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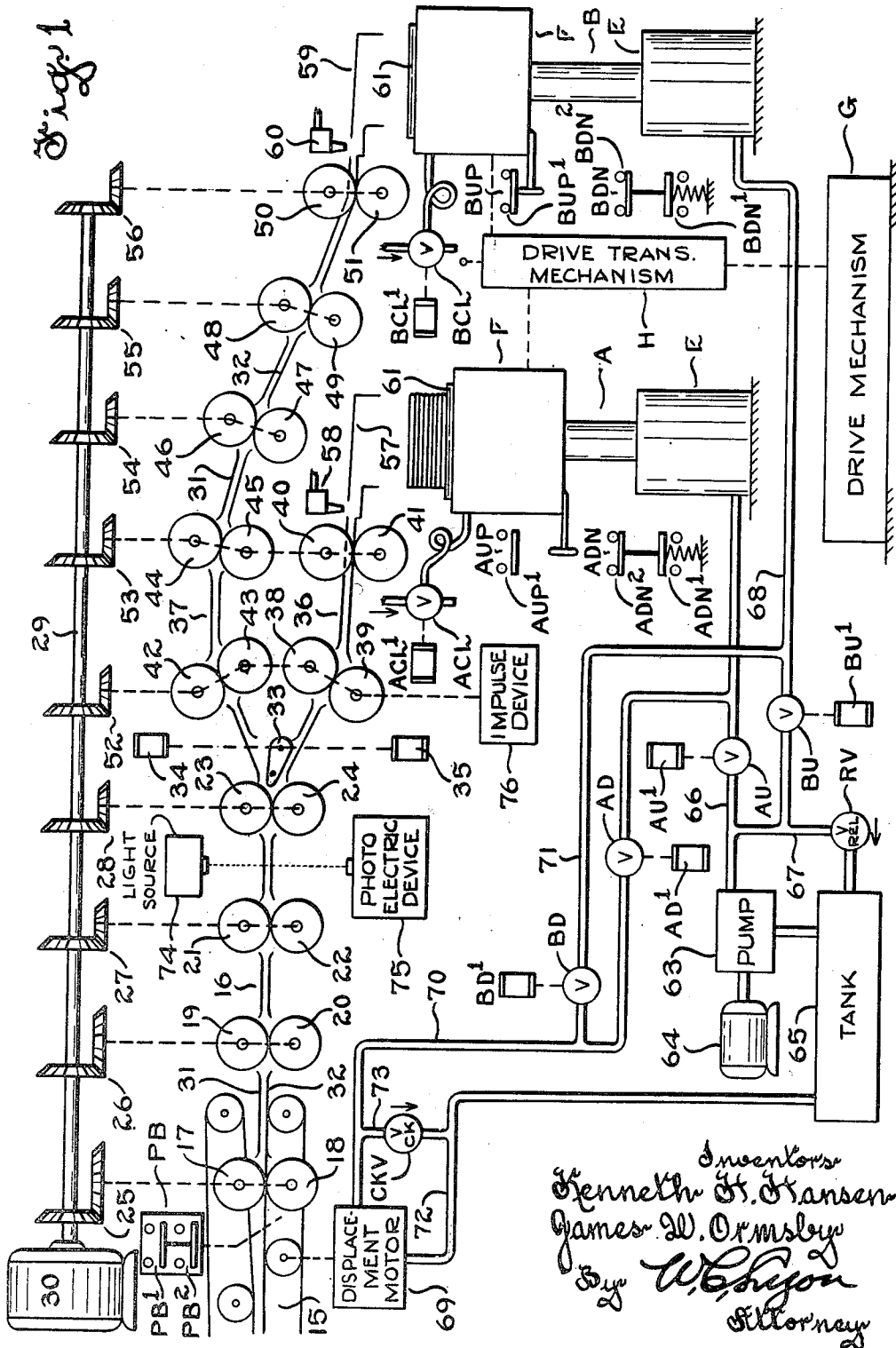
K. H. HANSEN ET AL

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SYSTEM FOR STACKING NEWSPAPERS AND THE LIKE

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6 Sheets-Sheet 2

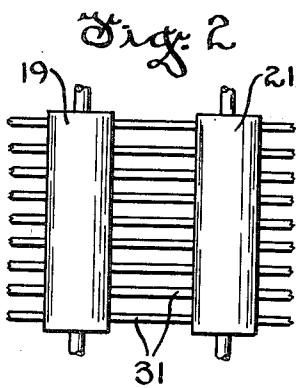
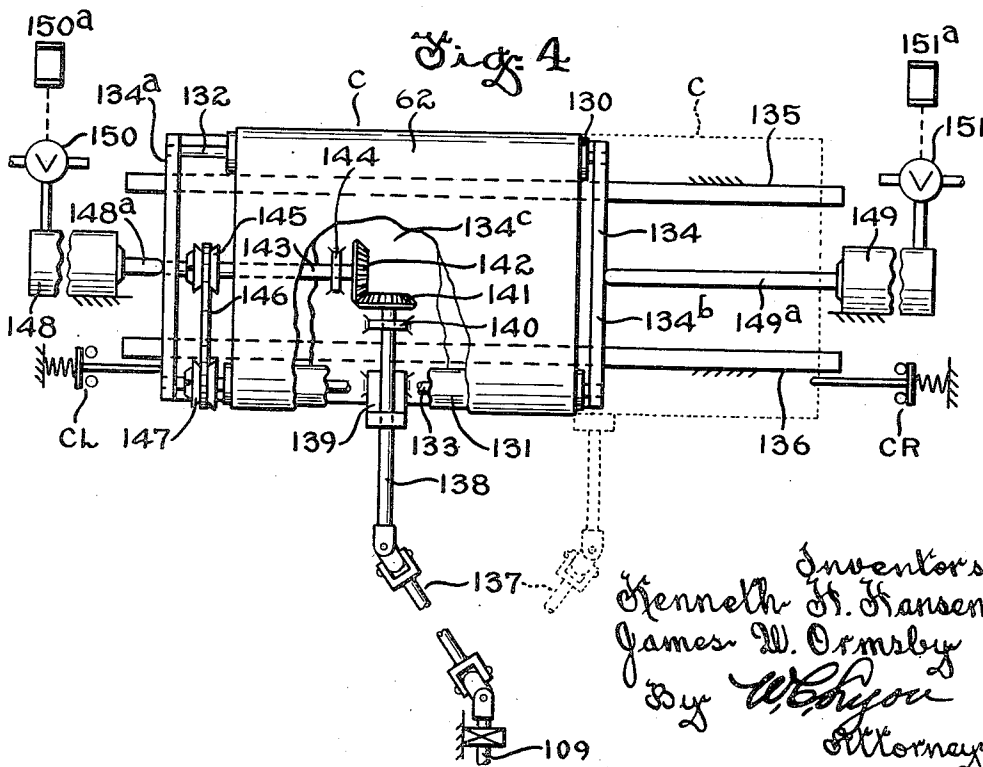
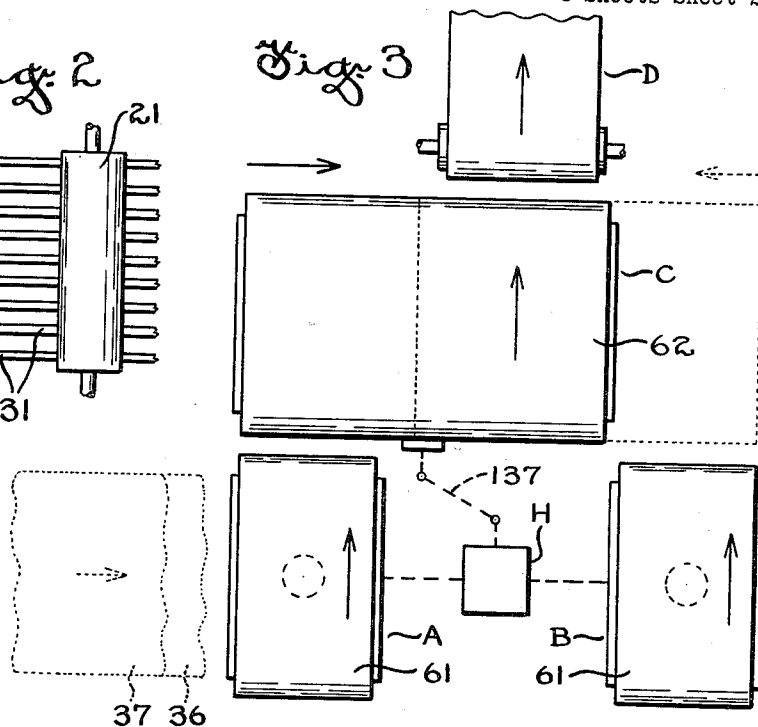


Fig. 3



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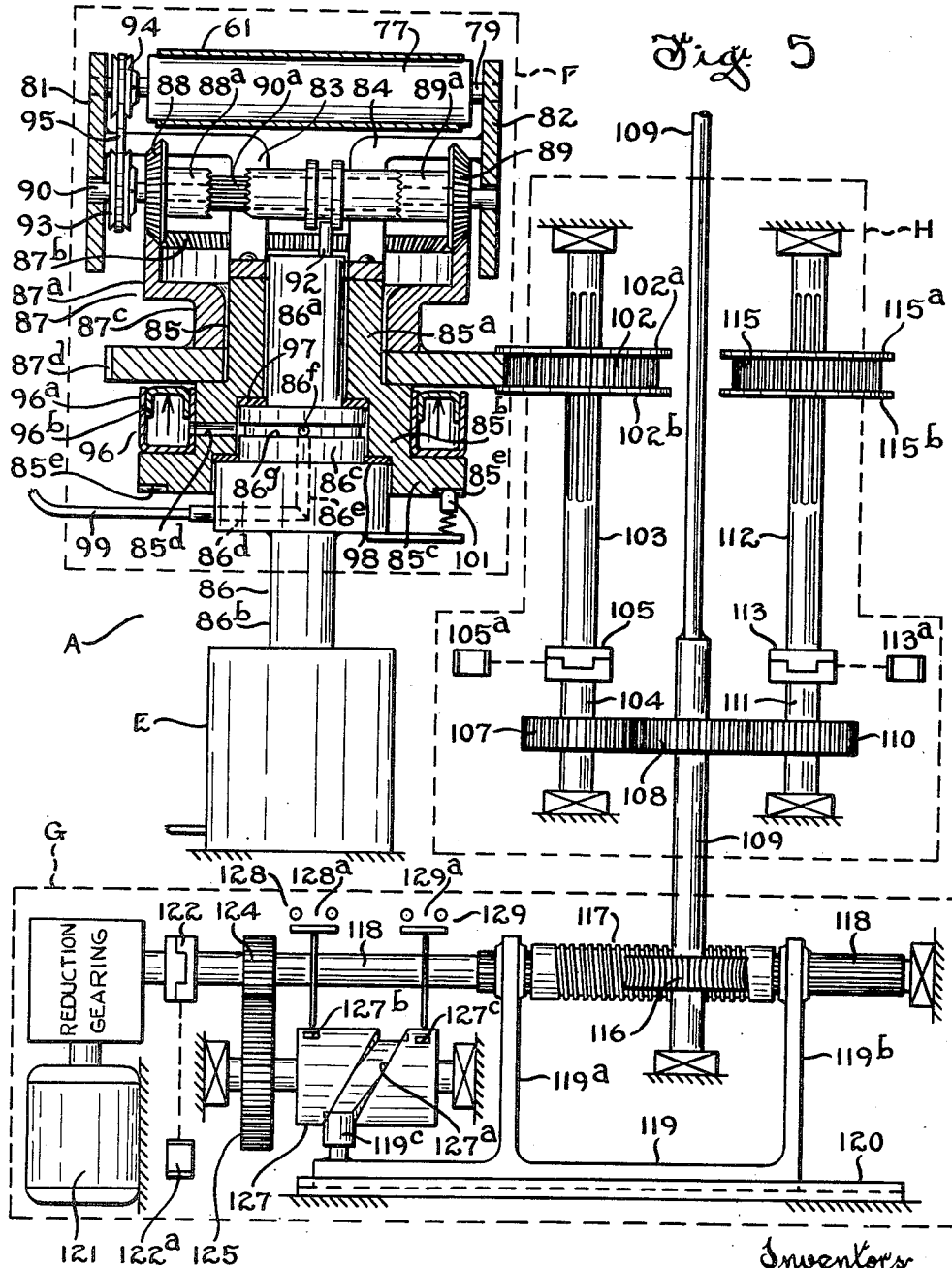
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2,697,388

SYSTEM FOR STACKING NEWSPAPERS AND THE LIKE

Filed May 21, 1951

6 Sheets-Sheet 3



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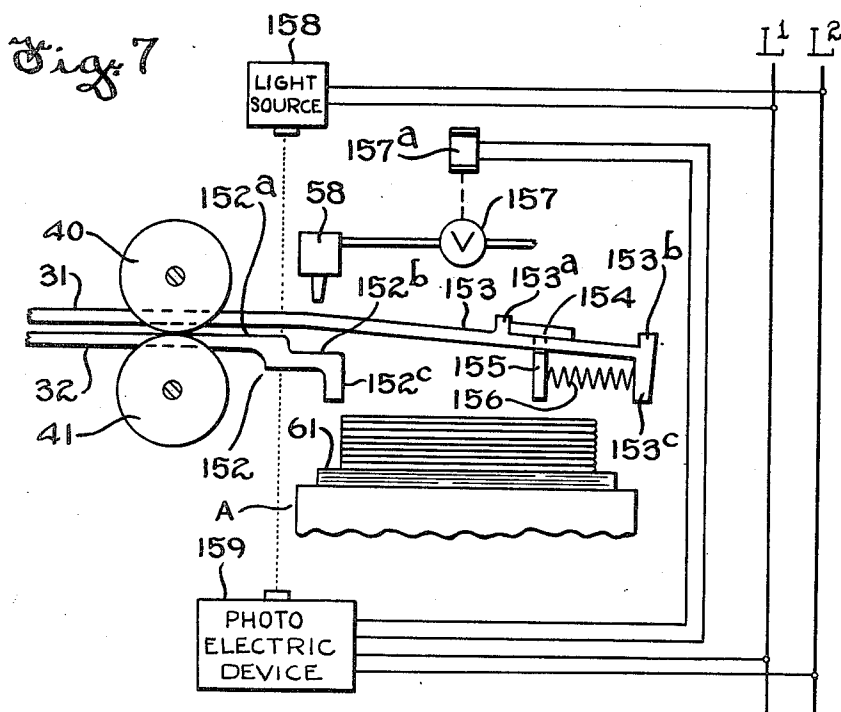
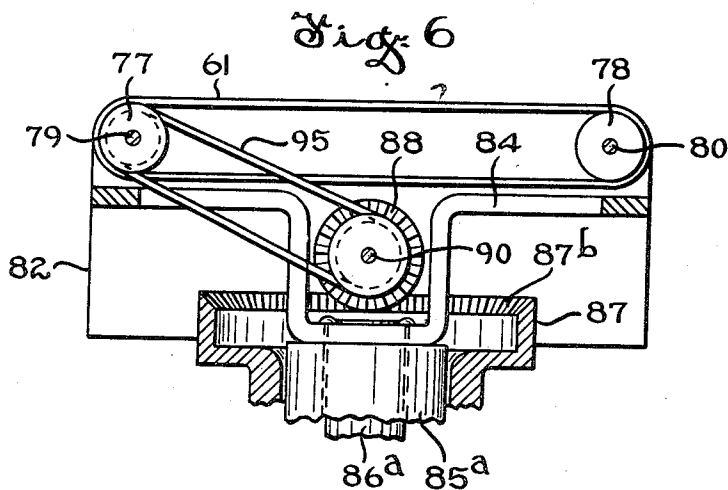
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2,697,388

SYSTEM FOR STACKING NEWSPAPERS AND THE LIKE

Filed May 21, 1951

6 Sheets-Sheet 4



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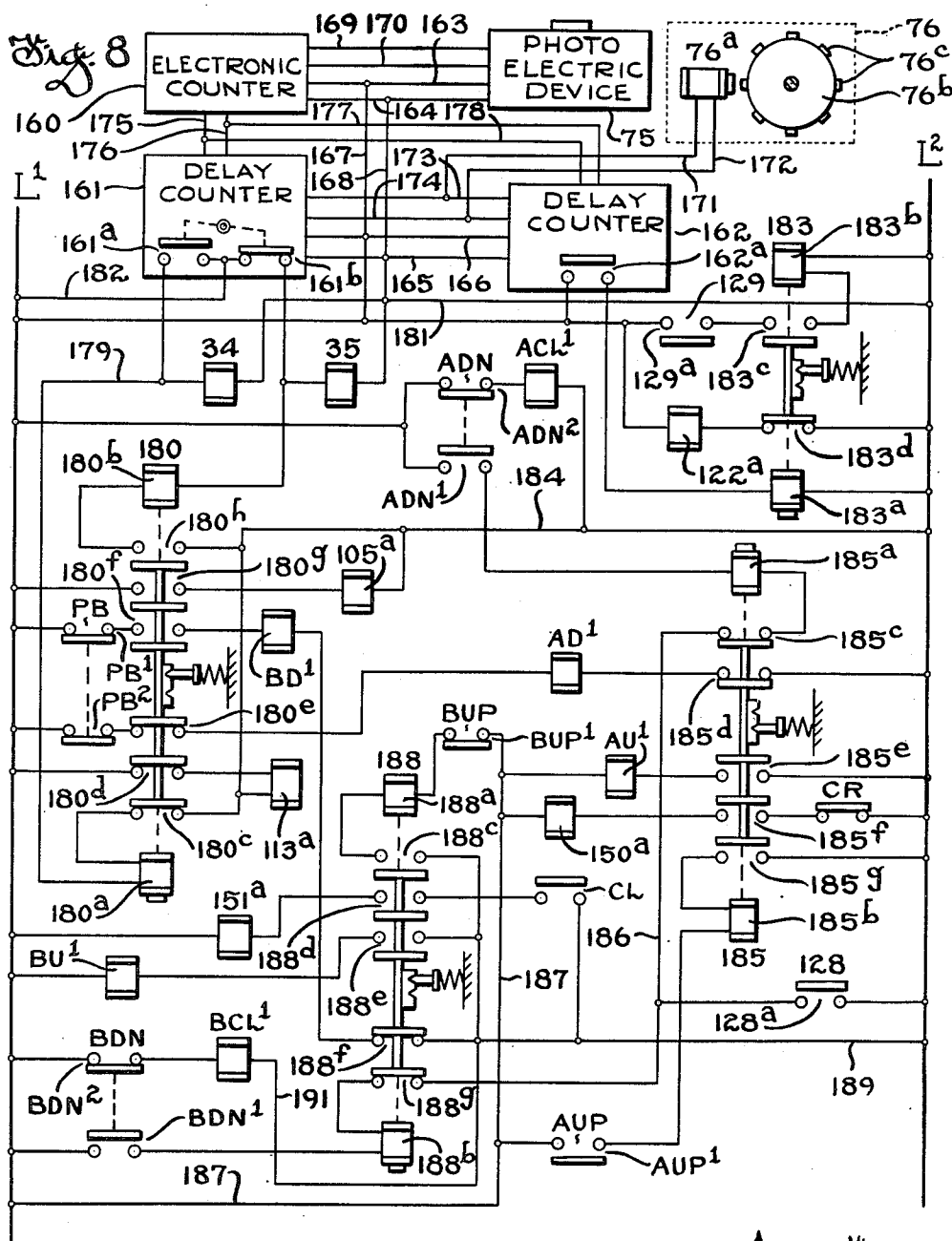
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2,697,388

SYSTEM FOR STACKING NEWSPAPERS AND THE LIKE

Filed May 21, 1951

6 Sheets-Sheet 5



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SYSTEM FOR STACKING NEWSPAPERS AND THE LIKE

Filed May 21, 1951

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Fig. 9

PAPER GROUP	TABLE A	TABLE B	TABLE C	CONVEYOR D
FIRST	DESCENDS FROM UPPER LIMIT AS PAPERS STACK THEREON	REMAINS AT UPPER LIMIT.	POSITIONED APPROPRIATE TO TABLE A	RUNNING
SECOND	DESCENT HALTED AND TABLE ROTATES 180°	DESCENDS FROM UPPER LIMIT AS PAPERS STACK THEREON	REMAINS APPROPRIATE TO TABLE A — BELT DRIVES	RUNNING
THIRD	DESCENDS TO LOWER LIMIT AS PAPERS STACK THEREON	DESCENT HALTED AND TABLE ROTATES 180°	REMAINS APPROPRIATE TO TABLE A — BELT DRIVES	RUNNING
FOURTH	BELT DRIVES — COMPLETED STACK UNLOADED TO TABLE C — RAISED TO UPPER LIMIT	DESCENDS TO LOWER LIMIT AS PAPERS STACK THEREON	BELT DRIVES — RECEIVES COMPLETED STACK FROM TABLE A — SHIFTS TO POSITION APPROPRIATE TO TABLE B	RUNNING
FIFTH	DESCENDS FROM UPPER LIMIT AS PAPERS STACK THEREON	BELT DRIVES — COMPLETED STACK UNLOADED TO TABLE C — RAISED TO UPPER LIMIT	BELT DRIVES — RECEIVES COMPLETED STACK FROM TABLE B — SHIFTS TO POSITION APPROPRIATE TO TABLE A	RUNNING — RECEIVES COMPLETED STACK FROM TABLE C
SIXTH	DESCENT HALTED AND TABLE ROTATES 180°	DESCENDS FROM UPPER LIMIT AS PAPERS STACK THEREON	REMAINS APPROPRIATE TO TABLE A — BELT DRIVES UNLOADING COMPLETED STACK TO CONVEYOR D	RUNNING — RECEIVES COMPLETED STACK FROM TABLE C

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SYSTEM FOR STACKING NEWSPAPERS AND THE LIKE

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Application May 21, 1951, Serial No. 227,472

6 Claims. (Cl. 93—93)

This invention relates to a method of and system for stacking newspapers and the like.

In the larger newspaper printing plants finished newspapers emanating from a press folder are usually conveyed in overlapped relation through the medium of double belt conveyors to a point remote from the folder where they are run out on delivery tables. At this point the papers are then manually removed from the delivery tables and stacked in vertical piles of suitable numbers on bundle conveyors which carry the completed piles to tying machines or mailing areas. At high rates of press operation considerable manual labor is required at the delivery tables to effect such stacking on the bundle conveyor. While automatic stacking systems have heretofore been devised for newspapers, none have been successful at the high rates of newspaper flow that often obtain in printing plants of many metropolitan newspapers.

A primary object of the present invention is to provide an improved method of and system for stacking finished newspapers and the like, flowing from a press in a continuous manner, in vertical piles of preselected numbers of papers, and effecting transfer of such vertical plies onto a bundle conveyor.

Another object is to provide a system of the aforementioned character which can be fitted to existing newspaper delivery apparatus with little or no change in such apparatus.

A further object is to provide a system of the aforementioned type which is adapted to handle with equal facility paper streams in which either the cut edge or the folded edges of the papers are leading.

Another further object is to provide a system of the aforementioned type which is adapted to handle with equal facility paper streams in which the papers are overlapped in either direct or indirect manner.

Another object is to provide a system of the aforementioned character which is adapted to high rates of newspaper flow.

A more specific object is to provide a system of the aforementioned type employing conveyor apparatus coordinated with two stacking tables to afford stacking of groups of papers alternately on the two stacking tables.

Another specific object is to coordinate the stacking tables so that one can function to unload a completed pile thereon while papers of another group are being stacked on the other stacking table and vice versa.

A further specific object is to provide a table intermediate the two stacking tables and a bundle conveyor which functions to transfer a completed pile of papers received from either of the stacking tables to the bundle conveyor, and

A still further specific object is to provide an automatic control system which is responsive to the rate of paper flow and the passage of each group of papers of a preselected number through a counting zone to coordinate the operation of the conveyor apparatus, the stacking tables and the transfer table so that stacking and transfer of completed piles of papers is carried on continuously and automatically so long as papers are fed into the conveyor apparatus.

Other objects and advantages of the invention will hereinafter appear.

The accompanying drawings illustrate a preferred embodiment of the invention which will now be described, it being understood that the embodiment illustrated is

susceptible of modification without departing from the scope of the appended claims.

In the drawings:

Figure 1 is a more or less schematic view in side elevation of a preferred stacking mechanism.

Fig. 2 is a fragmentary schematic view in top plan showing the arrangement of pinch rolls and guides therebetween.

Fig. 3 is a schematic view in top elevation showing the arrangement of stacking tables, a translating table and a dispatch conveyor.

Fig. 4 is a more or less schematic view in top plan which shows the translating table in greater detail.

Fig. 5 is a more or less schematic view in elevation, showing in some detail the mechanism of a stacking table, a drive mechanism and a drive transmission mechanism.

Fig. 6 is a fragmentary sectional view of the upper portion of the stacking table mechanism looking toward the right in Fig. 5.

Fig. 7 is an enlarged schematic view showing in some detail apparatus for forming vertical piles of papers on a stacking table.

Fig. 8 is a diagrammatic showing of the main control system for the stacking mechanism shown in Figs. 1, 4, and 5, and

Fig. 9 is a schedule indicating the operations of the stacking tables, translating table and dispatch conveyor during different intervals in a complete cycle of operation of the stacking mechanism.

Referring to Figs. 1, 2 and 3, they show the general arrangement of a preferred stacking system suitable for folded newspapers and the like. Papers are transported from a press folder (not shown) on a conveyor 15 of the double wire belt type in overlapped relation. Conveyor 15 merges with the entering end of a speed-up section 16 which functions to draw the papers out of overlapped relation and afford a predetermined minimum spacing therebetween.

Speed-up section 16 comprises a plurality of pairs of upper and lower pinch rolls, which pairs of rolls from left to right in Fig. 1 are designated 17—18, 19—20, 21—22, and 23—24. Each pair of associated pinch rolls are afforded common drive through the medium of sets of mating bevel gears 25, 26, 27 and 28, respectively. The driving gear of each set of bevel gears is mounted on a shaft 29 which is driven at a constant speed by an electric motor 30. The gear ratios of the sets of bevel gears are preferably selected so that the speed of each successive pair of rolls from the left end of the speed-up section is increased in a ratio which will result in a separation of approximately 3" between successive papers at the right end of the speed-up section. Each pair of rolls is spaced longitudinally from adjacent pairs of rolls in the speed-up section a distance slightly in excess of the width of the newspapers to be handled. A plurality of upper and lower guides 31—32 are disposed between the pinch rolls to insure smooth advance from one pair of rolls to the next. As best shown in Fig. 2, the pairs of guides 31—32 are spaced at intervals across the width of the pinch rolls.

At the right end of speed-up section 16 is located a movable guide vane 33 which is movable between two extreme positions by solenoid operating coils 34 and 35 to direct papers leaving the speed-up section into either a conveyor 36 or a conveyor 37. Conveyor 36 comprises two pairs of upper and lower pinch rolls 38—39 and 40—41, and has upper and lower guides 31—32 extending between its pinch rolls and the right-hand pair of pinch rolls 23—24 of speed-up section 16. Conveyor 37 comprises five pairs of upper and lower pinch rolls 42—43, 44—45, 46—47, 48—49 and 50—51, and has upper and lower guides 31—32 extending between its successive pairs of pinch rolls.

Pinch rolls 38—39 and 42—43 are afforded drive through a set of mating bevel gears 52 and pinch rolls 40—41 and 44—45 are driven through a set of mating bevel gears 53. The pairs of pinch rolls 46—47, 48—49 and 50—51 are driven through bevel gear sets 54, 55 and 56, respectively. The driving gear of each set of bevel gears 52 through 56 is fixed on shaft 29. The

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ratios of the gear sets are preferably the same and equal to the ratio of bevel gear set 28 so that all of the pinch rolls in conveyors 36 and 37 will be driven at the same speed as pinch rolls 21—22 in speed-up section 16.

A resilient guide device 57 and an air jet 58 are positioned adjacent the right end of conveyor 36, and as will be hereinafter described in detail in connection with Fig. 1 insure accurate alinement in stacking of papers on a stacking table, generally designated A. A similar guide device 59 and air jet 60 are positioned adjacent the right end of conveyor 37 to provide the same function in conjunction with stacking of papers on an associated stacking table, generally designated B.

Stacking table A is adapted to be raised and lowered through the medium of a piston (not shown) moving in a hydraulic cylinder E. Table A is also adapted to be rotated on a vertical axis through the medium of a mechanism generally designated F, which mechanism also affords drive of an endless belt 61 of table A on which papers emanating from conveyor 36 are stacked in vertical piles. Stacking table B is exactly like table A and the corresponding components thereof bear the same reference numerals.

A source of mechanical driving power for the mechanisms F of tables A and B is afforded by a drive mechanism generally designated G, and power is transferred from drive mechanism G to said mechanism F through a transmission mechanism, generally designated H.

When the belts 61 of tables A and B are respectively driven they afford unloading of a completed pile of stacked papers onto the moving endless belt 62 of a transfer table, generally designated C. As will be hereinafter more fully explained, transfer table C is movable longitudinally between two opposite extreme positions through the medium of pneumatic power means to thereby be appropriately positioned with respect to either table A or B to receive a completed stack of papers from either of the latter, and to transfer a stack of papers previously unloaded thereon to a single belt bundle conveyor D, which may be assumed to transfer the completed stacks of papers to a tying machine and/or to a loading dock or the like. Drive of the belt 62 of transfer table D is also derived from the drive mechanism G through transmission mechanism H. The aforementioned mechanism F of tables A and B, drive mechanism G and transmission mechanism H will be hereinafter more fully described in connection with Fig. 5, and transfer table C will be more fully described in connection with Fig. 4.

A source of hydraulic power for the cylinders E of tables A and B comprises a hydraulic pump 63, a motor 64 for driving pump 63 and a sump tank 65. Pump 63 is connected to cylinder E of table A by a pipe 66 which contains valve AU having a solenoid operating coil AU¹. Pipe 66, intermediate pump 63 and valve AU, is connected to a by-pass pipe 67 connecting with tank 65 and containing a relief valve RV. A pipe 68 connects cylinder E of table B to by-pass pipe 67, intermediate valve RV and connection of pipe 67 with pipe 66, and contains a valve BU having a solenoid operating coil BU¹.

Hydraulic fluid is adapted to be removed from cylinders E of tables A and B, for lowering thereof, through the medium of a hydraulic displacement motor 69 which derives its drive from a shaft of conveyor 15. Motor 69 is connected to pipe 66, intermediate valve AU and cylinder E of table A, by a pipe 70, which contains a valve AD having a solenoid operating coil AD¹, and motor 69 is also connected to pipe 68, intermediate valve BU and cylinder E of table B by a portion of pipe 70 and by a pipe 71, which contains a valve BD having a solenoid operating coil BD¹. A pipe 72 connects motor 69 to tank 65, and the pipes 70 and 72 are interconnected adjacent motor 69 by a pipe 73, which contains a check valve CKV.

When table A is at its upper extreme position and stacking of papers on its belt 61 commences, valve AU is closed and valve AD is open. Thus hydraulic fluid in cylinder E of table A below the piston is pumped out, through pipes 66 and 70, motor 69 and pipe 72, into tank 65 to effect lowering of table A at a rate corresponding to the rate of flow of papers in conveyor 15. After table A reaches its lower extreme position, and following unloading of a completed stack of papers therefrom onto transfer table C, valve AU is opened and valve AD is closed. Accordingly hydraulic fluid is then pumped

from tank 65, through pump 63 and pipe 66 into cylinder E below the piston to raise table A rapidly to its upper extreme position. It will be apparent that table B will be correspondingly lowered and raised through appropriate operations of the solenoid valves BU and BD. The particular operating sequence for valves AU, AD, BU and BD will be hereinafter explained in connection with Fig. 8.

Table A has associated therewith a limit switch AUP having normally open contacts AUP¹ which are adapted to be closed when the table reaches its upper limit position. Table A also has associated therewith a limit switch ADN having normally open contacts ADN¹ and normally closed contacts ADN². Contacts ADN¹ are adapted to be closed, and contacts ADN² are adapted to be open when table A moves into its lower limit position. Table B has associated therewith limit switches BUP and BDN, which correspond to switches AUP and BDN, respectively, and carry corresponding contact designations.

A switch PB, preferably of the "paper break" type and comprising normally open contacts PB¹ and PB², is adapted to be closed whenever a stream of papers is flowing in conveyor 15. As will be hereinafter disclosed in more detail in connection with Fig. 8 contacts PB² and PB¹ are respectively in circuit with the energizing windings AD¹ and BD¹. Thus if the stream of papers stops, or there is discontinuity in the stream, lowering of the then active table A or B will be stopped.

As shown in Fig. 1, light source 74 and an associated photoelectric device 75 are appropriately positioned across the path of travel of papers in speed up section 16. Passage of the then separated papers passing through speed-up section 16 effects interruption of the light source on photoelectric device 75 for the passage of each paper. As will be hereinafter more fully explained in connection with Fig. 8 this affords a counting of the papers which is used for control purposes.

An impulse device 76, schematically shown in Fig. 1, may be assumed to have a rotating element which is afforded drive from bevel gear set 52. The function and purpose of transformer 76 will be more fully described in connection with Fig. 8.

Referring to Figs. 5 and 6, they show in more detail table A, its mechanism F, main drive mechanism G, and transmission mechanism H. More particularly table A comprises the aforementioned endless belt 61 which runs on spaced apart rolls 77 and 78 which are non-rotatably supported on shafts 79 and 80, respectively. Shafts 79 and 80 are afforded end rotational bearing support in parallel side members 81 and 82 which are supported on brackets 83 and 84, respectively. Brackets 83 and 84 are rigidly secured to the upper end of cylindrical portion 85^a, on opposite sides thereof, of a stepped cylindrical member 85 which is concentrically rotatable about the upper cylindrical portion 86^a of a connecting rod 86. Connecting rod 86 has a lower cylindrical portion 86^b which is connected with a piston (not shown) movable in cylinder E.

A member 87 concentrically and rotatably disposed about the portion 85^a of member 85, which is provided with an upper cylindrical portion 87^a on which is formed an annular bevel gear 87^b, an intermediate cylindrical portion 87^c and a lower gear portion 87^d. Bevel gears 88 and 89, having hubs 88^a and 89^a, respectively, are rotatably mounted on reduced end portions of a shaft 90 which has a splined portion 90^a. A clutch member 91 is splined on portion 90^a and is movable longitudinally thereon to engage with either the hub 88^a of gear 88 or the hub 89^a of gear 89 to afford drive of shaft 90 under certain conditions. Clutch member 91 has formed thereon spaced annular shoulders and a pin 92 fixed on the upper end of portion 86^a extends into the recess formed between said annular shoulders. Pin 92 is eccentrically positioned with respect to the longitudinal axis of member 86, so that when member 87 rotates about member 86 clutch member 91 is caused to move out of driving engagement with one of the bevel gears 88 and 89 and into driving engagement with the other thereof in 180° of rotation of member 87. A pulley 93 fixed on a reduced end portion of shaft 90 and a pulley 94 fixed on shaft 79 have a friction belt 95 running thereon, to afford drive of shaft 79, and consequently belt 61, whenever shaft 90 is driven.

An air clutch 96 is interposed between the shoulder,

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joining cylindrical portions 85^b and 85^c, and the lower side of gear portion 87^d of member 87. Clutch 96 comprises an annular member 96^a disposed about portion 85^b in tightly engaging relation thereto, and a second annular member 96^b fitting within and movable inwardly and outwardly relative to member 96^a. Portion 86^c of member 86 has opening to the outer surface thereof of a passage 86^d which connects with an axially extending passage 86^e formed in portion 86^c. A passage 86^f connects with passage 86^e at the upper end of the latter, and opens into an annular recess 86^g formed in portion 86^c of rod 86. A passage 85^d connects recess 86^g with the interior of member 96^a. Graphite sealing rings 97 and 98 serve to provide an air-tight seal between members 85 and connecting rod 86 above and below recess 86^g. A pipe 99 which connects internally with passage 85^d is provided with a three-way air valve ACL having a solenoid operating coil ACL¹ (see Fig. 1). It may be assumed that when coil ACL¹ is energized air under pressure is adapted to be supplied to pipe 99, and hence clutch 96, to afford a driving connection between members 85 and 87. When coil ACL¹ is deenergized it may be assumed that air is exhausted from clutch 96 to interrupt the last mentioned driving connection.

The lower cylindrical portion 85^c of member 85 is provided with diametrically opposed, radially extending notches 85^e, which are in parallel alinement with shafts 79 and 90. A spring biased detent 101 is adapted to engage within either of the notches 85^e to insure that table A upon conclusion of rotation thereof about rod 86 is in proper alinement with transfer table C.

The aforementioned gear 87^d of member 87 meshes with a spur gear 102 which is splined on a shaft 103 for longitudinal movement on the latter. Upper and lower keeper plates 102^a and 102^b fixed to the upper and lower surfaces of gear 102 overlap gear 87^d and thus insure that gear 102 is kept in continuous mesh with gear 87^d during the raising and lowering of table A.

With air exhausted from clutch 96, whenever shaft 103 rotates, member 87 rotates therewith and member 85 remains stationary. Under such conditions rotation of member 87 causes the bevel gears 88 and 89 to rotate. The bevel gear which is then drivingly engaged with clutch member 91 thus causes shaft 90 to rotate and drive belt 61 and the other bevel gear idles on shaft 90.

When air under pressure is supplied to clutch 96, members 85 and 87 are thereby non-rotatably connected, and the aforementioned drive of member 87 from shaft 103 causes table A to be rotated as a unit about member 86. During rotation of table A as a unit, clutch member 91 slides out of driving engagement with one of the bevel gears 88 or 89, and upon rotation of the table through 180° is then in driving engagement with the other of said bevel gears. Thus it will be observed that when air clutch 96 is subsequently deenergized and member 87 is driven from shaft 103 as aforeindicated, that belts 61 of table A will travel in the same direction as before to unload a completed stack of papers onto transfer table C.

Table B may be assumed to have the same components as hereinbefore described in connection with table A, together with the three-way air valve BCL having a solenoid operating coil BCL¹ for controlling its air clutch.

Gear 102 and shaft 103 are components of transmission mechanism H. Shaft 103 is drivingly connectable to a stub shaft 104 through the medium of a clutch 105 having a solenoid operating coil 105^a. A gear 107 fixed on shaft 104 meshes with a gear 108 fixed on main transmission shaft 109. Gear 108 also meshes with another gear 110, like gear 107, which is carried on a stub shaft 111. Stub shaft 111 is drivingly connectable to a splined shaft 112, like shaft 103, through the medium of a clutch 113, like clutch 105, which has a solenoid operating coil 113^a. Shaft 112 has splined thereon a gear 115, like gear 102, which has upper and lower keeper plates 115^a and 115^b. Gear 115 is adapted to mesh with a gear (not shown), like gear 87^d of member 87 in table A, carried by table B.

Adjacent its lower end transmission shaft 109 has fixed thereon a worm wheel 116 meshing with an elongated worm 117 splined on shaft 118. Shaft 118 is afforded rotational bearing support in bearing brackets 119^a and 119^b of a carriage 119 mounted for sliding movement longitudinally in a guide table 120. An electric motor

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121 is adapted to rotate shaft 118 whenever a clutch 122, having a solenoid operating coil 122^a, is engaged. It may be assumed that clutch 122 is engaged whenever coil 122^a is deenergized. Shaft 118 has fixed thereon a gear 124 meshing with a gear 125, fixed on a stub shaft 126. A cylindrical cam 127 is fixed on shaft 126 and is provided with a cam groove 127^a and raised cam projections 127^b and 127^c. A cam follower 119^c, secured to carriage 119, rides in cam groove 127^a. Cam projection 127^b is associated with a limit switch 128 and when in alinement with its operator is adapted to close the contacts 128^a thereof. Cam projection 127^c is associated with a limit switch 129 and when in alinement with its operator is adapted to close the contacts 129^a thereof.

Whenever clutch 122 is engaged and motor 121 is running, shafts 118 and 126 are rotated. Rotation of shaft 126 through one revolution causes movement of carriage 119 from a left-hand extreme position to a right-hand extreme position and back again to its left-hand extreme position. Such movement of carriage 119 effects corresponding movement of worm 117 longitudinally on shaft 118 which is also then rotating. Cam groove 127^a is preferably designed so that at the start of rotation of shaft 126 carriage 119 is moved toward its right-hand extreme position at maximum speed, is uniformly decelerated to a minimum speed at the right-hand extreme position, and then uniformly accelerated back to its maximum speed when it again moves to its left-hand extreme position. As will be appreciated, worm 117 will thus be decelerated and accelerated in the same manner while it is rotating at a uniform speed. Worm wheel 116 and transmission shaft 109 are thus caused to rotate from rest at a uniformly accelerated rate to maximum speed through one-half revolution and then at a uniformly decelerated rate through the remaining one-half revolution. It will be appreciated that shafts 103 and 112 will be rotated in a corresponding manner to shaft 109 whenever their associated clutches 105 and 113, respectively, are engaged. It may be assumed that the various gear ratios are such that gear 87^d of table A and the corresponding gear of table B will be rotated through one-half revolution for each revolution of shaft 118.

As best shown in Fig. 4, transfer table C comprises the aforementioned belt 62 running on end rolls 130 and 131, fixed on shafts 132 and 133, respectively. Shafts 132 and 133 are afforded rotational bearing support in vertical side portions 134^a and 134^b of an upstanding U-shaped frame 134, which has a base 134^c interconnecting with the vertical side portions. Base 134^c may be assumed to be provided with guideways on its lower side adapting the table for movement longitudinally on spaced apart parallel rails 135 and 136.

Drive of the belt 62 of table C is derived from transmission shaft 109 through the medium of a double Universal joint device 137 which connects at one end with shaft 109 and at its other end with a shaft 138 rotatably supported in bearing brackets 139 and 140 mounted on base 134^c. Shaft 138 has fixed on its opposite end a bevel gear 141 meshing with a mating bevel gear 142 fixed on a shaft 143. Shaft 143 is afforded rotational bearing support in side portion 134^a and in a bearing bracket 144 fixed to base 135^c. A pulley 145 is fixed on shaft 143 and a friction belt 146 runs thereon and on a similar pulley 147 fixed on shaft 132. It will be apparent that belt 62 will run whenever shaft 109 turns, and that the belt speed is such to remove the bundle from tables A or B in one revolution of shaft 109.

Table C is longitudinally movable between opposite extreme positions, shown in full and broken lines in Fig. 4, on rails 135 and 136, through the medium of air cylinders 148 and 149. Air cylinder 148 is adapted when subjected to supply of air to move a shaft 148^a, connected to its movable piston (not shown), outwardly and thereby move table C from its left-hand extreme position to its right-hand extreme position. Air cylinder 149 has connected with its movable piston (not shown) a shaft 149^a and when subject to supply of air under pressure moves shaft 149^a outwardly to thereby move table C from its right-hand to its left-hand extreme position.

A three-way air valve 150 having a solenoid operating coil 150^a is associated with air cylinder 148 and may be assumed when its operating coil is energized to supply air under pressure to cylinder 148 and to exhaust air from the latter when its operating coil is deenergized.

Cylinder 149 has associated therewith a valve 151, like valve 150, and having a solenoid operating coil 151^a. Valve 151 functions in the manner aforescribed for valve 150. The control system to be hereinafter described in connection with Fig. 8 is such that when air under pressure is supplied to cylinder 148 air will be exhausted from cylinder 149 and vice versa.

When table C moves into its left-hand extreme position it is adapted to open a normally closed limit switch CL, and when it moves into its right-hand extreme position is adapted to open a normally closed limit switch CR. Limit switches CL and CR are electrically connected in the control system hereinafter to be described.

Fig. 7 shows in more detail the arrangement of guide device 57 and air jet 58 at the right-hand end of conveyor 36. More particularly, a plurality of stepped brackets 152 projecting to the right beyond pinch roll 41 are disposed in spaced relation across the conveyor 36. The brackets 152 are each provided with an upper surface 152^a, which are level with the lower stationary guides 32, a surface 152^b disposed slightly below surface 152^a, and a downwardly projecting end portion 152^c which is in perpendicular relation to surface 152^b. A plurality of like stationary members 153 spaced across the width of conveyor 36 lie above the members 152 in spaced relation and extend appreciably therebeyond. The lower surface of each of the members 152 is in alignment with the lower surfaces of the guides 32 in conveyor 36. Each of the members 153 is provided with spaced apart lugs 153^a and 153^b and a downwardly extending end abutment 153^c. Guide 57 comprises a member 154 extending across the upper surface of the member 153 and a member 155 having connection with the member 154 at spaced points between each of the members 153. A plurality of like springs 156 normally urge guide 57 to a normal extreme position toward the end of conveyor 36, defined by the engagement of member 154 with lug 153^a of member 153, and said guide is movable against the bias of the springs 156 to an opposite extreme position, defined by engagement of member 154 with lug 153^b of member 153.

Air jet 58 is preferably positioned as indicated in Fig. 7 and is provided with an air supply valve 157 having a solenoid operating coil 157^a. A light source 158 is adapted to project a light beam downward across the path of papers between members 152 and 153, just slightly to the left of the surfaces 152^b of members 153, and such light beam is adapted to impinge on a photoelectric device 159 positioned below member 52. Light source 158 and photoelectric device are supplied with electric power from lines L¹ and L² of an electron supply source. Photoelectric device 159 has connection with solenoid operating coil 157^a of valve 157 and may be assumed to energize the latter to supply air to jet 57 whenever the aforementioned light beam impinges thereon. Thus air under pressure will issue from jet 58 except when a paper moving between members 152 and 153 breaks the light beam.

Let it be assumed that a paper is emerging from the right side of pinch rolls 40 and 41. It will move to the right on surface 152^a of member 152 and in so doing will break the light beam, stopping the supply of air to jet 57. The trailing edge of the paper will pass out of the range of the light beam just before it passes over the step between surfaces 152^a and 152^b and air will again issue from jet 57 to force the trailing edge of the paper against the surface 152^b. The forward momentum of the paper will bring the leading edge of the paper into engagement with member 155 of guide 57 which is then moved by the paper against the bias exerted by the springs 156. Thus the forward momentum of the paper is diminished and finally brought to a stop, and by that time the trailing edge of the paper will be in alignment with the right side of end portion 152^c and will then fall initially onto the belt 61 of table A, or on top of papers previously stacked on belt 61. It will be appreciated that the aforescribed apparatus provides for stacking of papers on belt 61 of table A in vertical piles with the leading edges in even alignment. Guide 59 and air jet 60 associated with conveyor 37 and table B, will be of the same form as hereinbefore described in connection with table A.

Fig. 8 shows the preferred electrical control network incorporating the photoelectric device 75, impulse device 76, and the various solenoid operating coils and limit switches aforescribed in connection with Figs. 1, 4, and 5, together with other control apparatus. More particu-

larly, electrical power for the network is supplied from a source comprising supply lines L¹ and L². Photoelectric device 75, an electronic counter 160, and electronic delay counters 161 and 162 are connected for supply from lines L¹ and L² through the pairs of conductors 163—164, 165—166, and 167—168. A pair of conductors 169—170 interconnect photoelectric device 75 and counter 160, and a pair of conductors 171—172 connected to the ends of a coil 76^a in impulse device 76 are connected to a pair of conductors 173—174 interconnecting delay counters 161 and 162.

Electronic counter 160 is preferably of a type disclosed and described in an article entitled "A Four Tube Counter Decade," appearing in "Electronics" magazine, issue of June 1944. Photoelectric device 75 may be assumed to provide an impulse to counter 160 each time a paper passes through the zone of the light beam which normally impinges on device 75, and that each such impulse is suitably registered in counter 160. After counter 160 has registered a preselected number of such impulses, it then functions to send an impulse to each of the delay counters 161 and 162 through conductors 175—176 and 177—178. Each time an impulse from counter 160 is received by delay counters 161 and 162 they are then rendered responsive to register impulses received from impulse device 76.

Impulse device 76 as aforesaid comprises the coil 76^a and is provided with a wheel 76^b which is driven from a shaft of either conveyor 36 or 37. Consequently wheel 76^b rotates at a speed directly proportional to the linear speed of papers passing through either of the conveyors 36 and 37. Wheel 76^b is provided with a plurality of small pins 76^c formed of magnetic material and secured to the periphery of wheel 76^b at equally spaced rotary angles. With wheel 76^b rotating, the pins 76^c run successively past coil 76^a and voltage pulses are thereby induced in coil 76^a each time one of the pins 76^c passes thereby. It will be appreciated that the frequency of these voltage pulses will be directly proportional to the linear speed of the papers in conveyors 36 and 37.

Delay counter 161, having previously been rendered responsive by an impulse from counter 160, registers the voltage impulses supplied from coil 76^a of device 76, and after registering a preselected number of such voltage impulses functions as an electronic switch to open one circuit and close another circuit. In order to simplify the understanding of the functioning of delay counter 161, these circuits have been depicted as comprising the mechanically interlocked contacts 161^a and 161^b. Thus when delay counter 161 functions after registration of a preselected number of impulses from coil 76^a it may be considered to function to close contacts 161^a and open contacts 161^b and vice versa. Until delay counter 161 again registers the same preselected number of impulses from coil 76^a, following its being rendered again responsive by another impulse from counter 160, it may be considered as maintaining the operating positions of contacts 161^a and 161^b last effected, and after again registering such preselected number of such impulses it may be considered as functioning to reverse the operating positions of contacts 161^a and 161^b. It will thus be appreciated that contacts 161^a and 161^b will be caused to reverse their operating positions each time a preselected number of papers has passed through the counting zone in speed-up section 16 and following a period of delay which is a function of paper speed. The delay provided prevents repositioning of vane 33 until the last paper in a group has passed clear of the vane and into whichever of the conveyors 36 or 37 the vane is then set appropriate to.

Delay counter 162 is similar to delay counter 161, but may be considered as functioning after it has registered a greater preselected number of voltage impulses from coil 76^a of device 76 to momentarily close and then reopen a contact 162^a. The delay provided in the functioning of delay counter 162 insures that any papers of a group remaining in one of the conveyors 36 and 37 following shifting of vane 33 will be run out and stacked on the stacking table associated with the particular conveyor before such table can be rotated, or the belt 61 thereof driven to unload a stack of papers onto transfer table C.

The right-hand and left-hand contact of contacts 161^a and 161^b, respectively, are connected to line L¹. The left-hand contact of contacts 161^a is connected to a con-

ductor 179, which is connected at one end with an operating coil 180^a of a transfer relay 180, and which is connected at its other end to one end of operating coil 34 of vane 33. The right-hand contact of contacts 161^b is connected to one end of operating coil 35 of vane 33 and is also connected to one end of a second operating coil 180^b of relay 180. The other ends of operating coil 34 and 35 are connected to a conductor 181, which is connected to line L², and which has connection with conductor 168.

The left-hand contact of contacts 162^a of delay counter 162 is connected to a conductor 182, which has connection with line L¹, conductor 167, one end of operating coil 122^a of clutch 122 and the left-hand contact of contacts 129^a of limit switch 129. The right-hand contact of contacts 162^a is connected to one end of an operating coil 183^a of a transfer relay 183 which has its other end connected to L².

Relay 180 is provided with six sets of contacts 180^c through 180^h inclusive. These contacts are so arranged that in one operating position of the relay contacts 180^c, 180^d and 180^e are open while contacts 180^f, 180^g and 180^h are closed, and in the other operating position of the relay contacts 180^c, 180^d and 180^e are closed while contacts 180^f, 180^g and 180^h are open. When contacts 180^h are closed the other end of operating coil 180^b is connected through a conductor 184 to line L². Closure of contacts 180^e establishes an energizing circuit for operating coil 105^a of clutch 105 from line L¹ through coil 105^a, conductor 184 to line L². Closure of contacts 180^f connects one end of operating coil BD¹ of valve BD to line L¹ whenever contacts PB¹ of switch PB are closed. Closure of contacts 180^g connects one end of operating coil AD¹ of valve AD to line L¹ whenever contacts PB² are closed. Closure of contacts 180^d completes an energizing circuit for operating coil 113^a of clutch 113 from line L¹ through contacts 180^d, coil 113^a and conductor 184 to line L². Closure of contacts 180^c connects the other end of operating coil 180^a to conductor 184. The operating position of relay 180 depicted in Fig. 8 is that resulting from previous energization of operating coil 180^b following closure of contacts 161^b of delay counter 161.

Relay 183 as aforeindicated, comprises the operating winding 183^a and further comprises a second operating winding 183^b and the two sets of contacts 183^c and 183^d. Relay 183 is so arranged that in one operating position of the relay contacts 183^c are open while contacts 183^d are closed, and in the other operating position contacts 183^c are closed while contacts 183^d are open. Operating coil 183^b is connected at one end to line L² and its other end is connected to the right-hand contact of contacts 129^a of limit switch 129 when contacts 183^c are closed. The other end of operating coil 122^a of clutch 122 is connected to line L² to complete an energizing circuit for such coil when ever contacts 183^d are closed. The operating condition of relay 183 depicted in Fig. 8 is that resulting from previous energization of operating coil 183^b following momentary closure of limit switch 129 near the end of a revolution of cam 127 (see Fig. 5). Thus with operating coil 122^a energized clutch 122 will be disengaged.

Limit switch ADN has the left-hand contact of each of its pairs of contacts ADN¹ and ADN² connected to line L¹. The right-hand contact of contacts ADN² is connected to one end of operating coil ACL¹ of air valve ACL associated with the air clutch of table A. The other end of coil ACL¹ is connected to line L² through conductor 184. The right-hand contact of contacts ADN¹ is connected to one end of an operating coil 185^a of a transfer relay 185. The operating position of limit switch ADN depicted in Fig. 8 is that assumed at all times when table A is above its lower limit position. It will thus be observed that the air clutch of table A will thus be energized except when table A is in said lower limit position and that operating coil 185^a of relay 185 can only be energized in such position of table A.

Relay 185 additionally comprises a second operating coil 185^b and five sets of contacts 185^c through 185^g inclusive. The contacts are so arranged that in one operating position of the relay contacts 185^c and 185^d are closed while contacts 185^e, 185^f and 185^g are open, and in the other operating position of the relay contacts 185^c and 185^d are open while contacts 185^e, 185^f and 185^g are closed. Closure of contacts 185^c connects the other

end of operating coil 185^a to a conductor 186 which is connected to line L² whenever the contacts 128^a of limit switch 128 close. Closure of contacts 185^d connects the other end of operating coil AD¹ of valve AD to line L². Closure of contacts 185^e completes an energizing circuit for operating coil AU¹ of valve AU from line L¹ through a conductor 187, coil AU¹, contacts 185^e to line L². Closure of contacts 185^f completes an energizing circuit for operating coil 150^a of valve 150 (Fig. 4) from conductor 187 through coil 150^a, contacts 185^f and limit switch CR to line L². Closure of contacts 185^g connects one end of operating coil 185^g to line L². The other end of coil 185^g is connected to conductor 187 whenever limit switch AUP is closed, which occurs only when table A is at its upper limit position. The operating position depicted for relay 185 in Fig. 8 is that resulting from previous energization of operating coil 185^b following closure of limit switch AUP.

Limit switch BUP, associated with table B, is connected to one end of an operating coil 188^a of a transfer relay 188 and to conductor 187. Relay 188 is also provided with a second operating coil 188^b and five sets of contacts 188^c through 188^g inclusive. The contacts are so arranged that in one operating position of the relay contacts 188^c, 188^d and 188^e are open while contacts 188^f and 188^g are closed, and in the other operating position of the relay contacts 188^c, 188^d and 188^e are closed while contacts 188^f and 188^g are open. Closure of contacts 188^c connects the other end of operating coil 188^a to a conductor 189 which is connected to line L². Closure of contacts 188^d connects one end of operating coil 151^a of valve 151 to limit switch CL; the other end of coil 151^a being connected to line L¹. Closure of contacts 188^e completes an energizing circuit for operating coil BU¹ of valve BU from line L¹ through coil BU¹, contacts 188^e and conductor 189 to line L². Closure of contacts 188^f connects the other end of operating coil BD¹ of valve BD to conductor 189. Closure of contacts 188^g connects one end of operating coil 188^b to conductor 186. The other end of coil 188^b is connected to the right-hand contact of contacts BDN¹ of limit switch BDN. The operating position depicted for relay 188 in Fig. 8 is that resulting from energization of coil 188^a following closure of limit switch BUP when table B moves to its upper limit position.

The left-hand contact of each of the pairs of contacts BDN¹ and BDN² of limit switch BDN are connected to line L¹. Contacts BDN² when closed complete an energizing circuit for operating coil BCL¹ of air valve BCL associated with the air clutch of table B. When contacts BDN¹ are closed the other end of operating coil 188^b of relay 188 is connected to line L². The operating position depicted for limit switch BDN in Fig. 8 is that obtaining whenever table B is above its lower limit position. It will thus be apparent that the air clutch of table B, like the air clutch of table A, will always be energized except when table B moves into its lower limit position.

The operation of the stacking system will now be described in connection with Figs. 1, 3, 4, 5, 8 and 9. Fig. 9 is a condensed schedule indicating the various operating conditions of tables A, B and C and conveyor D at various stages in a complete cycle of the system.

Let it be assumed that counter 160 is set to supply an impulse to delay counters 161 and 162 each time it registers a count of twenty-five papers. Also let it be assumed as an initial starting condition of the system that tables A and B are at their respective upper limit positions and vane 33 is positioned appropriately to divert the flow of papers from speed-up section 16 into conveyor 36, as depicted in Fig. 1, and that transfer table C is positioned appropriately to receive a completed stack of papers from table A, as depicted in Figs. 3 and 4. Further let it be assumed that papers, previously separated in speed-up section 16, are flowing through conveyor 36 and are stacking up on belt 61 of table A. It will be observed that under such conditions that the contacts PB¹ and PB² of switch PB will be closed.

It will be apparent that as the first group of twenty-five papers are stacking on table A that the latter will be descending. Operating winding AU¹ of valve AU will be deenergized and consequently the latter will be closed. Operating winding AD¹ of valve AD will be energized and thus valve AD will be open. Consequently hydraulic displacement motor 69 will be effective to pump fluid out of cylinder E of table A, and thus the latter will descend

gradually as papers emanating from conveyor 36 stack on its belt 61. Due to the fact that operating coils BU¹ and BD¹ of valves BU and BD will be deenergized during the loading of the first group of papers on table A, table B will be maintained at its upper limit position during this interval. It will be observed that descent of table A from its upper limit position causes limit switch AUP to open.

After the twenty-fifth paper of the first group has passed through the zone of photoelectric device 75, counter 160 will provide an output impulse to delay counters 161 and 162. Thereafter delay counter 161 functions to reposition contacts 161^a and 161^b reversely from their respective position depicted in Fig. 8, and delay counter 162 functions shortly thereafter to momentarily close and reopen its contacts 162^a.

Closure of contacts 161^a results in energization of operating coil 34 of vane 33, and in energization of operating coil 180^a of relay 180, while opening of contacts 161^b effects deenergization of operating coil 35 of vane 33. As a result vane 33 is shifted to its other position whenever papers will be directed into conveyor 37, and relay 180 operates to its other operating position wherein operating coil 105^a of clutch 105 is energized to engage the latter and an energizing circuit is completed for operating coil BD¹ of valve BD to open the latter. Such operation of relay 180 also results in deenergization of operating coil AD¹ of valve AD to close that valve, and in deenergization of operating coil 113^a of clutch 113 to disengage that clutch. Consequently, following the operation of relay 180 fluid is pumped out of cylinder E of table B so that the latter gradually descends as the paper emanating from conveyor 37 stacks on its belt 61. Closure of valve AD results in stopping of pumping of fluid from cylinder E of table A, and consequently, descent of the latter is halted during the stacking of the second group of twenty-five papers on table B.

When contacts 162^a of delay counter 162 close momentarily, an energizing circuit is thus completed for operating coil 183^a of relay 183 and the latter then operates to its other operating position wherein contacts 183^c are closed and contacts 183^d are open. Opening of contacts 183^d results in deenergization of operating coil 122^a of clutch 122 and the latter is then engaged. Consequently, as clutch 105 is also then engaged, driving connections are then completed from motor 121 through to gear 87^d of table A. Accordingly, table A is thus rotated about connecting rod 86 at a uniformly accelerated and then decelerated rate for a total of 180° of rotation, so that the leading edges of the first group of twenty-five papers stacked thereon will then be disposed oppositely from the direction thereof during stacking.

As table A nears completion of 180° of rotation, cylindrical cam 127 nears completion of 360° of rotation and limit switches 128 and 129 are successively closed and then reopen as cam 127 completes a full 360° of rotation. Closure of limit switch 129 completes an energizing circuit for operating coil 183^b of relay 183 through the then closed contacts 183^c, and consequently relay 183 operates back to the operating position depicted in Fig. 8, wherein contacts 183^d are again closed to effect energization of coil 122^a. Clutch 122 is thereby disengaged, and consequently the drive connections to table A are interrupted as the latter completes the aforementioned 180° of rotation. Operation of limit switch 128 has no effect at this stage in the operating cycle.

When counter 160 registers the twenty-fifth of the second group of papers, delay counters 161 and 162 again ultimately function as hereinbefore described. The second operation of delay counter 161 causes contacts 161^a and 161^b to revert to the operating positions respectively depicted therefor in Fig. 8. Consequently vane 33 reverts to its initial position to then divert the third group of twenty-five papers into conveyor 36 and relay 180 reverts to the operating position depicted in Fig. 8. It will thus be apparent that table A will then again descend gradually as another group of twenty-five papers is stacked on top of the first group previously stacked thereon. It will also be apparent that descent of table B will be halted.

The second operation of delay counter 162 results in operation of relay 183 as before described. Re-engagement of clutch 122 following such operation of relay 183 effects completion of driving connections from motor 121 to the gear on table B, corresponding to gear 87^d of table A. Consequently table B is then caused to rotate

180° as before described in connection with table A. Table B is thus readied to receive another group of twenty-five papers on top of the twenty-five previously stacked thereon.

Table A, during the time table B is being rotated, has the third group of papers stacked thereon and descends to its lower limit position just following completion of rotation of table B. In moving into such lower limit position, limit switch ADN is operated to open its contacts ADN² and close its contacts ADN¹. Opening of contacts ADN² results in deenergization of coil ACL¹ of valve ACL and consequently the air clutch in table A is disengaged. Closure of contacts ADN¹ has no immediate effect.

After counter 160 has registered the twenty-fifth of the third group of papers, delay counters 161 and 162 thereafter function to initiate operation of vane 33 and relays 180 and 183 as aforedescribed following registration of the twenty-fifth of the first group of papers. Consequently table B again descends gradually as the fourth group of papers flows through conveyor 37 and is stacked on top of the group (the second group) previously stacked on table B. As the air clutch of table A is disengaged the driving connections established between motor 121 and gear 87^d of table A cause drive of belt 61 to transfer the completed stack of fifty papers onto the then running belt 62 of transfer table C.

Near the end of the period of drive of belt 61 of table A, cam 127 will near the end of its 360° of rotation and cause limit switches 128 and 129 to momentarily close in succession. Momentary closure of limit switch 128 thus completes an energizing circuit for operating coil 185^a of relay 185 from line L¹ through the then closed contacts ADN¹ of limit switch ADN, coil 185^a, the then closed contacts 185^c and the then closed contacts 128^a of limit switch 128 to line L². Consequently relay 185 operates to its other operating position to open contacts 185^c and 185^d and close contacts 185^e, 185^f and 185^g. Consequently operating coil AD¹ of valve AD is deenergized causing closure of valve AD, and operating coil AU¹ of valve AU is energized opening valve AU. As a result of closing of valve AD and opening of valve AU fluid is pumped into cylinder E of table A and the latter is thereby raised. The last mentioned operation of relay 185 also results in completion of an energizing circuit for operating coil 150^a of air valve 156, associated with transfer table C, from line L¹ through conductor 187, coil 150^a, the then closed contacts 185^f and the then closed limit switch CR to line L². Consequently valve 150 opens to admit air to cylinder 148 to drive transfer table C from its left-hand to its right-hand extreme position (see Fig. 4), so that table C will then be in a position appropriate to table B. When table C reaches such right-hand extreme position limit switch CR opens, thereby deenergizing coil 150^a of valve 150 and consequently air is exhausted from cylinder 148.

Raising of table A continues until it is moved into its upper limit position wherein the previously open limit switch AUP is operated to closed position. Closure of limit switch AUP completes an energizing circuit for operating coil 185^b of relay 185 from line L¹ through conductor 187, contacts AUP¹ of limit switch AUP, coil 185^b and contacts 185^g to line L². As a result relay 185 then reverts to its operating position depicted in Fig. 8; and operating coil AU¹ of valve AU is thus deenergized to close valve AU.

By the time table A has been raised to its upper limit position and table C has been shifted to its right-hand extreme position, the stacking of the fourth group of twenty-five papers on table B will be nearing completion and the latter table will be approaching its lower limit position. When table B moves into such lower limit position limit switch BDN is operated so that its contacts BDN² are opened and its contacts BDN¹ are closed. As will be appreciated, opening of contacts BDN² results in disengagement of the air clutch of table B. Closure of contacts BDN¹ has no effect until limit switch 128 is again closed following the next rotation of cam 127.

After counter 160 registers the twenty-fifth paper of the fourth group, delay counters 161 and 162 ultimately function. Delay counter 161 in functioning opens its contacts 161^a and closes its contacts 161^b, thereby effecting operation of vane 33 to the position wherein papers of the fifth group will be directed into conveyor 36 to afford stacking of the same on table A. Relay 180 oper-

ates to operating position depicted in Fig. 8, and consequently table A is caused to descend. When delay counter 162 functions to momentarily close its contacts 162^a, driving connections are thereby completed to belt 61 of table B and belt 62 of transfer table C. Thus the completed stack of fifty papers on belt 61 of table B is transferred to belt 62 of table C. Table C concurrently transfers the stack of fifty papers previously received from table A onto bundle conveyor D (see Fig. 3).

Near the end of the period of concurrent drive of belts 61 and 62 of tables B and C, cam 127 nears the end of its 360° of rotation and limit switches 128 and 129 are thereby caused to momentarily close. Momentary closure of limit switch 128 results in completion of an energizing circuit for operating coil 188^b of relay 188 from line L¹, through the then closed contacts BDN¹ of limit switch BDN, coil 188^b, contacts 188^e and contacts 128^a of limit switch 128 to line L². Consequently relay 188 operates to the operating position wherein contacts 188^c, 188^d and 188^f are closed, and contacts 188^e and 188^g are opened. Closure of contacts 188^d completes an energizing circuit for operating coil 151^a of valve 151, associated with air cylinder 149 of table C, from line L¹ through coil 151^a, contacts 188^d, the then closed limit switch CL and conductor 189 to line L².

Consequently valve 151 is operated to the position where air is admitted to cylinder 149 to drive table C to its left-hand extreme position (see Fig. 4) so that table C will then be in a position appropriate to table A. When table C reaches such left-hand extreme position limit switch CL opens, thereby deenergizing coil 151^a of valve 151, and consequently air is exhausted from cylinder 149.

The last mentioned operation of relay 188 also results in completion of an energizing circuit for operating coil BU¹ of valve BU from line L¹ through coil BU¹, contacts 188^e and conductor 189 to line L². Opening of contacts 188^f results in closure of valve BD. Consequently fluid is pumped into cylinder E of table B to raise the latter.

Raising of table B continues until it is moved into its upper limit position wherein the previously open limit switch BUP is operated to closed position. Closure of limit switch BUP completes an energizing circuit for operating coil 188^a of relay 188 from line L¹ through conductor 187, contacts BUP¹ of limit switch BUP, coil 188^a, the then closed contacts 188^c and conductor 189 to line L². As a result relay 188 then reverts to its operating position depicted in Fig. 8, and coil BU¹ of valve BU is thus deenergized and valve BU closes.

It will be apparent that stacking of the fifth group of twenty-five papers on table A will be nearing completion by the time table B is raised to its upper limit position and transfer table C is moved back to its left-hand extreme position.

The hereinbefore described cycle of operation will be repeated so long as papers continue to be fed into speed-up section 16.

It will be apparent that in accordance with the assumed grouping of papers that the stacks delivered to dispatch conveyor D will consist of fifty papers; such stacks of fifty papers being arranged so that the bottom twenty-five papers have their folded edges all pointing in one direction, and the top twenty-five papers have their folded edges all pointing in a direction diametrically opposed to that of the bottom twenty-five papers. This arrangement of completed stacks makes for better vertical alignment of folded and cut edges, thereby making a more stable stack.

While in describing the operation of the system the groups were assumed to consist of twenty-five papers, it will be apparent that the invention is not limited to any particular number of papers in a group. Moreover, the number of times the tables A and B rotate before they reach their lower limit positions can be more than once, or not at all, depending upon the setting of displacement motor 69, the number of papers to comprise a completed pile, etc. When paper articles are delivered in a separated relation speed-up section 16 may be dispensed with, as the purpose of the latter is to afford a separation of papers to facilitate a counting of the same.

We claim:

1. In combination, means for conveying newspapers and the like to a counting point, delivering the papers at such point in a spaced relation, stacking tables for the papers, means to direct the flow of papers from said

counting point to said stacking tables selectively, each of said tables having associated means to impart a given axial rotary motion thereto and also associated means for removing a stack therefrom and means coordinating such associated means of the tables for effecting in respect of each table such rotary motion thereof while stacking of another table is in progress and for effecting in respect of each table when further stacked following its rotary motion removal of its stack while stacking on another table is in progress.

2. In combination, means for conveying newspapers and the like to a counting point, delivering the papers at such point in a spaced relation, stacking tables for the papers, means to direct the flow of papers from said counting point to said stacking tables selectively, each of said tables having associated means to impart a given rotary motion thereto, associated means for removing a stack therefrom and associated means for effecting vertical lowering and raising thereof, and means coordinating such associated means of said tables for effecting in respect of each table lowering thereof while stacking is in progress thereon, rotary motion thereof while stacking on another table is in progress and for effecting in respect of each table when further stacked following its rotary motion removal of its stack and raising thereof to a given starting position while stacking on another table is in progress.

3. In combination, means for conveying newspapers and the like to a counting point, delivering the papers at such point in a spaced relation, stacking tables for the papers, means to direct the flow of papers from said counting point to said stacking tables selectively, a stack conveyor, a stack transfer table, said stacking tables and said transfer table having associated means for removing stacks from said stacking tables and for transferring the same to said conveyor, and means coordinating the associated means of said stacking tables and of said transfer table for effecting in respect of each stacking table removal of its stack while stacking is in progress on another stacking table, and for effecting in respect of said transfer table transfer of each stack received thereby from a stacking table to said conveyor while another stack from another stacking table is being transferred to said transfer table.

4. In combination, a counting device, means for conveying newspapers and the like past said counting device, delivering the papers at such point in spaced relation, stacking tables for the papers, means under the control of said counting device to change the direction of flow of papers from said point to a different stacking table each time a preselected number of papers pass said counting point, each of said stacking tables having associated means to impart a given rotary motion thereto, and associated means for effecting vertical lowering and raising thereof, a stack conveyor, a stack transfer table, said stacking tables and said transfer table having associated means for removing stacks from said stacking tables and for transferring the same to said conveyor, and means including control means under the direction of said counting device coordinating such associated means of stacking tables and of said transfer table for effecting in respect of each stacking table lowering thereof while stacking is in progress thereon, such rotary motion thereof while stacking is in progress on another stacking table and when further stacked following its rotary motion removal of its stack and raising thereof to a given starting position while stacking is in progress on another stacking table, and for effecting in respect of said transfer table transfer of each stack received thereby from a stacking table to said conveyor while another stack from another stacking table is being transferred to said transfer table.

5. In combination, means for conveying newspapers and the like to a counting point, delivering the papers at such point in spaced apart relation, a pair of stacking tables for the papers, means comprising a pair of conveyor sections for conveying papers for stacking on an associated stacking table and means for directing the papers into one or the other of said sections from said point selectively, a stack conveyor, a stack transfer table intermediate said stacking tables and said stack conveyor, said transfer table having associated means for positioning it in alignment with one or the other of stacking tables selectively, said stacking tables and said transfer table having associated means for removing stacks from said transfer table and transferring the same to said stack

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conveyor, and means coordinating such associated means of said stacking tables and said transfer table for effecting in respect of each stacking table removal of a stack while stacking is in progress at the other table, and for effecting in respect of said transfer table positioning of the same in alignment with one table following transfer thereto of a stack from the other table and transfer of the latter stack to said stack conveyor while a stack from said one stacking table is being transferred to said transfer table.

6. In combination, means for feeding newspapers or the like in a continuous stream in overlapped relation, means for receiving the paper stream and feeding the papers further past a counting point while concurrently effecting separation of successive papers into spaced relation by the time they pass said counting point, a counting device responsive to passage of each paper at said counting point, stacking tables for the papers, means under the control of said counting device for causing the same to change the flow of the stream of separated papers from one stacking table to another each time a preselected number of papers pass said counting point, means associated with each table for imparting a given rotary motion thereto, means associated with each table

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for removing a completed stack of papers therefrom, and means including control means under the direction of said counting device coordinating such associated means of said stacking tables for effecting in respect of each stacking table rotary motion thereof while stacking is in progress on another stacking table and when further stacked following its rotary motion removal of its stack while stacking is in progress on another table.

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