

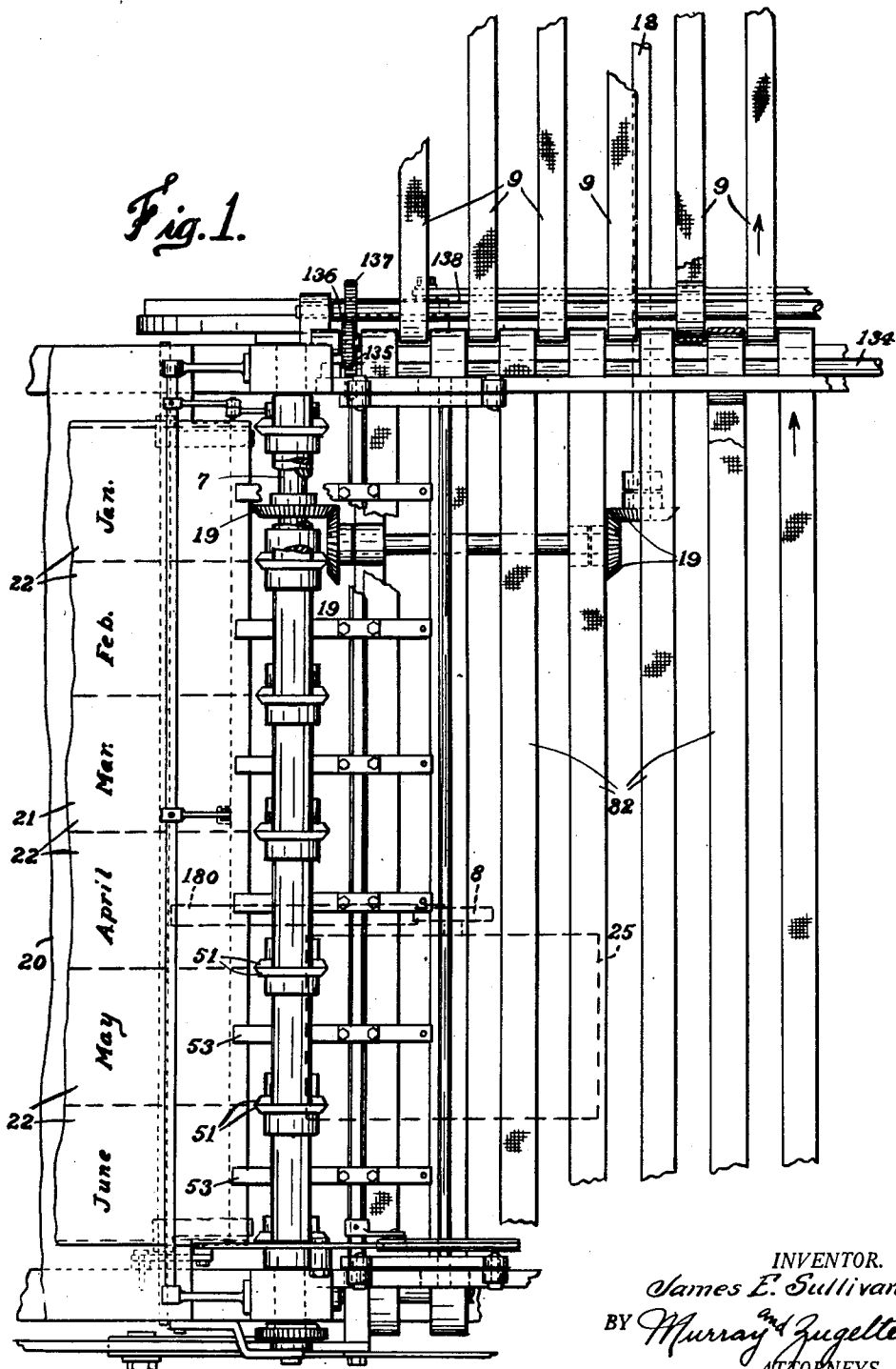
July 24, 1934.

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1,967,545

SHEET DIVIDING AND COMPILING MACHINERY

Original Filed March 4, 1932 4 Sheets-Sheet 1



July 24, 1934.

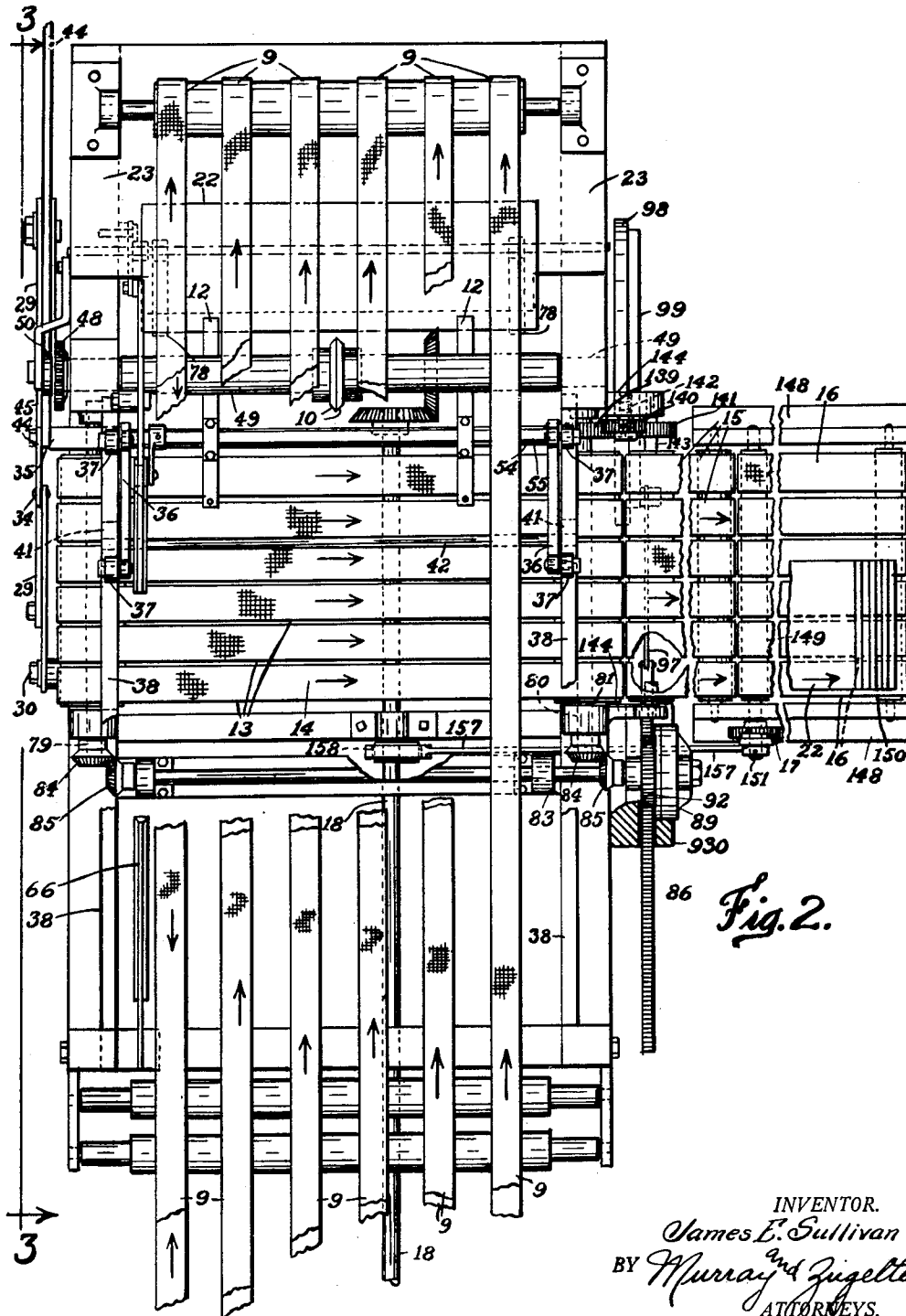
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4 Sheets-Sheet 3

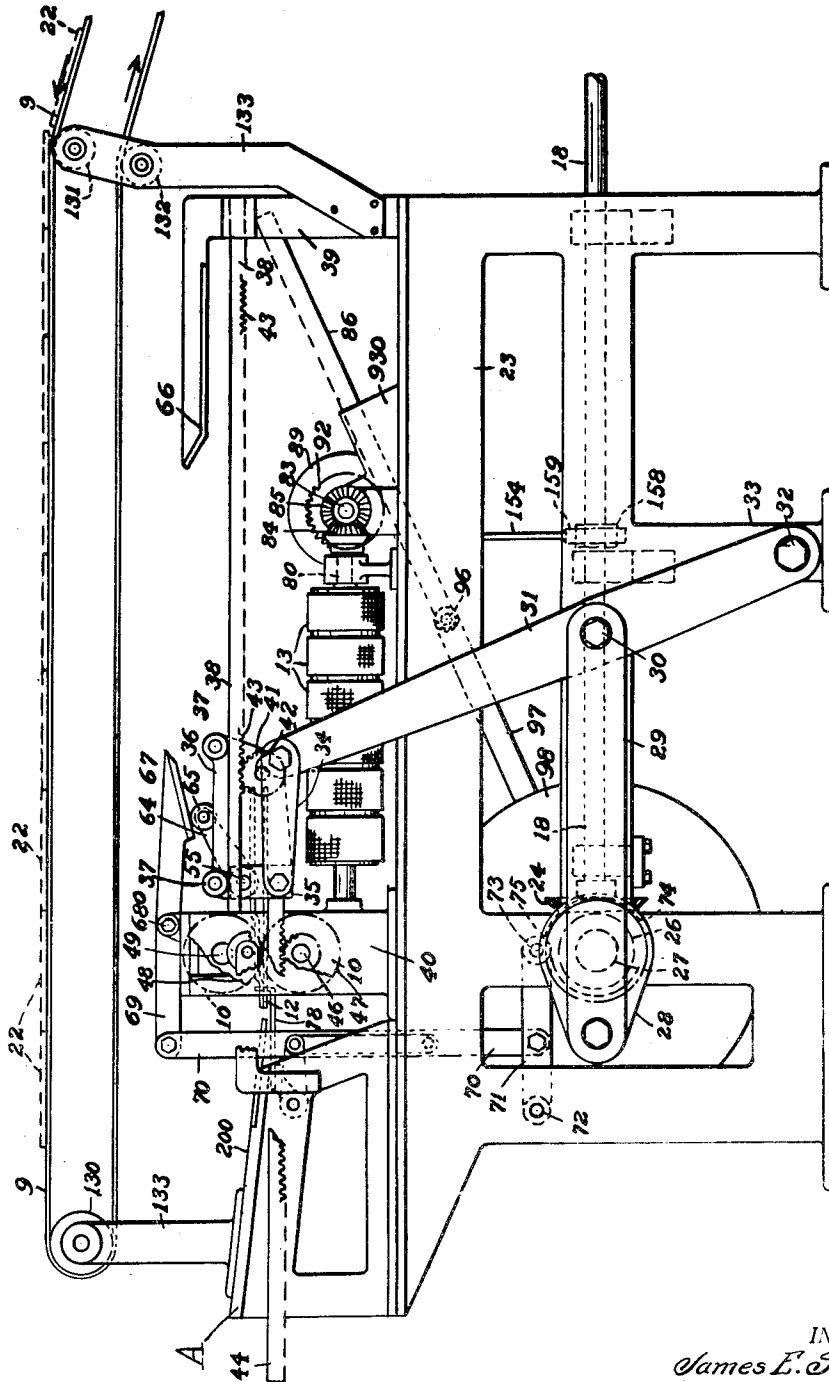


Fig. 3.

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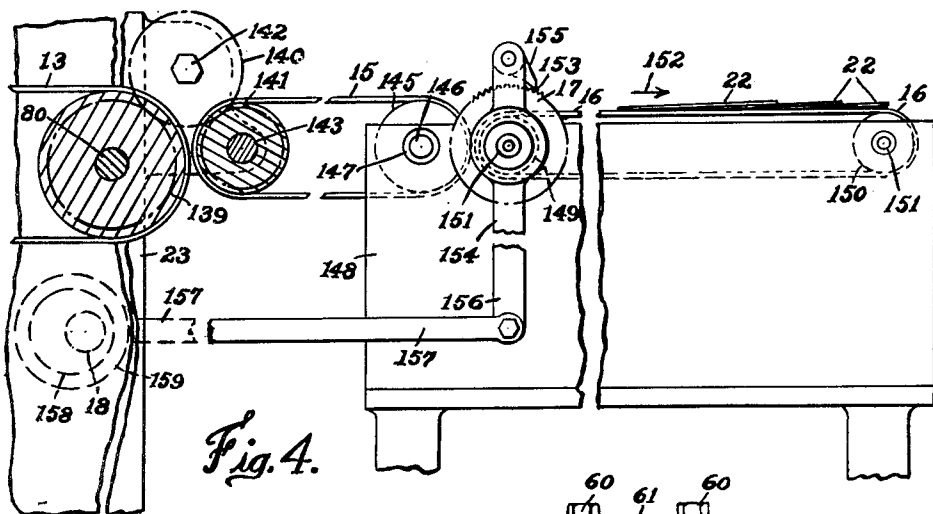
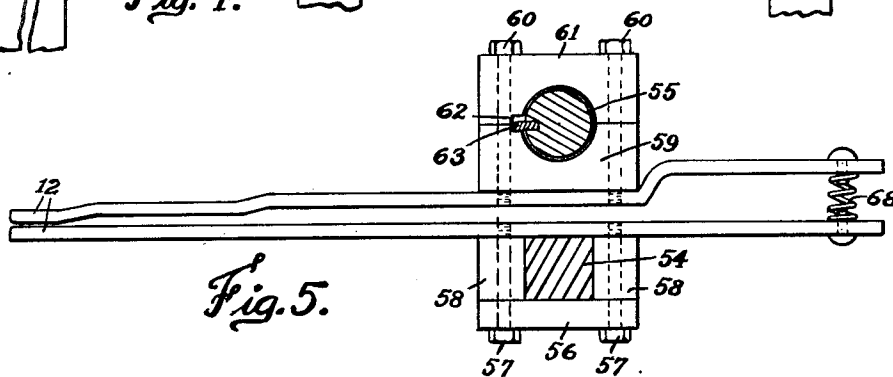
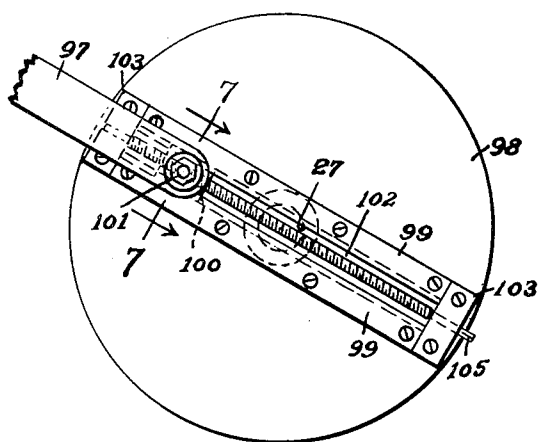
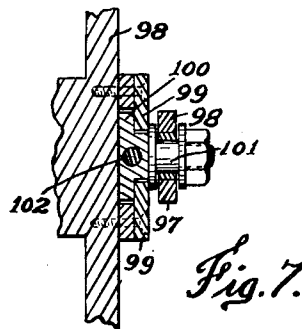
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SHEET DIVIDING AND COMPILING MACHINERY

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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

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SHEET DIVIDING AND COMPILING
MACHINERY

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Original application March 4, 1932, Serial No. 596,765. Divided and this application October 31, 1933, Serial No. 696,060

8 Claims. (Cl. 270—58)

The present invention relates to improvements in sheet dividing and compiling machinery of the character disclosed in my prior United States Letters Patent No. 1,815,744 dated July 21, 1931.

5 This application is a division of my copending application Serial Number 596,765, filed March 4, 1932.

10 An object of the invention is to provide means for rendering more completely automatic than the prior machine, the dividing and compiling of sheets, such as calendar sheets, in such a manner as to turn them out in stacks or groups in which specified sheets follow one another in a regular predetermined order or arrangement, so that they need not be assorted or rearranged prior to use.

15 Another object is to provide a device of the character stated above, whereby uniform sheets, each printed with a plurality of forms, are cut in one direction to produce smaller sheets after which said smaller sheets are compiled in a given or specified order, and then cut in another or transverse direction after which said sheets are automatically compiled with given stacks superposed upon one another and discharged in a novel manner to afford a complete desired compilation of stacks arranged for easy removal at the discharge end of the machine, at the convenience of the operator.

20 The foregoing and other objects are attained by the means described herein and disclosed in the accompanying drawings, in which:

25 Fig. 1 is a fragmental top plan view showing a portion of the machine of U. S. Patent No. 1,815,744 and its manner of association with the improvement disclosed herein.

Fig. 2 is a top plan view, parts being broken away, showing that portion of the mechanism not disclosed in plan in Fig. 1.

30 Fig. 3 is a side elevational view taken on line 3—3 of Fig. 2.

Fig. 4 is a fragmental side elevational view showing in detail the stack compiling conveyor mechanism disclosed at the right of Fig. 2.

35 Fig. 5 is a view showing a pair of grasping fingers forming a detail of the device of the invention.

Fig. 6 is an elevational view of a stroke adjusting mechanism forming part of a means for effecting an intermittent conveyor action.

Fig. 7 is a cross sectional view taken on line 7—7 of Fig. 6.

40 The disclosure of Fig. 1 is principally a showing of a portion of the device of the aforesaid J. E. Sullivan Patent 1,815,744 in which 21 ex-

emplifies a large sheet having printed across its width a plurality of printed forms 22, such as monthly calendar sheets. The sheet 21 is subjected to the properly spaced slitters or cutters 51 by the action of the grippers or fingers 53 and are carried thereby while the cutting takes place. The grippers thereafter deposit the severed sheets or portions 22 upon a conveyor comprising the parallel belts 82, the conveyor having an intermittent movement approximately equal in extent to the width of one of such severed portions 22. This manner of discharging a series of monthly calendar or other sheets in connection with the intermediate step by step shifting of the receiving conveyor, affords a simple and certain compiling of the sheets in a desired regular or predetermined order, as described fully in the aforesaid prior patent.

45 In accordance with the present invention, the stacks of sheets 22 which are disposed transversely upon the conveyor 82, are carried thereby to a forwarding conveyor comprising the parallel belts 9. Said forwarding conveyor in turn carries the stacks to a position or station "A", (Fig. 3), where an operator is stationed and who removes the stacks from the conveyor 9, aligns the edges of the sheets thereof, and then positions them for sidewise advancement to the cutters 10—10. The sidewise disposed sheets thereupon are gripped by reciprocating grippers or fingers 12, pulled through the cutter or slitter mechanism, then deposited upon a transversely moving conveyor comprising the parallel belts 13. These belts have intermittent forward movement in the direction indicated by arrow 14, each forward movement being approximately equal in extent to the length of the sheets after the above stated cutting operation. Thereafter, the stacks of sheets are removed from the belts 13 by another conveyor comprising the adjacent series of belts 15 which move in the same direction, but at a slightly greater speed, so as to space the stacks of sheets removed from the conveyor 13. From the stack spacing conveyor 15, the stacks are removed bodily by means of a slowly moving conveyor comprising belts 16, which serves to superpose the stacks upon one another in an offset relationship, as shown. The slowly moving conveyor has a step by step movement, afforded by means of the ratchet mechanism 17.

50 The foregoing constitutes a general statement of the operation and function of the improved device. The specific construction is set forth in the following.

55 The frame 23 of the machine carries a suitable

driving gear 24 which is mounted upon the shaft 18, said shaft being driven, as indicated in Fig. 1, by means of an arrangement of gears 19 associated with the electrical motor 25 of the mechanism which initially slits the sheets 21. Motor 25 carries on its shaft a gear 8 which meshes with a gear 180 on the main shaft 7 that supports one of gears 19. The entire device is actuated from this power source by preference.

10 Gear 24 drives gear 26 fixed on shaft 27 which in turn has crank 28 secured thereto. A pitman 29 is pivoted to crank 28 and to a point 30 intermediate the ends of lever arm 31. This lever arm is pivoted at its end 32 upon an extension 33 of the frame 23.

15 The lever arm serves as a means to reciprocate the gripper carriage and to impart rotation in alternately opposite directions to the cutter shafts.

20 A link 34 is pivoted at its one end to lever arm 31 and at its opposite end to an end 35 of the carriage 36 which is mounted by rollers 37 to ride upon the top plane edges of rack members 38 which are fixed upon suitable extensions 39 and 40 of the frame 23. Pinions 41 are fixed on a revoluble shaft 42 journaled in the opposite sides of the carriage and mesh with the teeth 43 on the lower side of each of the racks 38. The gripper carriage is in this way power driven at each end to effect a smooth uniform reciprocating movement.

25 A sliding rack 44 is attached at its one end to the carriage and as it reciprocates with the carriage it moves a gear 45 fixed on an extended portion of the lower cutter shaft 46 which also carries a gear 47 meshing with gear 48 on upper cutter shaft 49. A hold down wheel 50 on an extension of the upper shaft 49, keeps the rack 44 in mesh with gear 45 so that both cutter shafts are power driven alternately in opposite directions as the carriage and its associated rack 44 are reciprocated by the lever arm 31.

30 The shafts 46 and 49 are provided with a suitable number of pairs of complementary cutter or slitter discs 10 which are removable and adjustable so that a stack such as 22 (Fig. 2) may be divided into a desired number of smaller stacks of sheets.

35 The cutting or sheet slitting is effected by gripping the stack of sheets 22 with a pair of gripping fingers 12 (see Figs. 2 and 3) between each pair of slitter discs 10, said fingers reaching between and beyond the shafts 46 and 49 and between adjacent sets of slitted discs so that the stack is gripped by the grippers in advance of the slitters and is drawn between the slitters to be divided by them. The gripper fingers 12 retain their hold on the divided portions of stack 22 as the grippers are moved away from the slitters and are finally opened to deposit the individual smaller stacks in their original side by side (but now separated) relation upon conveyor 13 which has a stepwise transverse movement relative to the line of movement of the stacks or portions 22 equal to the space between adjacent pairs of slitters 12, as hereinbefore described.

40 The gripper structure comprises a square bar 54, which may also be a continuation of the extension 35 of the carriage, and a rocking shaft 55, which shafts carry the mountings for the gripping fingers 12. The fingers 12 are each securely but adjustably mounted on bar 54 by means of a yoke piece 56 and a pair of bolts 57 which may pass through a pair of rectangular spacers 58.

75 The fingers 12 are each mounted on a block 59

by a pair of screws 60 which also pass through a companion block 61. The blocks 59 and 61 have between them a bore to receive shaft 55 and are additionally notched at 62 to provide a way which allows a key 63 in shaft 55 to have a limited amount of free radial movement therein. The shaft 55 has fixed thereon a cam finger 64 having an antifriction roller 65 at the end. As the carriage reciprocates it moves the cam finger beneath fixed cam 66 at one end of the frame and a movable cam 67 at the opposite end. Engagement of the roller 65 with such cams imparts partial rotary movement to shaft 55 so that key 63 may tilt the blocks 59 and 61 and raise the gripping end of one finger 12 against the resistance of a spring 68 which normally retains the gripping ends of the fingers in engagement. In order to permit the gripping fingers to close upon the stack 22 at the proper moment the movable cam 67 is pivoted at 680 and has a lug 69 projecting beyond it to provide a pivotal mounting for an operating bar 70 which depends therefrom. A rocker arm 71 is pivoted on the frame at 72 and has the operating bar pivoted to it intermediate its ends. A roller 73 on the end of arm 71 rides upon a cam wheel 74 which is mounted on shaft 27. It will be seen that an abrupt nose 75 on cam 74 will serve to lift the cam 67, which had previously served to hold the gripping fingers apart, and allow the fingers to take hold of a stack 22 positioned on feed table 200. The operating bar 70 also has a link 76 connected to bell crank 77 which carries a retiring guide 78 which is moved down out of the path of the stack 22 when the grippers close on them.

80 The cam 74 through operating bar 70 holds cam 67 out of operative position so that the grippers retain their hold on stacks 22 as they are moved back by the carriage, and draw the sheet between the slitter discs. Continued movement of the carriage causes the grippers to draw the now separated sheets or portions transversely across the conveyor 13 until roll 65 on finger 64 engages fixed cam 66 when the grippers open and withdraw, leaving the several stacks side by side on the conveyor. The carriage now returns allowing the grippers to repeat the operation on the next stack 22.

85 The conveyor 13 consists essentially in a pair of parallel intermittently actuated shafts 79 and 80 each carrying a suitable closely spaced series of pulleys 81 upon which the conveyor belts 13 are mounted. The shafts 79 and 80 are driven in unison from a shaft 83 through miter gears 84 and 85. On the end of shaft 83 there is provided a suitable means to secure intermittent unidirectional rotation of the shaft from a reciprocating rack 86. In this embodiment this intermittent motion is attained by an overrunning clutch indicated generally at 87. The overrunning clutch operates, through gear 92, to actuate the conveyor 13 in one direction upon each complete reciprocation of the rack 86. An extension 930 bolted on or integral with the frame of the machine serves as a bearing for the rack 86 and a journal for shaft 83.

90 The rack 86 has a hinged connection at 96 with a pitman 97 which has an accurately adjustable eccentric mounting on disc 98. The eccentric mounting (see Figs. 6 and 7) comprises a pair of inverted L-shaped members 99, conveniently made of two flat strips, which serve to slidably support an inverted T-shaped block 100 for adjustment diametrically across disc 98. The block carries an upright stud 101 to which

the pitman 97 is attached. An adjusting screw 102 is rotatably mounted at its opposite ends in end pieces 103 and the threads engage in a threaded bore in block 100. The end 105 of adjusting screw 102 is adapted to receive a wrench or other tool whereby the block, or more specifically the stud 101 is moved to the desired distance from the center of the disc 98 to regulate the stroke of the pitman 97 and the rack 86 connected thereto. This structure makes possible an exact intermittent advance of the conveyor belts for each turn of the disc 98 which make one revolution for each complete reciprocation of the gripper carriage.

From the foregoing it will be noted that while the carriage is advancing to move the fingers forward toward the table 200, the conveyor moves one step forward thus advancing the previously deposited cut stack a distance equal to the width of one of such stacks. When the grippers reach and grip a new stack, the conveyor comes to rest and remains so while the stack is drawn through the slitters.

The conveyor 9 which overhangs the mechanism of machine 23 (Fig. 3) may conveniently be supported by rollers 130, 131 and 132 which are rotatably mounted upon standards 133 bolted or otherwise secured to the frame of the machine. This conveyor may be driven in any suitable manner, such as by the provision of gearing for transmitting motion from the shaft 134 of conveyor 82. Shaft 134 may have fixed thereto a gear 135 which meshes with an idler gear 136 that in turn meshes with a gear 137 on the conveyor shaft 138 of conveyor 9. The conveyor 9 thereby has imparted thereto the intermittent forward movement of conveyor 82, and in the same direction.

As stated in the earlier part of the description, the stacks of sheets 22, after having been subjected to the cutters 10, are carried by the fingers or grippers 12 to a position directly above the conveyor belts 13, and are dropped thereon as the fingers release their hold when the roller 65 of the carriage strikes the cam 66. The conveyor 13, moving intermittently in the direction of arrow 14, carries the severed stacks to the conveyor 15, which conveyor 15 has imparted thereto the intermittent movement of conveyor 13 by means of the intermeshing gears 139, 140 and 141. Gear 139 may be fixed on the shaft 80 of conveyor 13, said gear being in engagement with the gear 140 which in turn engages gear 141 whereby to afford unidirectional movement of conveyor 15 in the direction of movement of conveyor 13. Gear 140 may be mounted upon a stud shaft 142, and gear 141 may be mounted upon a shaft 143 journaled in suitable bearing blocks 144. Gear 139 preferably is larger than gear 141, so as to effect movement of conveyor 15 at a slightly greater speed than conveyor 13. By this means, the stacks removed from conveyor 13 become spaced from one another. The foregoing is illustrated in detail in Fig. 4.

That end of the conveyor 15 which is remote from conveyor 13 may be provided with a suitable conveyor roll 145 which has axles 146 mounted in suitable bearings 147 in an auxiliary frame or standard 148.

The conveyor 16, which closely abuts the conveyor 15, comprises belts passing over suitable conveyor rolls 149 and 150 the ends of which are journaled in bearings 151 of frame 148. This conveyor 16 may be of any suitable length, and is slowly moved intermittently in the direction

of arrow 152 by any suitable means such as the ratchet mechanism 17. The purpose of conveyor 16 is to superpose upon one another the stacks of sheets 22 as they are discharged from the cutting and compiling machine. As is evident from Fig. 4, the stacks of sheets 22 overlap one another or may be said to have an offset relationship. The means for power actuating said conveyor 16 may comprise a ratchet wheel 153 fixed relative to conveyor roll 149, there being disposed beside said ratchet wheel a member 154 having at its upper end a pivotally mounted pawl 155 adapted to engage the teeth of the ratchet wheel. Member 154 preferably is mounted for rotation relative to the shaft 151, and the extending portion 156 thereof may have pivotal connection with a reciprocating connecting rod 157. Any suitable means may be provided for reciprocating the rod 157, there being disclosed in Fig. 4 a cam 158 fixedly mounted upon the shaft 18, said cam being surrounded by the cam ring 159 which is fixed relative to the connecting rod 157. From the foregoing it should readily be apparent that rotation of the shaft 18 effects reciprocation of rod 157, which in turn causes the ratchet mechanism 155—153 to slowly move the conveyor 16 in an intermittent manner.

In the operation of the device, the large printed sheets 21 of Fig. 1 are advanced toward and beyond the cutters 51 and deposited upon the conveyor 82 in the manner set forth in the aforesaid Sullivan patent. Conveyor 82 moves the sheets, then in stacks, to the conveyor 9 which carries the stacks to the operator's station indicated at A. At this point, the operator places the stacks upon the table 200 in position for reception by the grippers or fingers 12. As the grippers are moved to the right (Fig. 3) by the action of the arm 31, the stacks of sheets are pulled to and through the cutters 10 and thereafter deposited upon the conveyor 13. The conveyor 13, moving intermittently toward the conveyor 15, advances the severed sheets to the conveyor 15. Said conveyor 15, moving at a speed slightly greater than that of conveyor 13, spaces the stacks of sheets an inch or two apart and carries them to the conveyor 16. Said conveyor 16, moving slowly and intermittently, as hereinbefore described, effects a compiling of the stacks upon one another in overlapping relationship as indicated in Fig. 4. Conveyor 16 may be sufficiently long, if so desired, as to permit a great number of overlapping stacks to accumulate thereon, which stacks thereafter may be removed by an operator or workman whose duty it is to remove the stacks or to place inserts between them, prior to stacking thereof on a hand truck or other receiving device.

What is claimed is:

1. In combination, means for slitting large sheets into longitudinal smaller sheets having opposite side edges, a conveyor, and means for deposition of the smaller sheets upon the conveyor in substantial side by side relationship with the side edges of adjacent sheets disposed in close proximity, a second conveyor operating slightly faster than the first conveyor and disposed in close proximity and in substantial alignment with the first conveyor to receive and advance the sheet-like objects fed thereto by the first conveyor, whereby to space the side edges of the adjacent sheets from one another, and means for power actuating the conveyors in a common direction of movement.

2. In combination, means for slitting large

sheets into longitudinal smaller sheets having opposite side edges, a conveyor, and means for deposition of the smaller sheets upon the conveyor in substantial side by side relationship with the side edges of adjacent sheets disposed in close proximity, a second conveyor operating slightly faster than the first conveyor and disposed in close proximity and in substantial alignment with the first conveyor to receive and advance the sheet-like objects fed thereto by the first conveyor, whereby to space the side edges of the adjacent sheets from one another, and means for power actuating the conveyors intermittently in a common direction of movement.

3. In combination, means for successively slitting large sheets into smaller sheets having opposite side edges, a conveyor, means for successively depositing the smaller sheets upon the conveyor, means for intermittently moving the conveyor a distance approximating the distance between the opposite side edges of the said smaller sheets, intermediate the successive deposition of sheets upon the conveyor, thereby disposing said sheets upon the conveyor in substantial side by side relationship with the side edges of adjacent sheets disposed in close proximity, a second conveyor disposed in substantial alignment with the first conveyor to receive the sheets fed thereto by the first conveyor, and means for operating the second conveyor in the same direction as the first conveyor at a rate of linear movement greater than that of the first conveyor.

4. In combination, means for successively slitting large sheets into smaller sheets having opposite side edges, a conveyor, means for successively depositing the smaller sheets upon the conveyor, means for intermittently moving the conveyor a distance approximating the distance between the opposite side edges of the said smaller sheets, intermediate the successive deposition of sheets upon the conveyor, thereby disposing said sheets upon the conveyor in substantial side by side relationship with the side edges of adjacent sheets disposed in close proximity, a second conveyor disposed in substantial alignment with the first conveyor to receive the sheets fed thereto by the first conveyor, and means for intermittently operating the second conveyor in the same direction as the first conveyor at a rate of linear movement greater than that of the first conveyor.

6. The combination of a conveyor for advancing sheet-like objects disposed thereon in substantially spaced relationship, and means for moving the conveyor intermittently in a given direction of movement, a second conveyor disposed substantially in alignment and in close proximity with the first conveyor for receiving the sheet-like objects fed thereto by the first conveyor, and means for moving the second conveyor, in the same general direction of movement as the first conveyor, at a greatly reduced

relative speed to compile the sheet-like objects in overlapping relationship.

6. The combination of a conveyor for advancing sheet-like objects disposed thereon in substantially spaced relationship, and means for moving the conveyor intermittently in a given direction of movement, a second conveyor disposed substantially in alignment and in close proximity with the first conveyor for receiving the sheet-like objects fed thereto by the first conveyor, and means for intermittently moving the second conveyor, in the same general direction of movement as the first conveyor, at a greatly reduced relative speed to compile the sheet-like objects in overlapping relationship upon the second conveyor.

7. The combination of a conveyor and means for operating the conveyor intermittently in a given direction of movement, means for feeding sheet-like objects onto the conveyor in substantial end to end relationship, a second conveyor disposed substantially in alignment and in close proximity with the first conveyor for receiving the sheet-like objects fed thereto by the first conveyor, means for intermittently advancing the second conveyor in the same general direction of movement as the first conveyor at a rate of linear movement greater than that of the first conveyor, a long accumulator conveyor disposed substantially in alignment and in close proximity with the second conveyor for receiving the sheet-like objects fed thereto by the second conveyor, and means for advancing the accumulator conveyor in the same general direction of movement as the first and second conveyors, at a greatly reduced speed, to compile the sheet-like objects in overlapping relationship.

8. The combination of a conveyor and means for operating the conveyor intermittently in a given direction of movement, means for feeding sheet-like objects onto the conveyor in substantial end to end relationship, a second conveyor disposed substantially in alignment and in close proximity with the first conveyor for receiving the sheet-like objects fed thereto by the first conveyor, means for intermittently advancing the second conveyor in the same general direction of movement as the first conveyor at a rate of linear movement greater than that of the first conveyor, a long accumulator conveyor disposed substantially in alignment and in close proximity with the second conveyor for receiving the sheet-like objects fed thereto by the second conveyor, and means including a short stroke intermittently actuated clutch for advancing the accumulator conveyor in the same general direction of movement as the first and second conveyors, at a greatly reduced speed, to compile the sheet-like objects in overlapping relationship.

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