June 30, 1942. R. A. WILLIAMS 2,288,149

MANIFOLDING METHOD AND MEANS

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Fig. 3

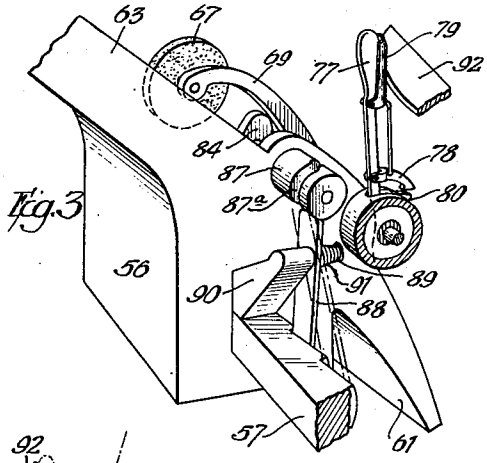

Fig. 2

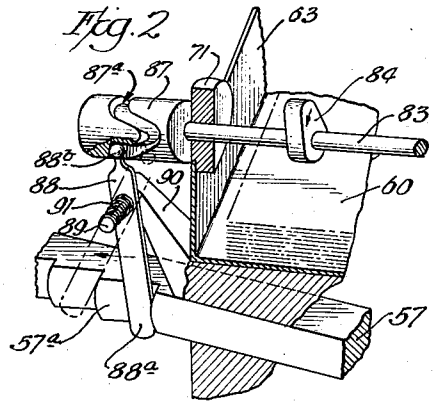

Fig. 1

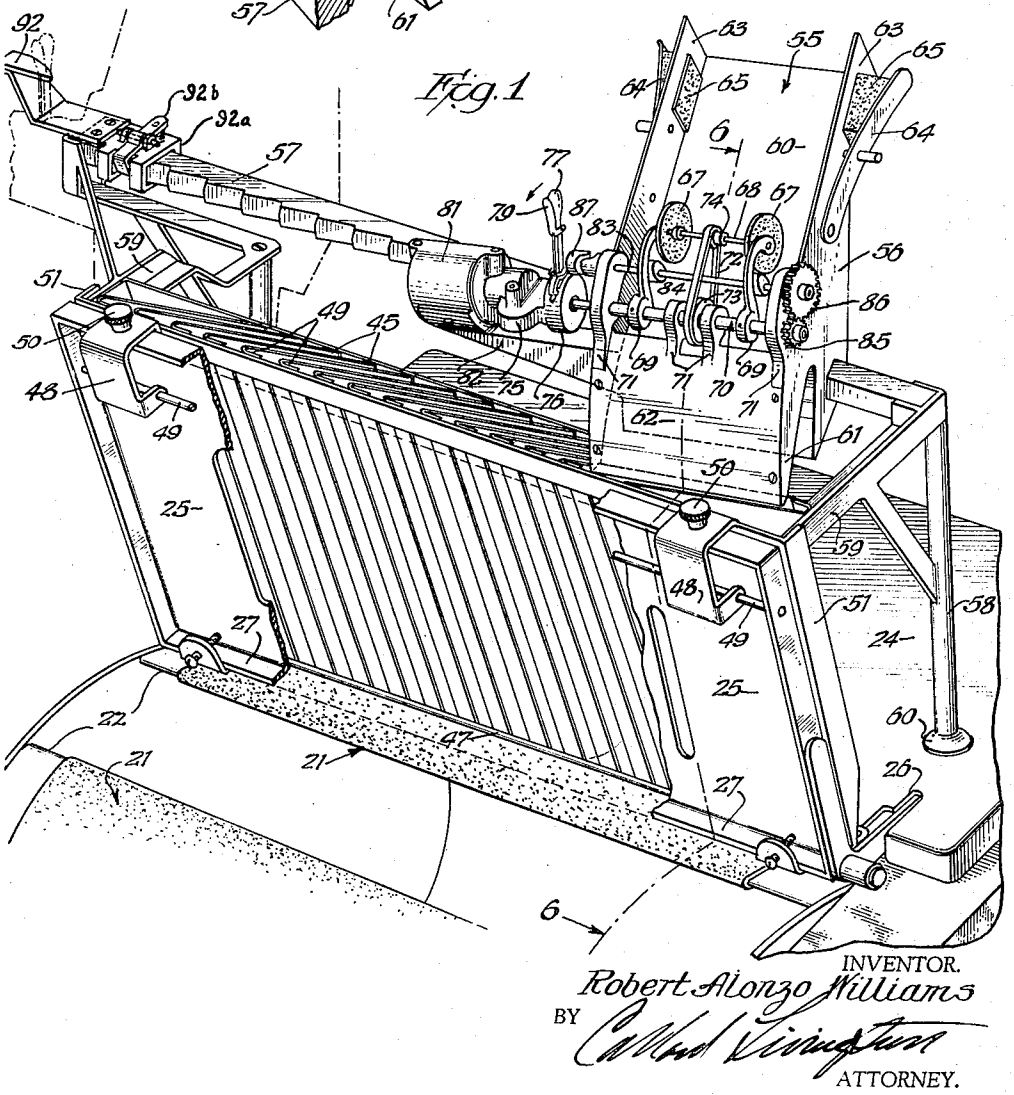

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Fig. 5

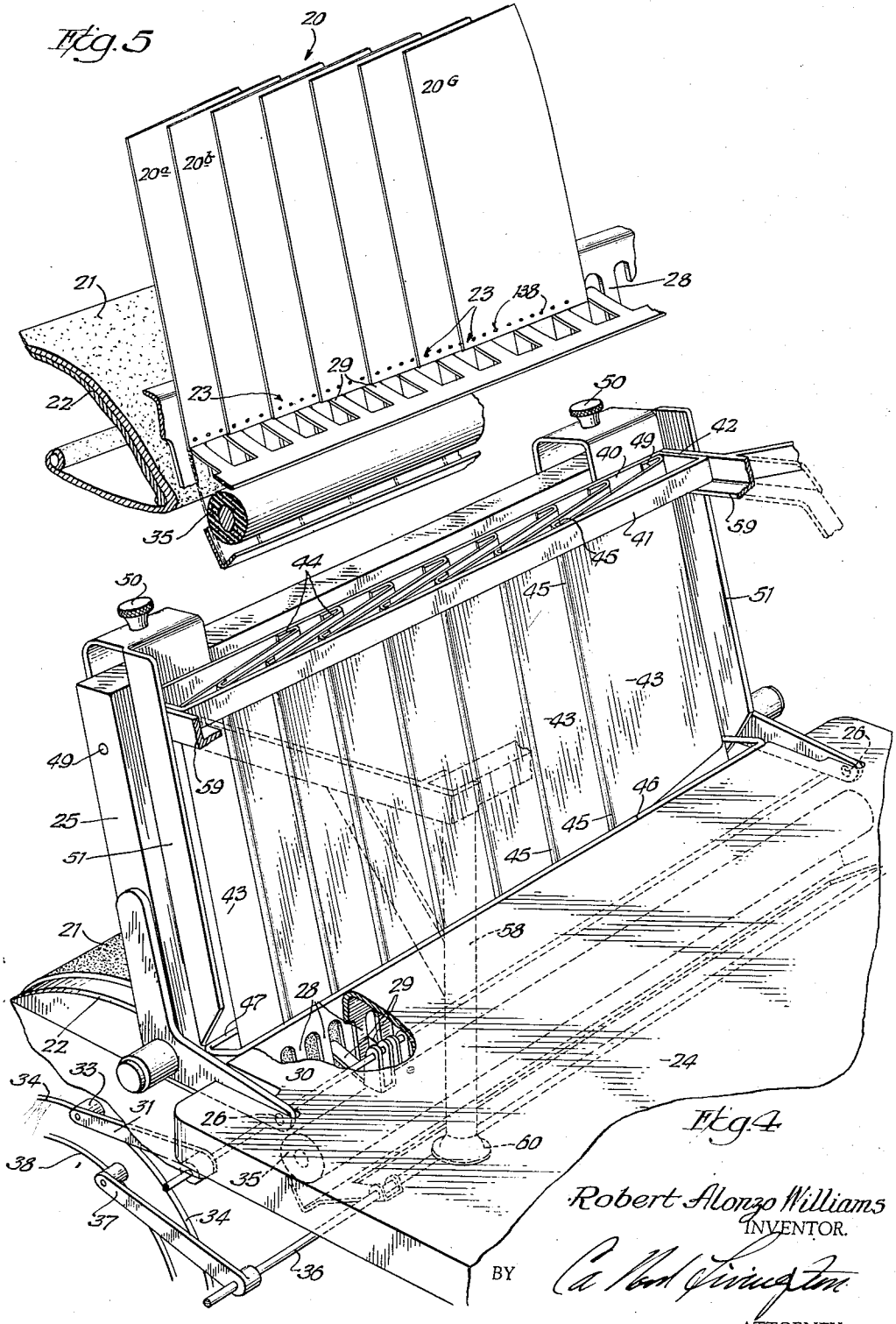

Fig. 4

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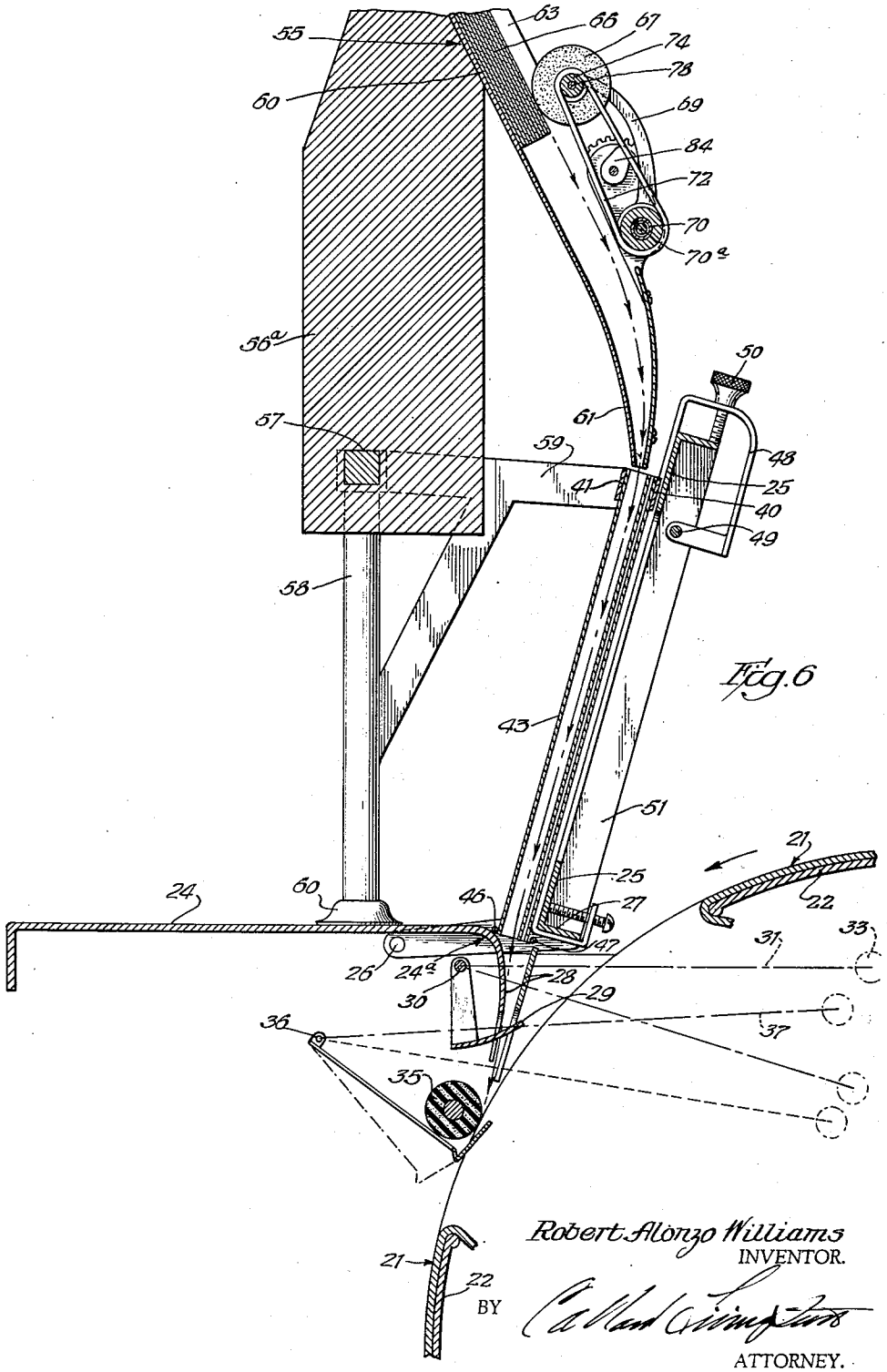

Fig. 6

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Fig. 7

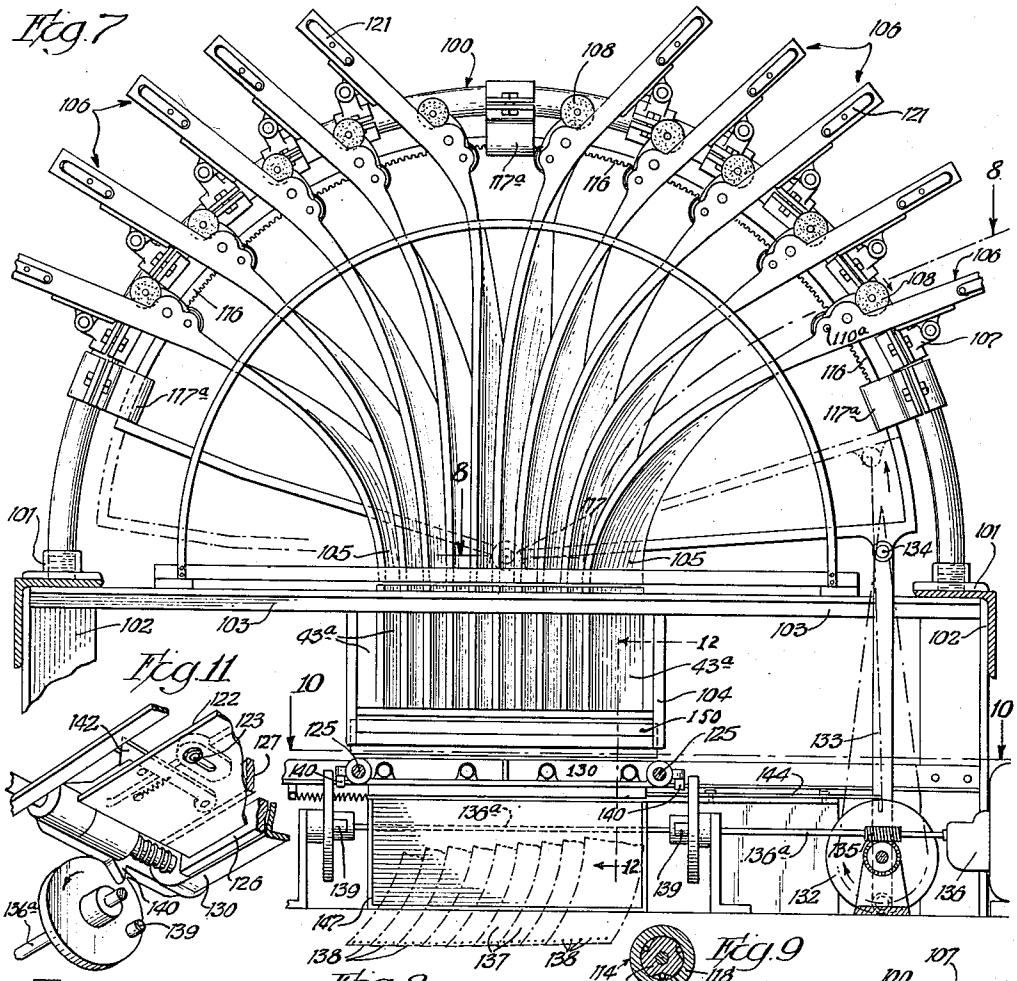

Fig. 11

Fig. 8

Fig. 9

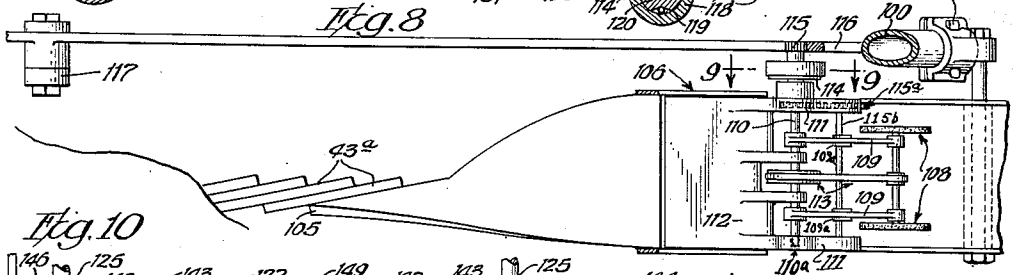

Fig. 10

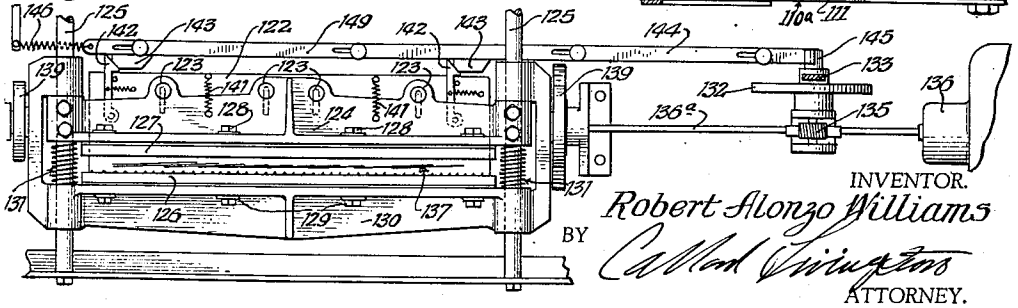

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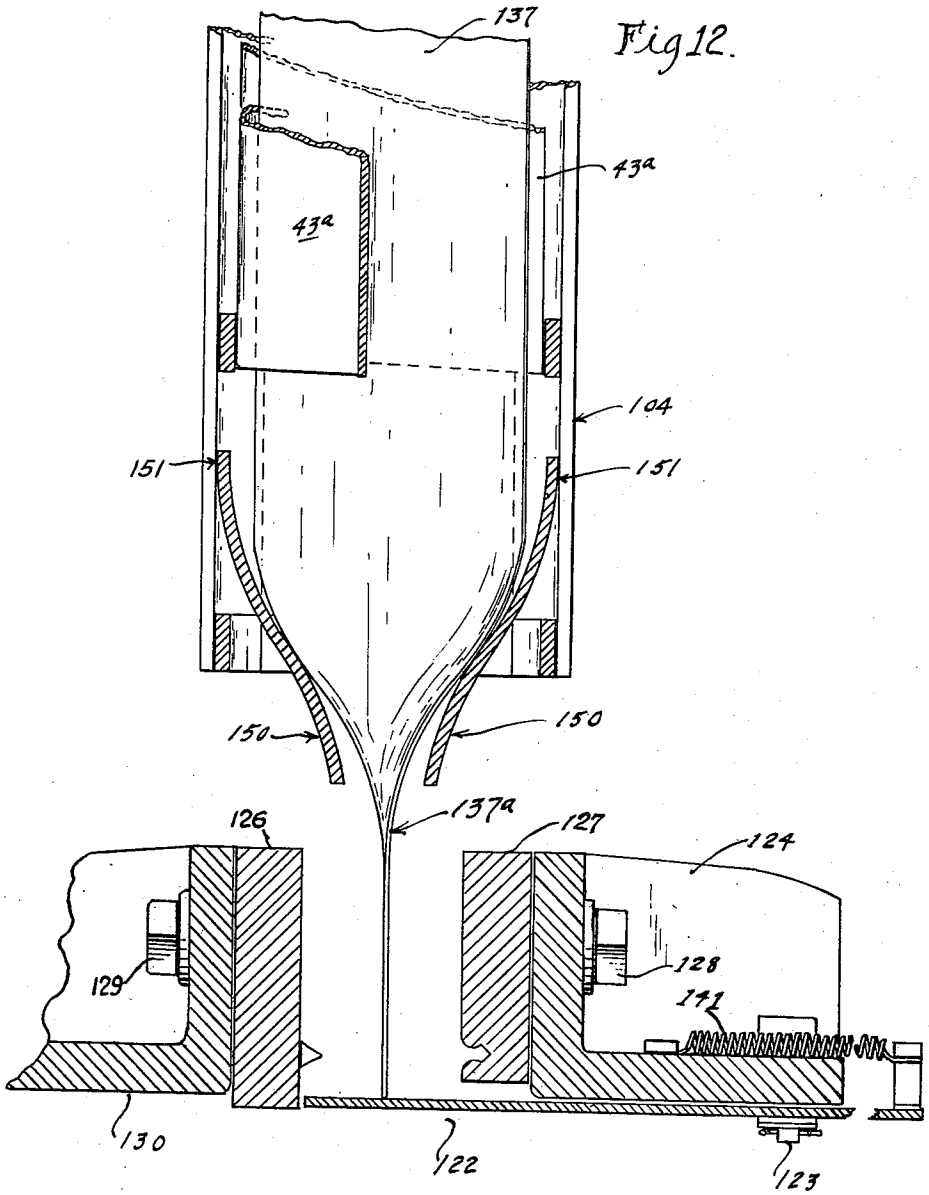
Fig 12.



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Patented June 30, 1942 2,288,149

UNITED STATES PATENT OFFICE

2,288,149

MANIFOLDING METHOD AND MEANS

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Application March 25, 1940, Serial No. 325,774

18 Claims. (Cl. 101—132)

This invention relates to a method and means for assembling paper sheets in groups wherein an edge portion of each sheet is offset from the corresponding edge portion of an adjoining sheet to expose a surface on each sheet for printing or analogous purposes.

One of the particular objects of the invention resides in the provision of a special sheet receiving and guiding means adapted for use as an auxiliary attachment for duplicating machines to feed a certain number of blank sheets or printed forms as a group into the duplicating machine so that each sheet has a corresponding edge portion exposed to receive copy transferred thereto in the movement of the group of sheets through the duplicating machine.

A further object is the provision of improved paper or sheet feeding means for cooperation with the aforesaid guiding means to deliver a sheet into a plurality of guiding channels or pockets in the guiding means.

Still further objects relate to details of the construction and operation of the feeding means whereby the same is rendered automatic in its operation to load a predetermined number of the sheets into the guiding means.

Yet another object is the provision of means for assembling or manifolding paper sheets into prepared sheaves for use with certain duplicating equipment, the sheets in the sheaves each having an edge portion offset in parallelism with respect to the corresponding edge portion of an adjoining sheet so that each sheet of the sheaf may receive an imprint at the same time.

A still further object relates to the provision of a method of forming sheets into books or sheaves of the type hereinabove characterized, which method includes the feeding of individual sheets into adjoining angularly offset guides with corresponding edge portions of the sheets offset as aforesaid and the adjoining lower edge portions of the several sheets exposed from the guides for engagement simultaneously by some form of paper fastening means, for example a paper welding or pasting device, which secures the sheets in sheaf form for convenient handling and insertion as a unit in various printing and duplicating machines.

Other objects and novel aspects of the invention relate to various details of construction, as well as the cooperative arrangement of the various parts of the devices hereinafter described in view of the annexed drawings in which:

Fig. 1 is a perspective of the feeding end of a duplicating machine with the novel sheet feeding and guiding means in operating position thereon;

Fig. 2 is a fragmentary perspective of the steping ratchet for the feeding carriage with parts shown in section;

Fig. 3 is a fragmentary perspective of the feeding means showing the stepping ratchet and clutch, the latter partly in section;

Fig. 4 is a fragmentary perspective of the guiding means with the feeding means removed;

Fig. 5 is a fragmentary perspective of sheets fastened in a sheaf in the overlapped relationship in which they must pass through the duplicating machine with relatively offset legend-receiving or imprinting areas exposed for simultaneous impression;

Fig. 6 is a vertical section through the feeding and guiding means of Fig. 1 modified for direction at a sharper feeding angle, the view being taken in a direction corresponding to lines 6—6 of Fig. 1;

Fig. 7 is an elevation with parts shown in section of a multiple sheet feeding and securing mechanism, which is a modification of the arrangement of Fig. 1;

Fig. 8 is a fragmentary section looking in the direction of lines 8—8 of Fig. 7, looking down on one of the multiple feeders;

Fig. 9 is a sectional detail through one of the slip clutches as viewed along lines 9—9 of Fig. 8;

Fig. 10 is a section looking down on lines 10—10 of Fig. 7 showing the paper fastening or welding mechanism;

Fig. 11 is a perspective fragment of the releasable sheet supporting shelf or tray;

Fig. 12 is a vertical sectional fragment through one of the guides, the securing means, and paper supporting pan, taken along lines 12—12 of Fig. 7.

In accordance with certain methods for transferring data in the nature of writing or printing to a plurality of sheets at one time, the several sheets 20 are arranged in the manner shown in Fig. 5 so that each sheet has one edge portion 20*a*, 20*b* . . . 20*g* offset in parallelism with the adjoining sheets to expose an elongated area adequate to receive the transferred matter, the transfer preferably being effected by the movement of all of the sheets 20 as a group relative to duplicating means including for example a gelatin or other master duplicating surface 21 carried on a drum 22 which is rotated in a direction to carry the sheets 20 from a position such as shown in Fig. 5 to a discharge point in the

duplicating machine, all in a manner well known in the art.

Heretofore, the sheets 20 have been secured together as a sheaf by various expediencies including the interlocking of the sheets by tab and slot means, as well as the gluing of the sheets, along a lower edge portion 23 of the sheaf, the sheaves being prepared in this manner prior to insertion in the duplicating machine. The novel sheet feeding and guiding means of the present invention makes it possible to prepare the sheaves in advance for subsequent placement in the duplicating machine, or is capable of cooperation with the duplicating machine to feed unattached sheets in the required offset relationship, as desired.

The form of duplicating machine shown in part in Fig. 1 includes a feeding platform 24 adjacent the duplicating drum 22, and a sheet receiving or positioning frame or plate 25 pivotally mounted on the platform 24 as at 26 (Figs. 4 and 6 also) so that the lower edge portion 27 of the frame lies above certain paper positioning and feeding fingers including spaced stationary fingers 28 and interfitting depressible fingers 29 (Figs. 4, 5 and 6).

As seen in Fig. 4, the depressible fingers 29 are mounted on a rock shaft 30 which is periodically rocked by action of a cam arm 31 and its cam roller 33 riding on a cam 34 movable with the drum 22 so that a sheet of paper or the like may drop between the fingers 28 and 29 to be picked up by the drum and pressed against the duplicating surface or master sheet 21 cooperably with a presser roller 35 (Figs. 4 and 6) which is also mounted on a rock shaft 36 actuated by cam means 37 cooperating with a cam 38 on the drum so that the presser roller moves forward in timed relation to the opening of fingers 29 to press the paper against the drum for imprinting purposes, the paper being subsequently stripped from the drum by means not shown and discharged from the machine. So much of the duplicating mechanism is old in the art.

In order to utilize the offset sheet arrangement 20 shown in Fig. 5, the individual sheets must be manually positioned in the manner shown so far as the edges 20*a*, 20*b* . . . 20*g* are concerned, or especially prepared sheaves must be employed.

The present invention provides a sheet guiding means consisting of spaced horizontal bars 40 and 41 (Figs. 1 and 4) rigidly joined at their ends as at 42, with a plurality of guide channels 43 secured thereto in parallel planes cutting across the bars. Each guide channel is preferably constructed of a thin sheet of metal bent back upon itself along opposite vertical edges to provide a forward lip 44 which is attached as by welding or soldering to the front bar 40, and a rearward lip 45 resting against the backwall of the next adjacent guide and affixed to the rear bar 41. At their bottoms, the several guide channels are welded or otherwise secured to parallel cross rods 46 and 47 so that the entire assembly of channels is a rigid unit which may be conveniently lifted into and out of operative position on the paper receiving plate or frame 25 as illustrated in Figs. 1, 4 and 6.

If desired, the foregoing guide structures may be seated in the frame 25 as illustrated in Fig. 6 with the lower edge of the assembly, and particularly the lower rod 46 resting on the forward edge portion 24*a* of the table 24. The guide frame 25 is provided with horizontally sliding clamps 48 (Figs. 1, 4 and 6) moving on a cross-rod 49 and held in adjusted positions by set screws 50 binding against an offset top edge portion of frame 25. The clamps 48 are provided with vertically extending flanges 51 which are moved against the opposite vertical edges of the guide channel assembly as shown particularly in Fig. 6, the set screws 50 being turned down to fix the guide means on the frame.

Individual paper sheets 20 may then be dropped manually into the several guides or channels 43 from the top, and thereafter the duplicating drum is started. The lower edge portions 23 of the individual sheets will rest upon the fingers 29, which are normally raised as in Fig. 6, but as the drum rotates from its starting position, fingers 29 are lowered away by action of the cam means 33—34, and at the proper moment the presser roller 35 is moved against the lower ends of the sheets by action of cam means 37—38, and the sheets are pressed against the gelatin sheet on the drum and withdrawn from the guide channels.

By reason of the angular disposition of the several guide channels 43, the paper sheets will be fed into the duplicating machine, that is onto the drum, in the relative positions shown in Fig. 5 so that the offset edgewise areas 20*a*, 20*b* etc. will be imprinted with the appropriate copy which is similarly positioned on the master duplicating gelatin sheet 21.

Means for feeding individual sheets automatically into the guide channels includes the provision of a feeding carriage generally indicated at 55 in Figs. 1 and 6 and consisting of a casting having a base portion 56 slidably mounted upon a horizontal rack bar 57 which is supported on posts 58 connected by channel or angle arms 59 to the upper frame bars 40 and 41 of the guide channel assembly, the lower ends of the posts being provided with feet or stanchions 60 adapted to rest upon the table 24, when the assembly is in position on frame 25.

The carriage 55 includes a tray portion 60 inclined toward a downwardly curved discharge mouth 61 provided with a cover plate 62 and opposite sidewalls 63 each having mounted thereon a spring presser arm 64 with a sponge rubber pad 65 movable through an opening in the sidewall to bear against the side of a stack of paper sheets 66 (Fig. 6) firmly enough to prevent the sheets from sliding down the chute portion 61—62.

Means for ejecting sheets one at a time from stack 66 includes a pair of friction wheels 67 mounted on a shaft 68 carried between smaller rocker arms 69 on a tubular shaft 70 seated in bosses 71 forming part of the carriage casting and cover plate casting. As seen best in Fig. 6, the friction wheels are driven at a relatively high rate of speed by a belt 72 working on a pulley 73 on the driving shaft 70*a* within tubular shaft 70 and pulley 74 on the smaller driven shaft 68.

Normally the friction wheels rest on the topmost sheet of the stack 66 and when rotated counter-clockwise in Fig. 6 vigrously sweep the sheet down the chute. The driving shaft 70 connects with a speed reducer 75 (Fig. 1) through a hand operated clutch 76 including an operating lever 77 and a normally released dog 78 (Fig. 3) actuated by a trip 79 to disengage the clutch tooth 80 and break the driving connection between the shaft 70 and speed reducer. The speed

reducer is drivingly connected to a small electric motor 81 carried on a bracket arm 82 fixed on the carriage.

In order that the ejection of sheets from the stack in the carriage will occur in timed relation to the movements of the carriage, the friction wheels are periodically raised and lowered from engagement with the top of the stack, this being accomplished by the relatively slow rotation of a cam shaft 83 journaled on the bosses of the carriage casting and carrying cams 84 against the arcuated undersides of the rocker arms 69. The cam shaft 83 is driven through a further gear reduction effected by a small gear 85 on the driving shaft 70 and a larger gear 86 on the cam shaft. Thus, the friction wheels are driven at a relatively rapid rate through an increased ratio drive 73—74, while the cams 84 move at a slower rate through the reduced ratio drive 85—86 to assure driving contact of the wheels with the paper for positive ejection.

Once the clutch has been set, the carriage will step automatically across the rack, such action being effected through a stepping ratchet mechanism shown particularly in Fig. 2 wherein it will be seen that a special cam 87 is mounted on an extension of the cam shaft 83, and there is provided a rachet lever 88 pivoted on a stud 89 carried on a bracket arm 90 forming part of the carriage casting. The ratchet lever is permitted to shift axially of its pivotal mounting on the stud by action of a spring 91, so that the lower end portion 88a may slip over the teeth 57a on the carriage supporting rack responsive to clockwise movement (Fig. 2) of the ratchet lever under influence of its cam follower 88b working in the cam track 87a of the special cam and which is effective to oscillate the lever from the dotted to the full line positions shown in Fig. 2 and thereby move the carriage in steps in timed relation to the raising and lowering of the friction wheels in ejecting sheets from the stack in the chute.

When the hand clutch means 77—79 has been set, the carriage structure 55 will be moved step by step automatically by action of the cam and ratchet means 87—88, from the starting position shown in Fig. 1 to the left hand end of the rack bar 57, where the carriage will be automatically stopped by engagement of the trip 79 on the hand clutch with a tripping cam arm 92 mounted on a runner 92a slidable on the rack bar and provided with a detent 92b engaging in the rack teeth to hold the runner in adjusted positions. Thus the carriage may be made to stop at any position by sliding the cam arm 92 to proper position (Figs. 1 and 3).

As illustrated in Figs. 1 and 6, the discharge mouth 61 of the feeding chute is disposed at an angle for alignment with the upper ends of each of the guiding channels 43 as the carriage is stepped across the rack, and such movement of the carriage is calculated to occur in timed relation to the ejection of the sheets from the stack 66 by the rising and falling action of the rotating friction wheels, so that as the carriage is moved into its positions of alignment with each guide, a sheet will be quickly swept from the stack into the guide, and thereafter the carriage will move to the next position, step by step, until the clutch trip 79 is depressed by the cam arm 92 as aforesaid.

In Fig. 6 the base portion 56a of the carriage casting is heightened to dispose the tray portion 60 at a sharper angle for increasing the gravity component to facilitate the discharge of stiffer grades of paper.

A peculiarity of the novel manifolding method and mechanism resides in the fact that, whereas the major portion of the several sheets is disposed in its own plane at an angle to the plane of the duplicator sheet, and approximately parallel to the plane of the adjoining sheets, the lower ends of all of the sheets are bent or twisted by the oppositely spaced stationary fingers 28 (Figs. 4 and 6; see also 12) so as to lie in a substantially common plane (Fig. 10) by reason of which the entire group of sheets may be fed in overlapping relationship uniformly into the duplicating machine, with each of the legend or imprinting areas 20a, 20b, etc., lying substantially flat against the gelatin sheet 21, to be pulled by the latter from the guides in imprinting action.

In the operation of the new feeding and guiding means for manifolding or assembling sheets for the purpose set forth, the guide structure 40—41—43—46—47, and the associated carriage structure, is mounted on the table 24 with the guide structure resting in the frame 25 and clamped in position by the means 50—51. Assuming that a stack of sheets 66 has been positioned in the chute portion 60 of the carriage as in Fig. 6, the carriage is manually restored to the position of Fig. 1 by springing the ratchet lever 88 from the rack teeth, and with motor 81 running, clutch lever 77—79 is operated to connect the driving shaft 70 for rotation by the speed reducer unit 75, whereupon the friction wheels 67 are rotated and cams 84 are rotated to lower the rockers 69 so that the friction wheels may engage the topmost sheet of the stack and send the sheet rapidly down the chute into the first guide channel 43 with the bottom edge of the sheet resting on the now raised fingers 29 (Fig. 6) of the duplicating machine feed means.

Meanwhile, the carriage stepping cam 87 will be rotating to pivot the stepping lever 88 and move the carriage into alignment with the next guide channel 43, and the friction wheels will again be lowered onto the stack to eject another sheet and so-on until the carriage moves into its last position at the left of Fig. 1, where the tripping cam arm 92 will pivot the trip 79 and release the clutch 76 preparatory to the restoration of the carriage to starting position by the attendant, who starts the duplicating drum in the usual manner by operation of another clutch (not shown), which effects rotation of the drum and withdrawal of the sheet supporting fingers 29 and movement of the presser roller 35 against the lower exposed portions of the group of sheets against the gelatin duplicating sheet 21, which effects withdrawal of the group of sheets from the guide channels preparatory to the feeding of a new group.

In the arrangement of Fig. 7, the novel feeding and guiding mechanism is employed to assemble the individual sheets and secure the same in sheaves for use in a duplicating machine such as described in conjunction with the showing of Fig. 1. However, in the device of Fig. 7 the sheet feeding chutes are stationary and multiplied in number corresponding to the number of guides 43a, and the aligned sheets are secured together, as by a form of paper welding mechanism, so that they may be handled and stocked, ready for use by simply being fed into the imprinting or duplicating machine, as by placing a sheaf such as illustrated in Fig. 5 on the frame 25 (the guide means 43 etc. being removed)

and the entire group of sheets being fed through the duplicating machine in proper alignment by virtue of their mutual attachment.

The device of Fig. 7 includes an arcuate overhead support 100 mounted as at 101 upon a frame structure 102 provided with cross bearers 103 supporting a bank of guide channels 43a, identical in construction to the guides 43 heretofore described except that they are preferably mounted in a heavier frame 104. Fixedly aligned with the upper mouth or entrance to each guide channel is the discharge end 105 of a paper or sheet feeding chute appropriately curved so that its upper or feeding end 106 may lie alongside the arcuate support 100 for attachment thereto by clamp means 107.

As in the case of Figs. 1 and 3, the feeding mechanism of Fig. 7 includes in association with each chute a pair of friction feeding wheels 108 (Fig. 8 particularly) mounted on rocker arms 109 carried by a tubular shaft 110 on boss means 111 forming part of the corresponding chute cover 112. Pulley means 113 spins the friction wheels as heretofore described, the shafts 110 of each feeding unit extending into a uni-directional clutch 114 drivingly associated through small pinions 115 with a semi-circular gear rack 116 mounted for oscillatory motion as by the clamps 117a and the pivot mounting 117. Clutches 114 are of the free-wheeling variety including, as seen in the section of Fig. 9, a driven ring 118 rotatable with pinion 115 and engaged by bearing balls 119 working in eccentrically pitched notches in a driven hub 120 which is fast with the inner shaft 110a inside the tubular shaft 110, pulley means 113 being fast with the inner shaft to be rotated by the latter when the slip clutch takes hold in one direction, that is to say when the rings 118 are rotated clockwise, Figs. 8 and 9. Thus, when the common arcuate rack 116 moves upwardly from the position of Fig. 7 (i. e., anti-clockwise) the clutches 114 slip and idle, but when the rack moves in the opposite direction, the clutches take hold and all of the friction wheels are rotated to eject one sheet from each stack, rockers 109 being lowered by rotation of cams 109a on shaft 115b driven through gears 115a set in one of the bosses 111 and driven from inner shaft 110a. Broadly, the sheet ejecting means of Fig. 7 operates in the same manner as the ejector of Fig. 1.

In order to have the friction wheels 108 which lie to the left of a vertical center line through Fig. 7 rotate in the proper direction (since their respective chutes are reversed with respect to the right side of said line) the pulley belts for the corresponding pulley means 113 are twisted in the known manner to effect the necessary reversal of rotation (anticlockwise). As in the case of the device of Fig. 1, the sheet stacks 66 are prevented from falling in their chutes by spring grippers 121 constructed like the pressers 64—65 of Fig. 1.

When the several sheets are fed into the guides 43a by the feeding means just described, their bottom edges rest upon a reciprocable pan or shelf 122 (Figs. 10, 11, 12) slidably mounted as at 123 on a stationary welder bracket 124 fixed on rods 125 beneath the set of guide channels 43a, the sheets resting on the pan between male and female paper welding dies 126 and 127, the former of which is removably secured as at 129 to a movable welder bracket 130, while the latter die 127 is removably secured as at 128 to a stationary welder bracket 124. The movable welder bracket 130 is slidably mounted on the rods 125 and is normally urged away from the stationary companion bracket by springs 131 so as to space the male die from the other to permit the sheets 137 to drop therebetween onto the pan 122 as illustrated in Figs. 10 and 12.

When the sheets are resting on the supporting pan as aforesaid, the upper portions of each sheet are still disposed in the corresponding guide 43a, each in its own plane parallel or nearly so to the planes in which the adjoining sheets are situated; but it will appear from an examination in Fig. 10 that the bottom portions of the several sheets lie in a common plane into which they have been twisted by the spaced stationary fingers 128, in the arrangement of Fig. 6, or by a common guiding funnel or trough 150 (Fig. 12) secured to the frame 104 as at 151 beneath the bottoms of the several guides 43a. This funnel has downwardly sloping opposite sides curving into a narrowed mouth which lies just above the dies 126 and 127.

The common sheet feeding rack 116 is oscillated by a main crank disc 132 (Fig. 7) connected as at 134 with a crank arm 133 reciprocated by the disc, the latter being driven through a worm connection 135 by a motor 136. In properly timed relation to the ejecting operations of the rack, the male die 126 is moved forward to press the ejected lower edge portions 137 of the sheets against the female die, thus providing a multitude of very small interlocking perforations 138 (Fig. 5) in the several sheets to secure the same as a unit or sheaf which may be conveniently handled without danger of the sheets being separated, but which nevertheless permits separation of one or more sheets deliberately.

It is contemplated that the dies 126, 127 may be employed to press gummed tape against opposite sides of the commonly aligned portions of the sheets, the tape being fed with the sticky side toward the paper between one of the dies and the sheets from positions at one side or the other of the die holders, the opposite ends of the tape thus applied being sheared by suitable shearing means carried by the dies.

Movement of the die as aforesaid is accomplished by rotation of eccentrics 139 (Figs. 7 and 11) fast on the motor shaft 136a, the eccentrics 139 transiently engaging depending lugs 140 on the movable bracket 130. The sheet supporting pan 122 is normally thrust forward into sheet-supporting position beneath the open dies by action of springs 141 (Figs. 10 and 12), the pan being pushed out of the way by the advancing die and latched in retracted position by latch dogs 142 (Figs. 10 and 11) pressed into engagement with keepers 143 on a longitudinally shiftable release bar 144. The arrangement provides that after the dies have been pressed fully into the sheets, following a feeding action of the means 108—116, the release bar 144 is transiently engaged by a roller 145 on the main crank disc 132 and shifted toward the right against the effort of normal spring 146 so as to withdraw keepers 143 from latch dogs 142 to free pan 122 for restoration by springs 141 quickly to normal sheet-supporting position.

Release of the pan as aforesaid does not occur until the movable die has abruptly withdrawn from engagement with the companion die responsive to disengagement of the eccentrics 139 from bracket lugs 140, so that the sheets will have time to drop into a discharge chute 147.

Assuming that a supply of paper sheets has

been deposited in each chute portion 106, the operation of the device of Fig. 7 is such that while the main crank disc 132 is moving the common feeding rack 116 in its idle stroke (wherein clutches 114 are free), the movable die unit 126—130 is advancing toward the companion die, the sheet supporting pan being pushed back and latched by the latch dogs 142 and releasable keepers 143. By the time the common rack starts back on its feeding stroke to spin the friction wheels 108 and sweep the topmost sheet from each stack down the corresponding chute and into the corresponding guide 43a, cam 145 will have pushed the release bar 144 to free the dogs 142 and permit the pan to snap back into sheet-supporting position prior to the arrival of the newly ejected sheets into the guides.

The next group of sheets being thus in position between the dies, the movable die means 126—130 again starts toward the stationary die to perforate the sheets and secure the same for handling as a unit, the movable die means retreating far enough to permit the unit or sheaf of offset sheets to drop into chute 147 before the supporting pan is again released for a repetition of the cycle.

The objects and advantages of the invention may be realized by modified forms of the arrangement hereinbefore described in detail for purposes of illustration, and such detailed description is not to be construed as limiting the invention except as may be provided in the appended claims, which are intended to include all equivalent arrangements and forms fairly coming within their call.

Having thus described my invention, what I claim and desire to protect by Letters Patent of the United States is:

1. In a sheet assembly device, sheet guiding means including a plurality of guides arranged in offset relationship to each other for completely separating a plurality of sheets and holding them shifted edgewise differentially in overlapping relationship whereby the sheets may be withdrawn simultaneously from the guides in overlapping relationship as aforesaid and each sheet will have a copy-receiving area exposed adjacent the aforesaid parallel edge portions.

2. Sheet assembling means including a plurality of guides in oblique position with respect to each other mounted in serially offset overlapping relationship and providing a plurality of parallel runways each adapted to receive a sheet and position the same in a plane extending in approximate parallelism with the plane of an adjoining sheet whereby each sheet will have an edge portion offset in parallelism with the corresponding edge portion of an adjoining sheet, said guides each having an opening through which the sheet therein may pass into overlapped offset relationship with the other sheets as aforesaid upon withdrawal of the sheets as a group from said openings.

3. In a manifolding apparatus, in combination, a plurality of sheet receiving guides mounted in parallelism in serially offset relationship and each having corresponding entrance and exit openings at opposite ends whereby sheets may be passed therethrough into overlapping relationship with corresponding edge portions offset to expose identical copy-receiving areas on each sheet, a movable sheet-carrying device mounted for movement edgewise transversely of the apparatus into alignment successively with the entrance to each guide, means for moving said sheet-carrying device into positions of alignment as aforesaid for moving the sheets edgewise into overlapping relationship, and means driven cooperatively with said last-mentioned means for ejecting a sheet from said device following movement of the same into alignment with the entrance to a guide as aforesaid.

4. Sheet assembling apparatus comprising, in combination, a plurality of serially offset sheet receiving guides having adjoining entrance openings at one end and adjoining exit openings opposite thereto, a sheet feeding carrier mounted for movement into alignment with any of said entrance openings, mechanism for moving said carrier into positions of alignment as aforesaid, said carrier being adapted to carry sheets in a stack, sheet ejecting means on said carrier and mounted for movement into and out of engagement with the topmost sheet on said stack and for movement to displace the topmost sheet in a direction into the entrance opening of a guide with which the carrier is aligned, together with means driven in timed relation to the movements of said carrier into alignment with the guides as aforesaid for actuating said ejecting means to move the same into engagement with the topmost sheet on the stack as aforesaid and displace said sheet into a guide following movement of the carrier into alignment therewith.

5. Sheet assembling apparatus comprising, in combination, a plurality of relatively flat sheet guides having opposite sheet passages and mounted in a series in approximately parallel planes each with a side portion extending between the respective opposite passages thereof offset from the corresponding side portion of an adjoining guide, a sheet feeding carrier adapted to support a supply of sheets, means mounting said carrier for movement into alignment with the several passages at one end of the guides to feed sheets into the latter, mechanism for moving the carrier step by step into alignment as aforesaid, mechanism on said carrier operable to eject sheets one at a time therefrom into the guides with which the carrier is aligned, motor means and a clutch arranged to be set to drivingly connect the motor means with said carrier moving mechanism to effect step by step movement of the carrier as aforesaid from a starting position at one end of the series of guides, clutch tripping means movable into positions of adjustment relative to said guides for releasing the clutch to stop the carrier at a desired position, and means driven by said motor means through said clutch for actuating said ejecting means following each alignment of the carrier with a guide to feed a sheet therein, said sheets being movable into relatively overlapping offset relationship from the passages at the ends of the guides opposite from those into which the sheets are fed as aforesaid.

6. In a sheet assembling apparatus including a plurality of sheet receiving and aligning guides, sheet feeding means comprising a carrier mounted for movement into successive positions of alignment with the guides for moving the sheets edgewise into overlapping relationship to each other, stepping mechanism cooperable with said mounting means and carrier for moving the latter step by step into alignment with the several guides, mechanism driving said stepping mechanism, and means on said carrier driven in timed relation to the stepping operations of said stepping mechanism for ejecting a sheet into a guide following each movement of the carrier into

alignment with one of the same in the manner aforesaid.

7. In apparatus of the class described including a plurality of serially aligned sheet guides, sheet feeding means including a sheet carrier mounted for movement into alignment with said guides successively, mechanism driving said carrier from a starting position at one end of the series of guides toward the opposite end thereof for alignment as aforesaid, sheet ejecting mechanism movable with said carrier and operable periodically to eject one sheet at a time into a guide with which the carrier is aligned, means driving said driving mechanism and said ejecting mechanism in timed relationship to effect ejection of a sheet into a guide following movement of the carrier into alignment therewith, together with means for starting said carrier under manual control and for stopping the carrier automatically at a desired position of alignment as aforesaid.

8. In a sheet assembling apparatus, in combination, guides mounted in parallel planes in a series and each offset from the other in a direction between the ends of the series, each guide having a sheet receiving mouth at an upper end and a discharge mouth at a lower end, a sheet feeding device associated with each guide, sheet supporting means movable into and out of sheet supporting position beneath said discharge mouths to support a sheet in each guide with a lower end portion exposed beneath the guide, and sheet securing mechanism mounted to engage exposed portions of said sheets and operable to secure the same together as a group, together with mechanism driving said sheet feeding devices, said sheet supporting means, and said sheet securing mechanism in periodically timed relation to dispose the supporting means in supporting position, actuate the feeding devices, and thereafter actuate the securing mechanism and effect withdrawal of said supporting means to permit the secured group of sheets to pass from said guides.

9. In a sheet assembling apparatus, in combination, guides mounted in parallel planes in a series and each offset from the other in a direction between the ends of the series, each guide having a sheet receiving mouth at an upper end and a discharge mouth at a lower end, a sheet feeding chute associated with each guide, means for supporting a stack of sheets relative to each chute, ejecting means associated with each chute and operable to eject sheets one at a time from the corresponding stack, mechanism actuating said ejecting means simultaneously and intermittently, means removably supporting a sheet in each guide with a lower portion exposed beneath the guide, and means for disposing the exposed portions of said sheets in a substantially common plane whereby the sheets may be withdrawn in overlapping offset relationship as a group from said guides.

10. In a sheet assembling apparatus, in combination, a plurality of guides arranged in serially offset relationship to dispose sheets therein in approximately parallel planes with corresponding edge portions offset in a direction between the ends of the series and each guide having an entrance at an upper end and an exit at a lower end adjoining the aforesaid offset edge portion of a sheet disposed therein as aforesaid, means releasably supporting the sheets in the guides with a lower portion exposed beneath the guide, and means operable to engage the exposed portions of the sheets and secure the same together as a group in overlapping offset relationship such that each sheet will have an area exposed adjoining the edge portion thereof which is offset in the manner aforesaid.

11. In a sheet assembling apparatus, in combination, a plurality of sheet receiving guides disposed in serially offset relationship, a sheet feeding chute associated with each guide and each chute being constructed to support a stack of sheets, means associated with each chute for ejecting sheets one at a time from said stacks, into the corresponding guides, a driving motor, and means drivingly connecting the motor in common with all of the ejecting means for simultaneous actuation of the latter.

12. In a device of the class described, the combination with a plurality of sheet receiving guides arranged in vertically parallel planes and offset serially in a horizontal direction, of an arcuate support above said guides and a plurality of sheet feeding chutes mounted on said support with each chute having a lower end portion aligned with one of said guides, each chute being provided with means adjacent said support for supporting a stack of sheets, a rotatable sheet ejecting wheel on each chute engageable with the topmost sheet in the corresponding stack to eject a sheet into the chute for movement into the corresponding guide, and driving means common to all of said ejecting wheels for simultaneously actuating the latter in sheet ejecting operation.

13. In sheet assembling apparatus, in combination, a series of sheet retaining guides mounted in relatively overlapping disposition so that each guide is offset from the next one in a direction between the ends of the series, each guide being arranged to position a sheet in a plane extending diagonally of a line joining the ends of the series, each sheet being positioned as aforesaid in parallelism with the others, said guides each having an entrance at an upper end and an exit at a lower end thereof, a sheet supporting member yieldably urged into sheet-supporting position beneath said guides and mounted for withdrawal out of supporting position, means releasably and automatically latching said supporting member in withdrawn condition, means beneath said guides and above said supporting member for receiving the lower end portions of sheets from said exits and turning the sheets into a substantially common plane, sheet securing members mounted above said supporting member on opposite sides of said common plane and at least one of the same being movable toward the other securing member for securing cooperation therewith in gripping said lower ends of the sheets therebetween, mechanism for feeding sheets into said guides, and driving means operatively associated with said feeding mechanism, said securing member, and said latching means for operation of the same in timed relation to release the supporting member for movement into supporting position, feed sheets into the several guides, move the movable securing member against said lower portions of the sheets to grip the latter with the companion securing member, said movable securing member coacting with said supporting member to effect movement of the latter into latched withdrawn condition coincident with said gripping of the sheets, and means yieldably urging said movable securing member out of gripping engagement with said sheets following movement of the supporting member into

withdrawn position, whereby said sheets may pass from said guides.

14. The method of manifolding sheets in a group in which the sheets are in overlapping relationship and each offset from an adjoining sheet to expose an area on each sheet to receive an imprint or the like, which method comprises arranging the several sheets in parallel planes in a series with each plane disposed diagonally of a common line extending therethrough from one end of the series to the other, and moving said sheets simultaneously from their respective parallel planes into a substantially common plane by substantially identical angular displacements from said parallel planes.

15. Sheet assembling means comprising a receiving chute, a plurality of guide channels each arranged to guide a sheet into said chute with an edge portion in parallel offset relationship with the corresponding edge portion of an adjoining sheet whereby to expose identical copy-receiving areas on each sheet, and a retractable support at the bottom of said chute for releasing the several sheets as a group while they are in overlapped relationship.

16. Sheet assembling means comprising a support, spaced guide means above said support for positioning a plurality of sheets in parallel planes and on edge upon said support, each sheet having a particular edge portion offset lengthwise of the support, and in parallelism, with respect to an edge portion of an adjoining sheet to expose a copy-receiving area on each sheet, and means for withdrawing said support from beneath the sheets whereby to deliver said sheets as a group arranged in overlapping relationship.

17. Sheet assembling means comprising a plurality of overlapped guide channels, each arranged to position a sheet therein with an edgewise copy-receiving area extending in parallel spaced relation with respect to a similar area on an adjacent sheet in an adjoining channel, and means at one end of said channels for securing all said sheets together in overlapped relation while held in position in said channels to enable said sheets to be withdrawn as a group from said guide channels.

18. Sheet assembling means comprising a plurality of sheet guiding channels each mounted to position a sheet in approximate parallelism with the other sheets, and each channel being offset with respect to adjoining channels such that when the sheets are withdrawn from the channels as a group they will lie in relatively overlapping relationship and each sheet will have an edge portion offset from a corresponding edge portion of an adjoining sheet to expose an area thereon, and a receptacle below said channels having a removable support for the bottom edges of the overlapped sheets.

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