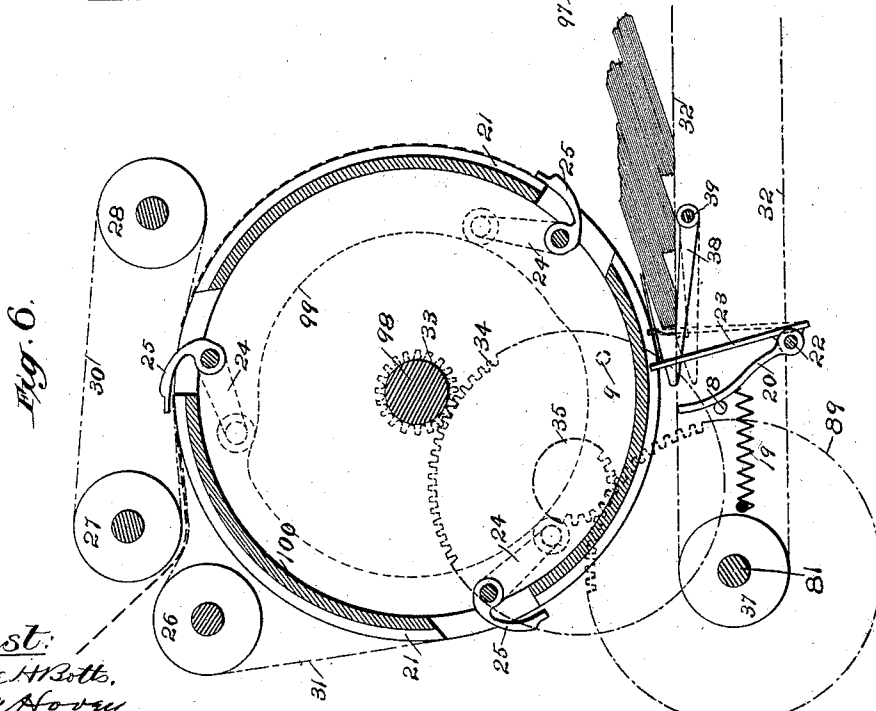


Fig. 6.

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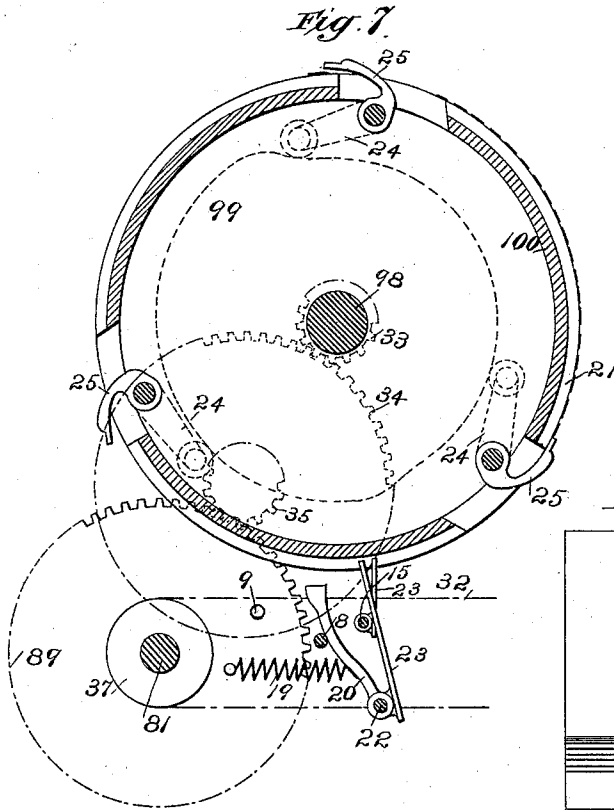


Fig. 8.

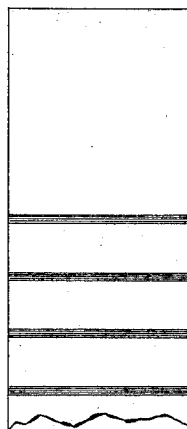


Fig. 9.

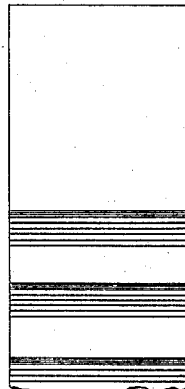
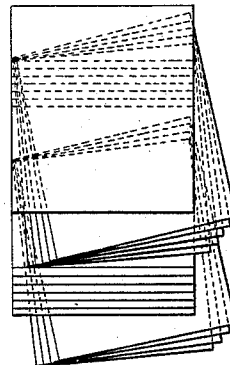


Fig. 10.



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# UNITED STATES PATENT OFFICE.

LUTHER C. CROWELL, OF BROOKLYN, ASSIGNOR TO R. HOE & CO., OF NEW YORK, N. Y.

## COUNTING MECHANISM FOR SHEET-DELIVERY APPARATUS.

SPECIFICATION forming part of Letters Patent No. 331,282, dated December 1, 1885.

Application filed October 6, 1884. Serial No. 144,808. (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 Counting Mechanism for Sheet-Delivery Apparatus, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

In the production of ordinary newspapers, and particularly where they are to be delivered to carriers or news-dealers, it is desirable that they should be delivered from the printing-machine in such manner that they can be readily separated into lots containing any desired number without the necessity of counting. This result has heretofore been attained in a variety of ways. Sometimes it has been effected, as described in Letters Patent No. 269,019, by printing an indicating-mark upon certain sheets of the series, and sometimes by shifting at regular intervals the position of the piling-table or other surface upon which the papers were laid as they passed from the machine, so that the irregularities which resulted from this shifting of the piling-table marked regular divisions in the pile, and thus made it possible to separate the papers into lots containing the desired number without the necessity of counting.

The present invention relates to a mechanism by which the counting of the papers is effected by irregularities in the piling without the necessity of shifting the position of the piling-table or other surface upon which the papers are deposited.

The mechanism constituting the present invention can be successfully employed in connection with any or almost any of the ordinary forms of sheet laying or piling mechanisms in which the sheets are deposited upon a slow-moving apron or tapes, to be conveyed away from the machine, but is more especially adapted for use in connection with those mechanisms in which the piling is effected by means of a revolving cylinder or carrier of the character shown in United States Letters Patent No. 281,754. In the accompanying drawings, therefore, this form of piling mechanism has been selected for the purpose of illustrating

the construction and application of the invention.

The construction and operation of the mechanism embodying the invention are so simple that they will be readily understood by those familiar with the art without further preliminary description.

Referring to the accompanying drawings, Figure 1 is a partial front elevation of a sheet laying or piling mechanism similar to that shown in the Letters Patent referred to embodying the present invention. Fig. 2 is a sectional elevation of the same, taken upon the line *xx*. Fig. 3 is a view similar to Fig. 1, showing the invention embodied in a slightly-different form. Fig. 4 is an irregular sectional elevation of the same, the shell of the carrier being taken upon the line *xx* and the other parts upon the line *zz*, certain parts being also broken away to expose the parts in the rear. Fig. 5 is a view similar to Figs. 1 and 3, showing the invention embodied in still another form. Fig. 6 is an irregular sectional elevation of the same, the carrier being taken upon the line *xx* and the devices for moving the sheets upon the line *zz*. Fig. 7 is a view similar to Fig. 6, showing a slight modification of the construction shown in Figs. 5 and 6. Fig. 8 is a diagram illustrating the order in which the sheets will be piled by the mechanism shown in Figs. 1 and 2. Fig. 9 is a similar view illustrating the order in which the sheets will be piled by the mechanism shown in Figs. 3, 4 and 5, 6; and Fig. 10 is a similar view illustrating the order in which the sheets will be piled by the mechanism shown in Fig. 7.

Referring to said drawings, it is to be understood that the sheet laying or piling mechanism shown in all of the figures is, as to its general construction and operation, substantially the same as that shown in the Letters Patent No. 281,754, before referred to, consisting, essentially, of a rotating cylinder or carrier, 100, onto which the sheets are directed as they emerge from the folding or associating mechanism, and which is provided with sheet grasping or retaining devices, by which the sheets are taken and retained upon its surface during part of a revolution, and a slow-moving apron or series of tapes, 32, upon

which the sheets are successively deposited as they are released from the carrier, and by which they are carried away from the laying mechanism. The sheets, as they emerge from the printing mechanism or from the folding or associating mechanism, are conducted onto the carrier by any suitable means—as, for example, by two series of tapes, 30 31, arranged as shown in Figs. 5 and 6, the first of said series being arranged to pass around two sets of pulleys, 27 28, and run for a short distance in contact with the upper side of the carrier, while the second series are arranged to pass around the carrier and a series of pulleys, 26, which are located just below the pulleys 27. Any other suitable means may, however, be provided for delivering the sheets to the carrier.

The carrier 100, as illustrated in the present case, is of a circumference equal to the length of three sheets, including the working-spaces between them, and is provided with three sets of sheet holding grippers, 25, which are operated at the proper times to grasp and release the sheets by means of rock-arms 24, which are acted upon by a stationary cam, 99, all of which parts are arranged and operate in the usual and well-known manner. The carrier may, however, be of a greater or less size, and provided with a proportionately greater or less number of sets of grippers or other sheet-retaining devices. The carrier may be in the form of a cylinder, as shown in Figs. 3 to 7, but will preferably be composed of a number of narrow sections or pulleys mounted a short distance from each other upon the carrier-shaft, as shown in Figs. 1 and 2. The grippers 25 may, as shown in the present case, be slightly thickened at their outer ends, so as to press the successively-delivered sheets away from the carrier and prevent the rear end of the last sheet delivered from fouling with the forward end of the next or incoming sheet. The same result may be effected by means of projections formed upon the carrier, as shown in the Letters Patent referred to. The thickening of the grippers 25 is somewhat exaggerated in the drawings, and it has been found in practice that even if the grippers are of no more than the usual thickness they will in some cases effect the desired result. The tapes or apron 32 may receive motion in any convenient manner, but will preferably be driven from the shaft of the carrier 100. For this purpose, in the construction shown in Figs. 1 and 2, the shaft 98 of the carrier is provided with a bevel-gear, 96, which engages with a similar gear, 95, mounted upon the upper end of a vertical shaft, 94, which is mounted in suitable bearings, 80, secured to the frame-work, and is provided at its lower end with a worm, 93, which engages with a worm-wheel, 92, mounted upon the shaft 81, which carries the driving-pulleys 37 of the tapes or apron 32. The gear 92 will be of such size with relation to the pulleys 37 that the tapes 32 will receive the proper motion to keep the pile of sheets

sufficiently removed from the carrier to prevent them from unduly crowding against its surface. In order to arrest the sheets and cause them to fall onto the tapes 32 after they are released by the grippers 25, a series of arms or stops, 23, are provided, which extend upward between the tapes 32, with their ends lying in the spaces between the sections or pulleys composing the carrier.

The operation of the mechanism thus far described is as follows: The parts will be so timed that as the leading ends of the successive sheets are brought onto the surface of the carrier by the tapes 30 31, or otherwise, they will be taken by grippers 25 and carried around upon the surface of the carrier until just before their leading ends arrive at the stops 23, when they will be released by the grippers, and arrested by the stops 23, and allowed to fall onto the moving tapes 32. As the successive sheets are piled one upon another upon the tapes in this manner, the tapes will continue to move forward, so that the leading end of each sheet deposited, or what after the sheet is deposited becomes its rear end, will be moved a short distance away from the stops 23 before the leading end of the next sheet arrives at said stops, and thus the sheets, instead of being piled directly one upon another, will be shingled or overlapped.

The construction and operation of the mechanism thus far described are, as will be observed, substantially the same as that described in the Letters Patent referred to. It will also be readily understood that when the sheets are piled in this manner upon the tapes 32 the shingling or lapping of the sheets is regular and uniform, so that it is impossible to divide the pile into lots containing any desired or predetermined number except by counting.

As before stated, it is the object of the present invention to provide means by which irregularities will be produced in the pile of sheets thus delivered, which will enable them to be readily divided into lots containing some predetermined number without the necessity of counting. This is effected by causing the stops 23, at certain regular intervals, to be moved forward with the tapes 32, or at a speed greater than that of the tapes, so that at regular intervals certain sheets of the pile will be carried forward on the tapes, thus producing irregularities in the pile which will mark regular divisions, and enable the sheets to be separated into lots containing some predetermined number, the number in each lot depending upon the interval between two successive movements of the stops. To effect this movement of the stops, the shaft 22, upon which they are mounted, is made capable of rocking in its bearings in the frame-work, and is provided with an arm, 20, which extends upward and rearward, with its end lying just inside and near the face of the gear 92. The gear 92 is provided upon its inner face

with a number of studs, 9, (four, as shown in the present case,) which are arranged at equal distances from each other around the face of the gear and in such position that as the gear revolves they will engage with a projection, 1, formed on the end of the arm 20, and thereby, at each quarter-revolution of the gear, rock the shaft 22 and move the stops 23 forward, as indicated by dotted lines in Fig.

2. The rearward movement of the stops 23 is limited by some suitable means—as by a stud, 8, which projects inward from the frame of the machine and engages an arm, 16, extending from the shaft 22—and the shaft 22, or some one of its arms, is provided with a suitable spring, as 19, the tendency of which is to hold the arm 16 against the stud 8 and the stops in their rearmost position.

The operation of the mechanism just described is as follows: As the carrier revolves, and the successive sheets are released by the grippers 25, and arrested by the stops 23, and deposited upon the tapes 32, as before explained, the worm 93 will turn the gear 92, so as to move the tapes slowly forward. At the same time, however, one of the studs 9 will engage with the projection 1 upon the end of the lever 20, so as to rock the shaft 22 and cause the stops 23 to move forward at a speed about equal to or slightly in excess of that of the tapes, so that the sheets, instead of being overlapped or shingled, will be piled directly one above another against the stops. This will continue until the gear 92 has completed one-fourth of a revolution and the stops 23 have reached the position indicated by dotted lines in Fig. 2, when the stud 9 will pass out of engagement with the projection 1 and the spring 19 will rock the shaft 22, so as to quickly throw the stops 23 back to their original position, as shown by full lines in Fig. 2. This will permit the next and succeeding sheets to be carried considerably to the rear of the sheets before deposited before they are arrested by the stops, so as to leave the one lot projecting considerably beyond the other. Immediately or soon after the stops 23 have been returned to their rearmost position, as just stated, the next one of the studs 9 will come into engagement with the projection 1 of the arm 20 and commence to again move the stops 23 forward, and so the operation will continue to be repeated, each vibration of the stops 23 producing an irregularity in the pile of sheets upon the tapes, which will enable the pile to be readily divided into equal lots, as shown in Fig. 8. As here shown, the gear 92 is of such size and is provided with such a number of the studs 9 that the stops 23 will make one vibration for each eighteen sheets deposited upon the tapes; but this of course is not material, as the parts may readily be so proportioned that any desired number of sheets will be deposited between two movements of the stops.

It has been found in practice that after the stops 23 have been moved forward, as just

described, so as to leave a lot of the sheets last deposited in position one directly above another, and have then passed back to their rearmost position, the grippers, as they arrive in position to release the next sheet, or the current of air set in motion by the revolution of the carrier, will sometimes act upon the sheet last deposited, which is the upper one of the lot, so as to drag it back toward the stops, and thus to some extent destroy the effect produced by the movement of the stops. This has not, however, proved a serious obstacle to the successful operation of the invention; but, if desired, it may be obviated by providing means by which the sheets left by the stops will be held in their forward position until after the next sheet has been released by the grippers and carried against the stops. To effect this the apparatus may be provided with two or more retaining-fingers, 38, which are mounted upon a rock-shaft, 39, and are provided with hooked ends, which extend rearward and lie in such position as to engage with and retain all of the sheets left by the stops 23. The shaft 39 is provided with a light spring or springs, 18, the tendency of which is to rock the shaft, so as to hold the fingers in a raised position, as shown in Fig. 2, while the fingers are so located upon the shaft as to come into contact with and be depressed by the grippers 25 as the latter are carried around by the carrier. The action of the grippers may be depended upon to keep the fingers 38 sufficiently pressed away from the carrier, as will be presently explained; or they may be provided with means by which they will be positively lowered away from the carrier after one or more sheets have been carried in above them. To effect this the shaft 39, upon which the fingers are mounted, is provided with a rearwardly-extending arm, 17, the end of which lies just outside the face of the gear 92, and this gear is provided upon its outer face with a number of studs, 7, corresponding to the studs 9, which are so arranged as to engage with a projection, 2, upon the end of the arm 17, and depress said arm, so as to rock the shaft 39 and lower the fingers 38 shortly after the arm 20 has been released from the corresponding one of the studs 9.

The operation of this part of the apparatus is as follows: As the stops 23 are moved forward, as already described, one of the studs 7 will engage with the projection 2 of the arm 17 and press said arm downward, so as to rock the shaft 39, and lower the fingers 38 away from the carrier, and this will continue until just before the projection 1 is released from engagement with the stud 9, when the stud 7 will pass out of engagement with the projection 2, and the springs 18 will throw the hooked ends of the fingers 38 upward into position to retain the sheets which are in front of the stops 23. As soon as the projection 1 is released from the stud 9, the spring 19 will throw the stops 23 back to the position shown in Fig. 2, so that the next sheet will be car-

ried in above the fingers 38 and arrested by the stops, the grippers 25 acting to depress the fingers 38 sufficiently to permit this. After one or two sheets have been thus carried in above the fingers 38 the next one of the studs 7 will come into engagement with the projection 2, so as to depress the arm 17 and lower the fingers 38 away from the carrier, and at or about the same time the next one of the studs 9 will come into engagement with the projection 1 and commence to again move the stops 23 forward, and so the operation will continue to be repeated.

It will of course be seen that the means employed for moving certain of the sheets so as to mark the regular divisions in the pile may be varied considerably without departing from or losing the advantages of the invention. Three of the many modifications which may be made in the devices for this purpose are illustrated in Figs. 3 to 7, inclusive.

In the organization shown in Figs. 3 and 4 the worm-wheel 92, which drives the tapes 32, instead of being mounted upon the shaft 81, which carries the driving-pulleys 37, is mounted upon a transverse shaft, 91, which is provided, just inside the gear 92, with a gear, 90, which engages with a gear, 89, mounted upon the shaft 81. This of course makes it necessary that the worm 93 should be reversed in order to cause the tapes 32 to move in the proper direction. The studs 9, which in this case are three instead of four in number, instead of being upon the face of the gear 92, are upon a disk, 88, secured to the face of the gear 90. The upper ends of the stops or arms 23 are provided in this case with pivoted fingers 5, which are arranged so as to be capable of turning downward to a considerable extent, but are limited in their upward movement by means of shoulders 4, formed upon the rear side of the arms. The arms are provided upon their forward sides with light springs 6, the tendency of which is to hold the fingers 5 in their raised position, as indicated in Fig. 4.

The operation of the apparatus thus organized is as follows: The parts will be so timed that the forward movement of the arms 23 and fingers 5 will be slightly faster than that of the tapes 32. After several sheets have been deposited the arms 23 and fingers 5 will commence to move forward, the fingers 5 lying, as shown, in circumferential grooves 21, formed in the carrier 100, or between the sections of the carrier. As the fingers 5 move forward, the successive sheets, as they are released by the grippers, will be arrested by the fingers and piled upon the tapes, one directly above another, and this will continue, the fingers arresting all of the sheets, until the arms 23 have been thrown sufficiently far forward to carry the fingers 5 outside the periphery of the cylinder. At the time this takes place the stud 9 which is acting upon the arm 20 will come into engagement with the cam portion 3 of said arm, so as to throw the fingers

5 rapidly forward for a short distance and carry them quickly outward beyond the periphery of the cylinder, so that the next sheet, as it is brought around by the grippers 25, will have ample room to be carried in above the fingers 5. After this the fingers 5 will continue to move forward with the sheets and the tapes 32 until they reach the limit of their forward movement, as indicated by dotted lines in Fig. 4, the incoming sheets in the meantime being carried rearward. In order to arrest the sheets which are carried rearward above the fingers 5, as just described, there are provided a series of stationary fingers, 12, which are secured to a transverse shaft, 39, and are arranged to extend rearward and upward, with their ends lying in the grooves 21, by the sides of the fingers 5. As soon as the arm 20 is released from the stud 9, the spring 19 will immediately rock the shaft 22, so as to bring the arms 23 and fingers 5 back to their rearmost position, as shown by full lines in Fig. 4. As the arms 23 are carried back to this position, the springs 6 will yield, so as to permit the fingers 5 to pass under the sheets which have accumulated above them, and so the operation will continue to be repeated, the divisions in the pile of sheets passing forward on the tapes 32 being indicated in substantially the manner illustrated in Fig. 9, which is the same as illustrated in Fig. 8, except that in the first case all of the sheets of each lot are piled one directly above another, while in this only a portion of the sheets of each lot are so piled. In the organization just described the retaining-fingers 38 are of course dispensed with, as the fingers 5 perform substantially the same function, and consequently render retaining-fingers unnecessary in this case. As shown in the drawings, the parts are so proportioned that the arms 23 and fingers 5 will make one vibration to each twenty-four sheets deposited upon the tapes, and consequently will indicate divisions containing twenty-four sheets each. This, however, is not material, as the parts may be so proportioned that the arms 23 will vibrate more or less frequently, as may be desired.

In the organization shown in Figs. 5 and 6 the tapes 32, instead of being driven by a worm and worm-wheel, are driven as follows: The shaft 98 of the carrier is provided with a gear, 33, which engages with a larger gear, 34, which is mounted upon a stud, 97, extending from the frame-work, and has secured to its face a smaller gear, 35, which engages with the gear 89 upon the shaft 81 of the pulleys 37. In this case, also, the stops 23 are arranged in the same manner as in Figs. 1 and 2, but, instead of being moved slowly forward as the sheets are being deposited in front of them, and then quickly rearward, are caused to remain stationary while the sheets are being deposited upon the tapes, and then, after the proper number of sheets have been deposited, move quickly forward at a speed greater than that of the tapes, so as to move a portion of

the sheets along on the tapes and into position, one directly above another, and thus mark the divisions in the pile. To effect this the face of the gear 34 is provided with a single stud, 9, which is arranged to engage with the arm 20 at each revolution of the gear; but the arm 20 is so arranged in this case that instead of remaining in contact with the stud 9 for a considerable time it will remain in engagement with the stud for but a short time, and thus make the movement of the stops 23 comparatively quick. The arm 16 is in this case dispensed with, the arm 20 being arranged to rest against the stud 8.

As shown in Figs. 5 and 6, the parts are so proportioned that the stops 23 will be moved forward as every twelfth sheet is deposited upon the tapes, thereby dividing the pile into lots of twelve sheets each. This number has been selected merely for the purpose of illustration, as it is of course apparent that the parts may be so proportioned that the pile will be divided into lots containing any desired number. It will also be observed that the stud 9 and the grippers 25 are so positioned with relation to each other that the stud will come into contact with the arm 20 just after a sheet has been released from one set of the grippers, and will pass out of contact with the arm 20, so that the stops 23 may be restored to their normal position before the next succeeding set of grippers will arrive in position to release the sheet carried by them.

The operation of the organization just described is as follows: The sheets will continue to be deposited upon the tapes 32 in front of the stops 23, and will be carried slowly forward on the tapes, so as to be overlapped or shingled, as described, until twelve have been deposited. Just after the twelfth sheet has been deposited the stud 9 will come into engagement with the arm 20 and rock the shaft 22, so as to throw the stops 23 quickly forward to the position shown by dotted lines in Fig. 6, and thus move several of the sheets last deposited forward along the tapes, so as to bring them into position one above another, as shown in Fig. 9. Before the thirteenth sheet has arrived in position to be released from the grippers, however, the arm 20 will have been released from the stud 9, and the spring 19 will have restored the stops 23 to their normal position, so that the thirteenth sheet will be carried some distance to the rear of the twelfth, and thus mark a division in the pile. The mechanism, when thus organized, may, if desired or found necessary, be provided with the retarding-fingers 38, and these fingers may be provided with means by which they will be positively lowered away from the carrier after one or more sheets have been carried in above them, as already described; or the springs 18 may be made so light that the fingers 38 will do no harm if allowed to press continuously against the sheets.

The mechanism shown in Fig. 7 is the same

as that already described in connection with Figs. 5 and 6, except that only one of the stops 23 is vibrated, the remainder of said stops being rigidly mounted upon a transverse shaft, 15. The operation of the apparatus when thus constructed is exactly the same as in Figs. 5 and 6, except that the sheets which are moved forward by the stop 23 will be skewed, as indicated in Fig. 10. In this case only one of the retaining-fingers 38, if these fingers are used, will be necessary, as only one edge of the sheets will be operated upon by the single stop 23, which is vibrated in this case.

In conclusion, it is to be remembered that although, as before stated, the present invention is especially adapted for use in connection with a sheet-laying mechanism of the character shown, yet it may be used in connection with other forms of sheet-laying mechanism—such, for example, as the ordinary fly or the S-shaped fly shown and described in United States Letters Patent No. 269,021. It will also be seen that the mechanism for moving the arms or stops 23 may be varied greatly without departing from the principle of the invention. In some cases the stops or arms, instead of being mounted upon a rock-shaft so as to vibrate, may be made to reciprocate or move forward and backward in a straight line; or they may be given a forward and backward and rising and falling motion similar to the motion given to the feed-bar of an ordinary sewing-machine. It is therefore to be understood that the invention is not limited to the particular mechanism shown and described for effecting the movement of the stops or arms, but includes any suitable mechanism for effecting this movement.

What I claim is—

1. The combination, with a sheet laying or piling mechanism and a moving carrier, as the tapes or apron 32, for removing the pile of sheets therefrom, of one or more moving stops or arms, as 23, all substantially as described.
2. The combination, with a sheet laying or piling mechanism consisting of a revolving cylinder or carrier and a moving carrier, as the tapes or apron 32, for removing the pile of sheets therefrom, of one or more moving stops or arms, as 23, all substantially as described.
3. The combination, with a sheet laying or piling mechanism and a moving carrier, as the tapes or apron 32, for removing the pile of sheets therefrom, of one or more vibrating stops or arms, as 23, all substantially as described.
4. The combination, with a sheet laying or piling mechanism consisting of a revolving cylinder or carrier and a moving carrier, as the tapes or apron 32, for removing the pile of sheets therefrom, of one or more vibrating stops or arms, as 23, all substantially as described.
5. The combination, with a sheet laying or piling mechanism and a moving carrier, as the tapes or apron 32, for removing the pile of

sheets therefrom, of one or more moving stops or arms, as 23, and one or more retaining-fingers, as 38, all substantially as described.

6. The combination, with a sheet laying or piling mechanism consisting of a revolving cylinder or carrier and a moving carrier, as the tapes or apron 32, for removing the pile of sheets therefrom, of one or more moving stops or arms, as 23, and one or more retaining-fingers, as 38, all substantially as described.

7. The combination, with a sheet laying mechanism consisting of a revolving carrier, as 100, and a moving carrier, as the tapes or apron 32, for removing the pile of sheets therefrom, of one or more vibrating stops or arms, as 23, and one or more retaining-fingers, as 38, all substantially as described.

8. The combination, with a sheet-laying mechanism and a moving carrier, as the tapes or apron 32, for removing the pile of sheets therefrom, of the arms or stops 23 and means for causing said stops to move forward with the tapes or apron while a number of sheets are being laid, and then quickly backward, all substantially as described.

9. The combination, with a sheet-laying

mechanism and a moving carrier, as the tapes or apron 32, for removing the pile of sheets therefrom, of the arms or stops 23, means for causing said stops to move forward with the tapes or apron while a number of sheets are being laid, and then quickly backward, and one or more retaining-fingers, as 38, all substantially as described.

10. The combination, with a sheet-laying mechanism and a moving carrier, as the tapes or apron 32, for removing the pile of sheets therefrom, of the arms or stops 23, means for causing said stops to move forward with the tapes or apron while a number of sheets are being laid, and then quickly backward, one or more retaining-fingers, as 38, and means for moving said fingers downward at the proper time, all 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,  
T. H. PALMER.