

March 3, 1942.

L. M. POTTS

2,274,738

SHEET HANDLING MECHANISM

Original Filed Dec. 20, 1937

2 Sheets-Sheet 1

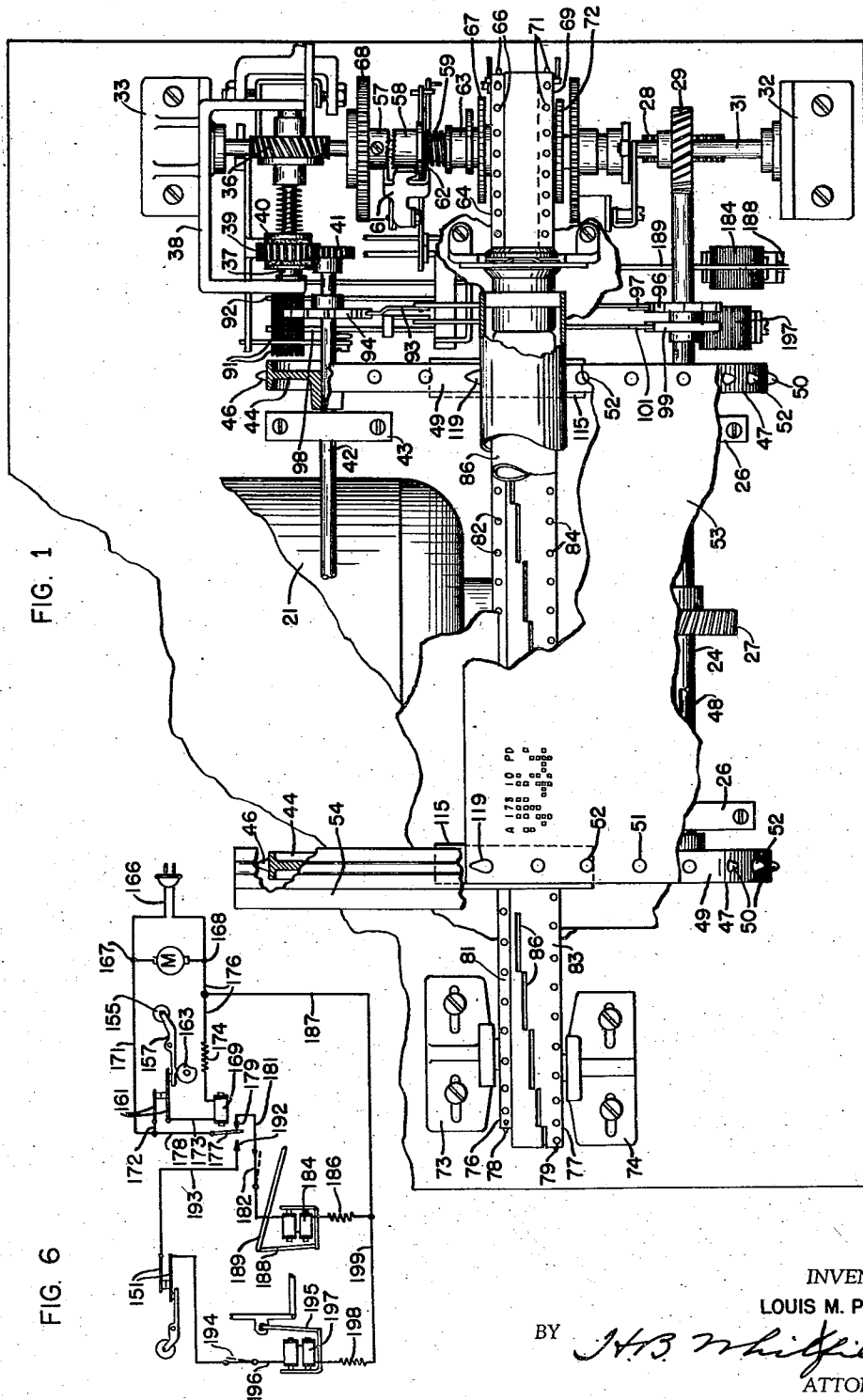


FIG. 1

FIG. 6

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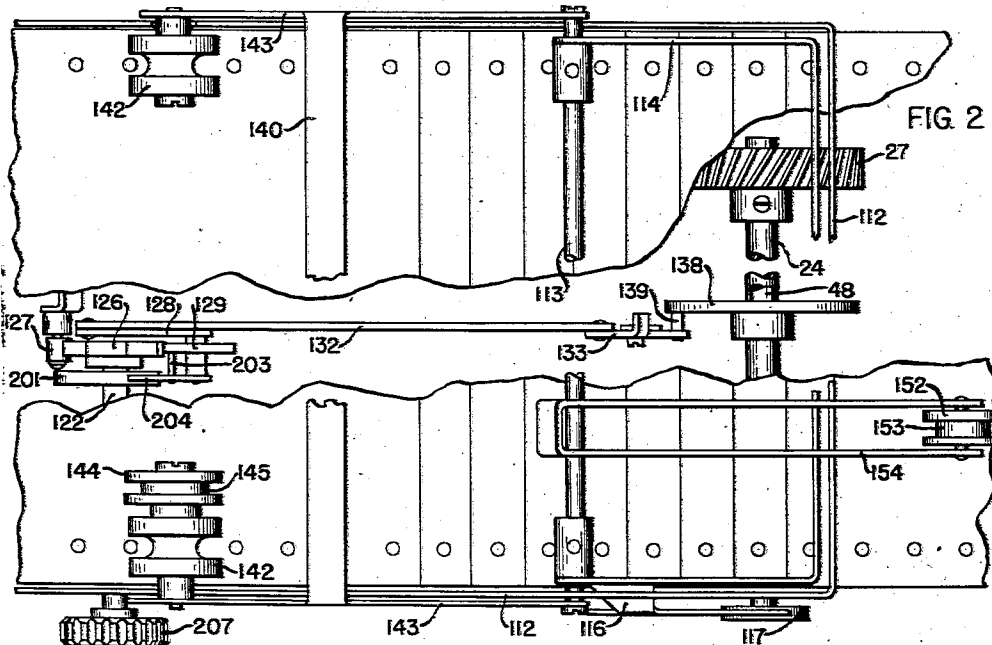
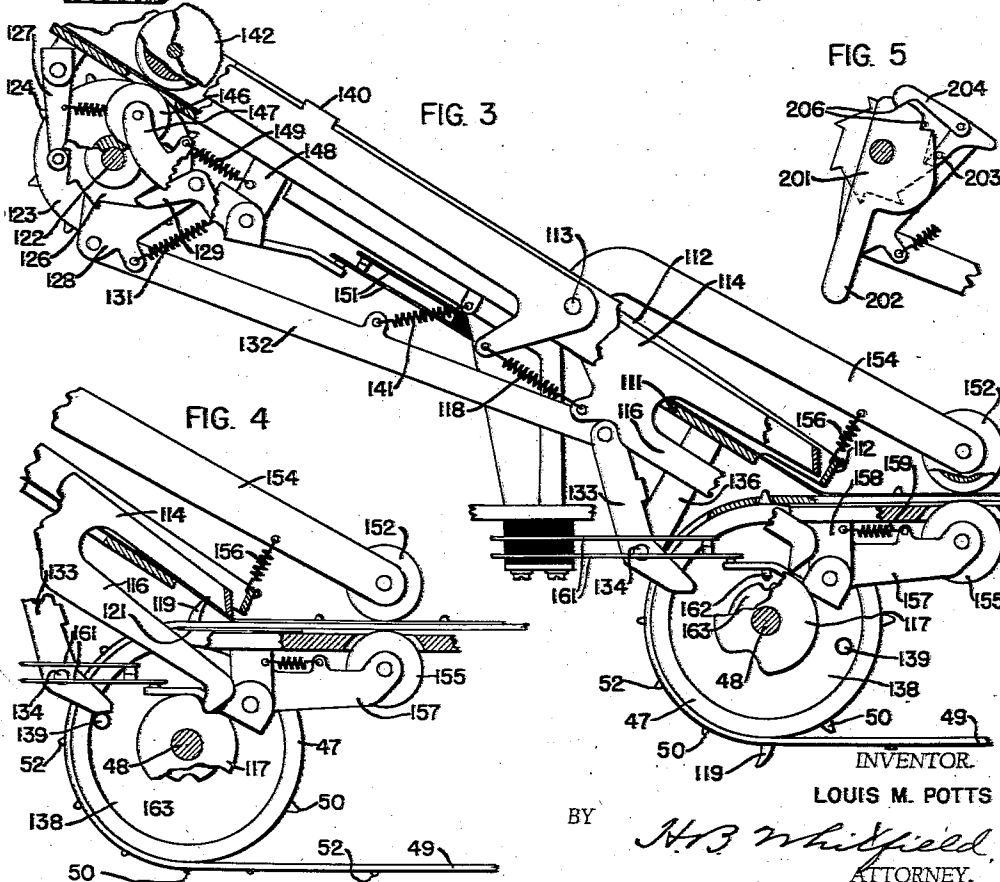
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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SHEET HANDLING MECHANISM

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Original application December 20, 1937, Serial No. 180,716. Divided and this application December 30, 1939, Serial No. 311,737

21 Claims. (Cl. 271—8)

This invention relates to sheet handling mechanism and particularly to apparatus for storing and delivering control forms for telegraph transmitters.

This application is a division of copending application, Serial No. 180,716, filed December 20, 1937, by Louis M. Potts.

An object of the invention is to receive and store a plurality of sheets or pages for delivery successively to a page receiving device and to deliver the pages or sheets thereto in succession automatically.

The invention is particularly adapted to the storing and delivering, to a telegraph transmitter, of message pages having indicia for controlling the transmission of telegraph signals corresponding to the message indicia.

The telegraph transmitter, with which the page handling mechanism according to the present invention is adapted to cooperate, is provided with a pair of endless bands spaced apart a distance depending upon the width of a page upon which signals to be transmitted have been impressed, and supported for movement in parallel paths by two pairs of sprockets or pulleys carried by two shafts. The belts or bands are provided with feed pins for receiving and holding in proper alignment a message page. A pair of endless scanning belts extends transversely of the page supporting belts and these scanning belts are operated to effect the scanning, by a photoelectric system, of the telegraph code signal combinations in a line.

The code signal combinations generated, in addition to being impressed upon a communication channel, control the operation of a selector mechanism local to the transmitter. The selector mechanism controls the performance of functions in the transmitter, such as the advancement of the page step by step to bring successive lines of message indicia into registry with the scanning belts and the photoelectric system, and the feeding out of the page from the transmitter after the complete message has been transmitted.

The sheet handling mechanism, according to the present invention, is mounted adjacent to the telegraph transmitter, and is provided with sprocket feed mechanism for engaging a plurality of message pages arranged overlapping for advancement simultaneously and delivery successively to the page handling bands of the transmitter. The feed mechanism of the page storage mechanism is actuated by the page handling band mechanism of the transmitter. The message storage and the message transmitting mechanism

is automatically arrested when the last page of message material has been transmitted and is automatically restarted by the placing of a page in the storage mechanism.

For a full and complete understanding of the invention, reference may be had to the following detailed description to be considered in conjunction with the accompanying drawings wherein,

Fig. 1 is a plan view of the telegraph transmitter having various portions broken away to reveal structural details;

Fig. 2 is a plan view of the page handling mechanism having portions broken away to reveal structural details;

Fig. 3 is an elevational view of the sheet handling mechanism shown in Fig. 2 with certain parts broken away or in section to show structural details;

Fig. 4 is a detail view of the operating mechanism appearing at the right of Fig. 3, showing the mechanism at a different time in a cycle of operation;

Fig. 5 is a detail view of a pawl and ratchet feed mechanism for the page handling mechanism shown in Figs. 2 and 3; and

Fig. 6 is a schematic wiring diagram of the electrical control system.

Referring now to Fig. 1 which shows particularly the message page handling and scanning mechanism of the telegraph transmitter, the reference numeral 21 designates an electric motor; the rotor shaft 22 of which carries a pinion which meshes with a gear 27 secured to shaft 24 journaled in brackets 26. Shaft 24 carries a gear 28 which is engaged by a gear 29 secured to a shaft 31 journaled in brackets 32 and 33. Adjacent to the end journaled in bracket 33, shaft 31 has secured thereto a pinion (not shown) which is engaged by a gear 36 secured to a short shaft 37 that is journaled in bracket 38 carried by bracket 33. Shaft 37 supports and drives, through a spring loaded friction clutch 40, a gear 39 with which is meshed a gear 41 secured to shaft 42 which is rotatably supported by bracket 43. Shaft 42 is normally restrained from rotating in response to the torque continuously applied through the spring loaded friction clutch 40 of shaft 37 by an escapement mechanism which will be described later.

Shaft 42 has fixed thereto in spaced relation a pair of sprockets 44, each of which has the periphery thereof provided with feed pins 46. In alignment with the two sprockets 44 are sprockets 47 secured to shaft 48 which is rotationally supported by brackets 26 above shaft 24. Sprockets

47 are likewise provided with feed pins 50. Endless bands 49 extend from each of the sprockets 44 to the corresponding sprockets 47. Bands 49 may be fabricated from any durable thin sheet material, such as sheet steel, and each is provided with feed perforations 51 spaced in accordance with the spacing of feed pins 46 and 50 of sprockets 44 and 47, so that when shaft 42 is permitted to rotate, bands 49 travel in endless paths. Bands 49 are provided with feed pins 52 similar to sprocket feed pins 46, and these pins are disposed intermediate each two feed perforations 51. Endless bands 49 serve to support and feed through the transmitting mechanism a page width paper which carries the code signal combinations to be transmitted. One such page is indicated by the reference numeral 53 and it will be observed that this page is provided with perforations arranged along the margins thereof to be fitted over and engaged by pins 46, 50 and 52. Retaining strips 54, having tunnels through which feed pins 46 and 52 may pass, are mounted above bands 49 in close proximity thereto to prevent page 53 from shifting out of position on bands 49.

Shaft 31 supports and imparts continuous rotation to the driving element 57 of a jaw clutch. Driven element 58 of the jaw clutch is slidable axially of shaft 31 and is urged toward driving element 57 by compression spring 59. The jaw clutch, consisting of elements 57 and 58, is of the single revolution type and the disengagement is effected by clutch throwout lever 61 cooperating with flange 62 carried by driven element 58. Driven element 58 of the clutch mechanism is splined to sleeve 63, which is mounted on shaft 31 and is free of the shaft so as to be capable of remaining stationary while the shaft rotates, and which constitutes the element that is driven intermittently by the clutch mechanism.

Sleeve 63 supports for rotation independently thereof a drum 64 having sprocket pins 66 uniformly spaced around the periphery thereof. A ratchet 67 is secured to drum 64 and step-by-step rotational movement is imparted to ratchet 67 and thus to drum 64 by means driven by gear 68 secured to shaft 31, as is fully disclosed in the copending application. Sleeve 63 also supports for free rotation with respect thereto a drum 69 having sprocket pins 71 arranged around the periphery thereof. A ratchet 72 is secured to drum 69 and continuous unidirectional rotational motion is imparted to ratchet 72 by means and under circumstances fully disclosed in the copending application.

At a point remote from drums 64 and 69, opposed brackets 73 and 74 are adjustably mounted by screws extending through slots in the bases of the bracket and clamping the brackets to the base of the transmitter. Brackets 73 and 74 rotatably support drums 76 and 77, respectively, which are aligned with drums 64 and 69, respectively. Drum 76 has sprocket pins 78 around the periphery thereof and drum 77 has similar sprocket pins 79. And endless flexible band 81 of any opaque material, such as thin metal, extends around and between drums 64 and 76, and is provided in one margin thereof with feed perforations 82 spaced to be entered by the sprocket feed pins 66 and 78. The upper tangent run of endless band 81 extends across the transmitter just below the upper tangent run of message page feed bands 49 and is moved unidirectionally in step-by-step movement when drum 64 is rotated step-by-step. Band 81 is

provided in the body thereof with transversely extending slots (not shown) of sufficient width and length to register with all of the signal impulse elements of a single code signal combination carried by the message page 53. It will be apparent that as band 81 is moved in the direction of its length, a slot will register successively with the several code signal combinations representing a line of the message. The spacing of its transverse slots is preferably equal to the length of the longest line of signal combinations which the message page 53 is expected to accommodate plus the width of one code signal combination. Thus, only one of its transverse slots may be in registry with any portion of a line of signal combinations on the page at a time.

Drums 69 and 77 are preferably just enough larger in diameter than drums 64 and 76 to enable an endless flexible band 83 of opaque material to overlie and overlap band 81. Band 83 is provided adjacent one edge with spaced feed perforations 84 that are entered by sprocket pins 71 and 79. Band 83 is provided with a plurality of sets of longitudinally extending slots, each set consisting of a number of slots 86 equal in number to the signal elements of a signal combination and preferably disposed in obliquely offset arrangement, so that as band 83 is moved, due to continuous rotation of sprocket 72, the slots 86 of a set register successively with the transversely extending slot of band 81. The distance from the beginning of one set of slots 86 to the beginning of the next set is equal to the circumference of drums 69 and 77 so that as the drums make one complete revolution any one of the sets of slots will be brought exactly into the position occupied by the preceding set at the beginning of the revolution. As is disclosed in the copending application, for each stepping movement of drum 64 to advance a slot in band 81 from one to another of the code combinations on page 53, drum 69 rotates through one revolution plus the distance from one to another of two code combinations, thereby causing the sets of slots 86 to keep in step with the advancement of band 81 so that for each advancement of band 81 one of the sets of slot 86 is brought into position to traverse immediately the transverse slot in band 81 which is in registry with a code combination on message page 53.

A lamp 86 is positioned above the bands 81 and 83 and extends transversely of message page 53 to illuminate an entire line of signal combinations. A photosensitive cell (not shown) extends transversely of message page 53, as disclosed in the copending application, below the bands 81 and 83 for generating signal impulses when activated by light from lamp 86. The slots 86 in band 83 represent the elements of permutation code signal combinations, and the impulses initiated due to the traversal by a set of slots 86, of the code signal elements below which a transverse slot in band 81 is positioned, may be of marking or spacing nature, depending upon the nature of the code impressions on the message page scanned by the slots.

In order to control the advancement of message page 53 through the transmitter, whether for line feeding to bring a new line of signal combinations into registry with the scanning bands 31 and 83, or for feeding a message page out of the transmitter at the completion of transmission of the message, a set of permutation code selector bars 91 is provided. The bars 91 may

be controlled by a permutation code receiving selector mechanism responding to the signal combinations generated as a result of the scanning of code signal combinations in message page 53.

For advancing the message page 53 to bring a new line of signal combinations into registry with the scanning bands, which may be described as a line feed operation, a selectable bar 92 co-operates with the selector bars 91 and enters an alignment of notches in the bars 91 when they have been set according to the line feed signal combination. The selectable bar 92 upon being selected, is moved forwardly (toward the bottom of Fig. 1) to actuate an escapement pawl 93 which co-operates with an escapement wheel 94 secured to shaft 42 to which the message supporting band sprockets 44 are secured. When escapement pawl 93 is operated escapement wheel 94 is free to rotate, and as a torque is continuously applied to shaft 42 from shaft 37 through friction clutch 40 and gears 39 and 41 ratchet 94 is rotated and with it sprockets 44 to move message page supporting band 49 toward the rear of the transmitter mechanism (upwardly, as viewed in Fig. 1) to advance message page 53. Shaft 48 which has secured thereto the front message feed band supporting sprockets 47 also has secured thereto a cam 96 which has cam projections corresponding to the number of teeth on escapement wheel 94, and which is also rotated when ratchet 94 is rotated, the motion being imparted through bands 49, sprockets 47, and shaft 48. A lever 97 engages the periphery of cam 96 and is associated with the foremost end of selectable bar 92. As cam 96 is rotated the first cam projection which encounters lever 97 rocks it and thereby imparts such movement to selectable bar 92 at its forward end as to cause escapement pawl 93 to be restored to normal relation to escapement wheel 94. Cam 96 and lever 97 serve as a trip-off device to permit escapement wheel 94 to be rotated through only one escapement step so that each line of signal combinations on message page 53 shall be arrested in succession at the scanning position.

For advancing a message page 53 out of the transmitter entirely at the conclusion of transmission of a message there is provided a selectable bar 98 which also co-operates with notched permutation code bars 91. When selectable bar 98 is selected and operated, it disengages both ends of the escapement pawl mechanism 93 from escapement wheel 94 so that wheel 94 and shaft 42 are released for rotation without interference by successive teeth of wheel 94. Shaft 48 also has secured thereto adjacent to cam 96 a cam 99 which has only one cam projection. A lever 101 co-operates with the periphery of cam 99 and engages the foremost end of selectable bar 98. When the single tooth of cam 99 encounters and operates lever 101 selectable bar 98 is restored to normal position as a result of which escapement pawl 93 is also restored to normal position and arrests shaft 42.

In order that the transmitter may be operated continuously without requiring the manual insertion of page after page of messages as the transmission of signals from each page is completed and the message page is ejected from the transmitter as a result of the selection and operation of selectable bar 98, a message storage magazine is provided. The construction of the message storage magazine is shown in Figs. 2 to 5 inclusive.

Referring to Fig. 3, the reference numeral 111 designates a platform which is mounted to slope downwardly towards message feed bands 49 and which terminates just above the message feed idler sprockets 47. Platform 111 is provided with an integral frame edge 112 which serves to maintain the message pages in proper alignment upon platform 111 and the right-hand end of which, as viewed in Fig. 3, is separated and spaced rightwardly from the lowermost end of platform 111, producing a message exit slot.

A pivot rod 113 is supported by the side of frame 112 and this rod extends across the platform 111 in parallel relation thereto. A bail 114 is pivotally supported by rod 113 just inside the frame 112 and the transverse portion of the bail is disposed in the space between the right-hand end of platform 111 and the right-hand end of frame edge 112. Just below one of the side arms of bail 114 platform 111 is provided with a slot through which extends a cam follower arm 116 integral with one side arm of the bail. A cam 117 is secured to the message feed idler shaft 48 and the periphery of the cam is engaged by cam follower arm 116. Cam 117 is provided with a single indentation so that once in each cycle of rotation of shaft 48 bail 114 is permitted to rock clockwise in response to biasing tension spring 118 and is thereafter restored to its counterclockwise position. The purpose of bail 114 is to depress into engagement with the message feed bands 49 the foremost end of a message page supported by platform 111.

At equally spaced points throughout their lengths the message feed bands 49 are provided with feed pins 119 which differ from pins 52 in that they are claw-shaped. A similar construction is disclosed in Patent No. 1,060,939. Pins 119 are carried by leaf springs 121 secured to the inner side of bands 49 and are projected through apertures in the bands. Leaf springs 121 are so tensioned that their free ends tend to draw away from bands 49 whereby pins 119 are normally retracted from the outer surface of bands 49. When that portion of a band 49 which carries a spring 121 passes over one of the sprockets 47, spring 121 is flexed into engagement with the underside of the band and the pin 119 carried by it is projected through the aperture in the band. The arrangement of pins 119 along band 49 is such that when the indentation in cam 117 is presented to the cam follower 116 so that bail 114 is permitted to rock clockwise, a claw-shaped pin 119 of each band 49 is presented directly beneath the first of the marginal perforations in a message page which has its foremost end presented adjacent to the right-hand end (Fig. 9) of frame 112, so that the foremost perforations are fitted over claw-shaped pins 119 by bail 114 as it rocks clockwise. From this it will be apparent that preferably the spacing between any two claw-shaped pins 119 is equal to the circumference of sprockets 47 and further that the length of a band 49 is equal to an integral multiple of that circumference, so that pins 119 are uniformly spaced upon band 49.

The timing of the mechanism is such that bail 114 is restored to its normal position before claw 119 has been carried forward to a point at which it would strike the transverse portion of the bail, and the right-hand end of frame 112 may be provided with clearances in alignment with the pins carried by band 49 through which claw-shaped pins 119 may pass. Claw-shaped pins 119 carry the message forward and as soon as they move

free of any supporting surfaces such as sprockets 47 they are retracted by their springs 121. By the time they are permitted to be retracted other feed pins carried by bands 49 have entered the marginal perforation in the message page so that engagement of the page by the claw-shaped pin is no longer required. In order that pins 119 shall not be projected through their apertures in bands 49 by message feed sprockets 44, each of the latter may have a recess in the periphery thereof which will accommodate springs 121 and pins 119 so that the claw-shaped pins shall not interfere with the ejection of a message page from the transmitter. Also since the upper run of bands 49 is very close to the scanning bands 81 and 83 it is desirable to maintain pins 119 projected through their apertures in bands 49 as these pins pass across the scanning bands, as pins in their retracted positions would interfere with the operation of the scanning band. Accordingly the pin supporting strips 115 of sufficient length to accomplish the purpose outlined above may be supported between bands 49 and the scanning bands as shown in Fig. 1.

At a point remote from its lowermost edge platform 111 carries rotatable shaft 122 which may be mounted in journal brackets (not shown) depending from the underside of platform 111. Shaft 122 has secured thereto a pair of sprocket feed wheels 123 spaced apart in accordance with the spacing between message feed bands 49, so that their feed pins 124 may register with the marginal perforations in a message page deposited in the message magazine and confined between the sides of its frame 112. Platform 111 is provided with apertures in alignment with the sprocket feed wheels 123 of sufficient size to permit feed pins 124 to project successively above the surface of platform 111. Shaft 122 also has secured thereto a ratchet wheel 126 which is engaged by a jockey detent 127 arranged to arrest ratchet wheel 126 in predetermined angular positions. The angular disposition of ratchet wheel 126 with respect to sprocket wheels 123 is such that in each position of arrestment of shaft 122 a pin 124 on each of the sprocket wheels 123 projects through platform 111 approximately normal thereto.

Shaft 122 pivotally supports a plate 128 which carries pivotally mounted ratchet feed pawl 129. Pawl 129 is biased into engagement with ratchet 126 by tension spring 131. A link 132 connects plate 128 to one end of a lever 133 pivotally mounted at 134 on a bracket 136 which depends from the underside of platform 111 adjacent to the lowermost end thereof. The other end of lever 133 is disposed in the path of a pin 139 extending from the face of a disc 138 fixed to the message feed idler shaft 48. When pin 139 engages lever 133 during the rotation of disc 138 it imparts counterclockwise rocking movement to lever 133 which, in turn, moves link 132 leftwardly as viewed in Figs. 2 and 3. Link 132, in turn, rocks plate 128 clockwise, which, through pawl 129 and ratchet wheel 126, rotates sprocket wheels 123 clockwise one ratchet feed step. After pin 139 passes the end of lever 133, the latter and link 132 and plate 128 are restored to normal position by tension spring 141 which engages link 132.

The distance from the right-hand end of frame, 112 as viewed in Fig. 3, to the point at which a pin 124 of sprocket wheel 123 projects through platform 111 is preferably such that when a standard length message page has its foremost end abutting the right-hand end of frame 112 its most remote feed perforations are

disposed upon pins 124 of ratchet feed wheel 123. The timing of the rotation of shaft 122 by disc 138 is such that about the time ball 114 rocks clockwise to engage a message page with claw-shaped pins 119, whereby the message begins to be moved forward by bands 49, ratchet 126 is operated to free the page from engagement with sprocket wheels 123, and the peripheral speed of sprockets 123 should be compatible with the peripheral speed of sprockets 47, so that mutilation of the message feed perforations shall not occur.

A plurality of message pages may be stored in the message magazine in overlap arrangement, each page being set back from the one below it a distance equal to that between feed perforations as shown in Fig. 2. A pair of pressure rolls 142 rotatably mounted upon pins carried by the left-hand ends (Fig. 3) of the arms 143 pivotally mounted on rod 113 and connected together by brace 140 serves to retain a pile-up of message pages in engagement with sprocket wheels 123. Each time ratchet 126 is operated all of the message pages are shifted downwardly along the inclined platform 111, the lowermost message, if in position to be engaged by the pins 119 is advanced free of sprocket 123 so that it may be advanced by bands 49 to the transmitting position, and the message next above it is brought into position where its foremost end is in position to be next picked up by band 49.

The spindle which supports one of the pressure rolls 142 also supports a roll 144 which has a relatively deep peripheral groove 145 intermediate its ends. Below platform 111 a roll 146 thin enough to enter groove 145 of roll 144 is rotatably supported in alignment with said groove by one end of a lever 147 pivoted to bracket 148. A tension spring 149 biases lever 147 in clockwise direction, and platform 111 is provided with an aperture at the point of registry of roll 146 with roll 142 so that when there are no message pages stored on platform 111 lever 147 may rock clockwise and roll 146 may enter groove 145 in roll 144. However, when platform 111 is supporting one or more message pages rolls 144 and 146 are held separated by the message pages. At its other end lever 147 engages one of a pair of contact springs 151 and holds the springs engaged when rolls 144 and 146 are maintained separated by a message page. When the supply of message pages is exhausted and lever 147 rocks clockwise, contact springs 151 separate and open an electrical circuit to be described later, the circuit remaining open until more message pages are placed in the magazine.

A roll 152 similar to roll 144 and provided with peripheral groove 153 is rotatably mounted in the free end of an arm 154 that is pivotally mounted on rod 113. A tension spring 155 biases arm 154 in clockwise direction and arm 154 extends rightwardly well beyond the end of frame 112 so that roll 152 may engage and be supported by a message page adjacent to the scanning position. A thin roll 155 capable of entering groove 153 in roll 152 is rotatably supported by one end of a lever 157 which is pivotally supported by bracket 158. A tension spring 159 biases lever 157 counterclockwise so that roll 155 seeks entrance into groove 153 of roll 152. The presence of a message page between rolls 152 and 155 prevents counterclockwise rocking movement of lever 157. At its other end lever 157 engages one of a pair of contact springs 161 and maintains those springs in engagement when lever 157 is retained in its extreme clockwise position.

A pin 162 is carried by the underside of lever 157 directly above shaft 48 and the pin engages the periphery of a cam 163 fixed to shaft 48. Cam 163 is provided with a single depression in the periphery thereof so that at a predetermined instant in a cycle of operation of shaft 48 cam 163 permits lever 157 to rotate counterclockwise if there is at that time no message page interposed between rolls 152 and 155. Thus it will be observed that lever 157 is not operable to permit opening of contact springs 161 the instant that a message page is withdrawn from between rolls 152 and 155 but that such opening must await the presentation of the indentation in the periphery of cam 163 to pin 162. The timing of the rocking of lever 157 with respect to the operation of other elements associated with shaft 48 is controlled thereby and the function of contact springs 161 in the electrical circuit will be described hereinafter.

The electrical control system for the transmitter is indicated diagrammatically in Fig. 6. Power cord 166 which may be plugged into any convenient source of power is connected to power terminals 167 and 168. A circuit for a switching magnet 169 is traced from power terminal 167 through conductor 171, conductor 172, contact springs 161, conductor 173, winding of switching relay 169, resistance 174, and conductor 176 to power terminal 168. Thus when contact springs 161 are engaged switching relay 169 is energized and its contact tongue 177 which is connected by conductor 178 to conductor 171 is held in engagement with front contact 179 from which a conductive path may be traced through conductor 181, normally closed switch 182, winding of electromagnet 184, resistance 186, conductor 187 and conductor 176 to power terminal 168.

Electromagnet 184 has a mechanical function for an understanding of which reference may be had to Fig. 1. Armature 188 of magnet 184 is connected by link 189 which controls a stop mechanism for the transmitter, as fully disclosed in the copending application, to effect arrestment of the signal scanning and signal transmitting operations when magnet 184 is de-energized and to set in operation the signal scanning and signal transmitting mechanisms when magnet 184 is energized. From this it will be observed that the operation of the scanning bands and the transmitting mechanism is supervised by message page follower lever 157 and cam 163 so that when no message page is disposed between rollers 152 and 155 and cam 163 has rotated into the position shown in Fig. 3 contacts 161 will be opened, switching magnet 169 will be de-energized, contact tongue 177 will move out of engagement with its front contact 179, the energizing circuit for magnet 184 will be opened and armature 188 will be retracted to effect the arrestment of the signal scanning and signal transmitting operations. Thus the scanning bands cannot perform idle scanning operations when no message page is positioned to be scanned. Upon the re-insertion for automatic passage of a message page between rollers 152 and 155 contacts 161 will be reclosed, switching magnet 169 and electromagnet 184 will be re-energized and the signal scanning and signal transmitting mechanisms will be restarted. Switch 182 affords a manually operable control, through the opening of the circuit of magnet 184, for stopping the transmitter for any desired purpose.

Referring again to Fig. 6 it will be observed

that a conductive path may be traced from back contact 192 of switching magnet 169 through conductor 193, contact springs 151, normally closed switch 194, conductor 196, winding of electromagnet 197, resistance 198, conductor 199, conductor 187 and conductor 176 to power terminal 168. It will be evident from this that when switching magnet 169 is de-energized so that its contact tongue 177 engages back contact 192, and contact springs 151 are closed, electromagnet 197 will be energized. Stating the same condition from the standpoint of the operation of the transmitter, electromagnet 197 will be energized when there is one or more messages in the message magazine awaiting transmission although there is no message page in the transmitter, the presence of message pages in the magazine being indicated by the closed condition of contact springs 151.

Electromagnet 197 also performs a mechanical function an understanding of which may be had by reference to Fig. 1. The armature 195 of magnet 197 is connected, as is fully disclosed in the copending application, to the foremost end of message ejecting function selectable bar 98. Upon the energization of electromagnet 197 function bar 98 is shifted forwardly (downwardly as viewed in Fig. 1) to effect the retraction of both ends of escapement pawl 93 from engagement with escapement ratchet 94, whereby continuous advancement of message page supporting bands 49 is initiated as previously set forth. Switch 194 is provided for preventing the operation of magnet 197, as for convenience in testing and adjusting the magnet or related apparatus or when inserting or rearranging messages in the storage magazine, so that a message feed operation shall not be initiated at an improper time.

As is fully disclosed in the copending application, a latch is provided for the armature of magnet 197 which latches the armature in attracted position and which is released by lever 101 when that lever is operated by cam 99. The reason for the provision of the latching mechanism is that magnet 197 remains energized only as long as switching magnet 169 is de-energized and the letter magnet can remain de-energized only as long as the recess in cam 163 is presented to the cam follower pin 162 of lever 157. The rotation of escapement ratchet 94 upon withdrawal of the escapement pawl 93 results in rotation of cam 163 and immediate reclosure of contacts 161. Magnet 169 is thus again energized and the magnet 197 becomes de-energized. It is necessary to prolong the operation of message feed bands 49 after magnet 197 becomes de-energized in order to effect the advancement of messages in the magazine or the presentation of the first line of signal combinations on a page received from the magazine in the scanning position. The latch mechanism for the armature of magnet 197 accomplishes this prolongation.

The position of cam 163 on shaft 48 is preferably such that the indentation in the cam is presented to the follower pin 162 at the instant that lever 101 is operated by cam 99 to effect the release of armature of magnet 197 and the arrestment of escapement wheel 94. Thus if no message page has been presented between rolls 152 and 155 switching magnet 169 will become de-energized, magnet 197 will become energized and its armature will again become attracted and latched. Another message feed operation seek-

ing to present a page to the scanning position will thus be initiated.

Once in each revolution of disc 138 (Figs. 3 and 4) attending the successive message feed function operations initiated by magnet 197 the magazine message feed mechanism comprising lever 133, link 132, pawl 129 and ratchet 126 will be operated. Magazine message feed sprockets 123 will thus be operated periodically and any message pages engaged thereby will be advanced step-by-step until the lowermost is presented in position to be engaged by claw-shaped pins 119 upon the next operation of bail 114. The message page will then be advanced by bands 49 between co-operating rolls 152 and 155, the contact springs 161 will be prevented from separating when cam 163 releases lever 157, and switching magnet 169 will remain energized.

When neither the transmitter nor the message storage magazine contains a message page, contact springs 151 and 161 both become separated. The energizing circuit for magnet 184 is thus broken at front contact 179, thereby effecting the arrestment of the signal scanning and transmitting operations through the operation of link 189. The energizing circuit for magnet 197 is interrupted at contacts 151 because roll 146 is permitted to enter the peripheral groove in roll 144 so that message feed function bar 98 remains in its normal position and the message feed bands 49 and scanning bands 81 and 83 are arrested and remain in their normal or idle positions.

At various points in the foregoing description reference has been made to relative dimensions of message feed bands and sprockets, the dimension of the message page storage magazine, and the arrangement of feed pins. These characteristics have direct bearing upon the length of page that can be handled conveniently and upon the timing of the page handling mechanism.

As previously stated the spacing of the claw-shaped pins 119 on a band 49 is preferably equal to the circumference of the message feeding sprockets of the transmitter. The reason for this is that once in each revolution of the idler sprockets 47, mechanism actuated by cams carried by the idler sprocket shaft 48 operates to deliver a message page from the magazine. When this occurs a set of claw-shaped pins 119 must be presented in position to accept and advance the message. It follows from this that each message page should not be longer than the distance between claw-shaped pins 119 or if they are, two successive claw-shaped pins on a band 49 will engage a single message page, which is of no advantage, and a message freshly delivered from the magazine may be deposited over a portion of the preceding message page, which is not desirable. Preferably each page will be substantially equal in length to the spacing between successive claw-shaped pins. There will then be neither overlap nor gap between successive message pages as applied to the bands 49. The size of page that is to be used determines the dimension of the page storage magazine. The distance from the end of frame 112 to the point at which pins 124 of sprocket 123 project through platform 111 should be neither substantially greater nor less than the distance from the top of a page to the axis of the last feed perforation therein. If a page should be too short the sprockets 123 will not advance it into position to be engaged by the claw-shaped pins 119. If it should be too long it will not be moved clear of the sprockets 123 when the claw-shaped pins 119 attempt to

deliver it to the scanning position in a single operation and the feed perforations may be torn out. It will be evident that with the page storage magazine proportioned as outlined above the right-hand end of frame 112 may serve as a guide for the positioning of the first of a supply of message pages. With the leading edge of the page abutting the end of frame 112 the last feed perforations on the page will be substantially in registry with sprocket pins 124.

In the event that special length message pages either longer or shorter than those the storage magazine is arranged to handle are to be used occasionally they may be placed in the magazine singly, resting above the pressure rolls 142, as for example upon the cross brace 140, and extending under rod 113 with the leading edge in position to be applied to the claw-shaped pin. Thus the page will not engage sprocket pins 124. A page of special length may thus be positioned for transmission ahead of messages in the magazine without removing those messages. It is, however, desirable to disable the message feed mechanism of the magazine in order that messages engaged by the magazine sprocket shall not be advanced during the forwarding of the special size or rush message of any size by bands 49. This may be accomplished by the magazine message feed pawl disabling mechanism shown in Fig. 5.

A pawl shifting cam 201 having an operating handle 202 is loosely supported on shaft 122 for rocking movement thereon adjacent to ratchet 126. Ratchet feed pawl 129 is provided with a pin 203 which engages the periphery of cam 201. At the point in its periphery that is normally presented to pin 203 cam 201 has a radius which permits the pawl to engage ratchet 126. In a clockwise direction from this point the radius of cam 201 increases until it exceeds the maximum radius of ratchet 126, so that when cam 201 is rotated counterclockwise by means of handle 202 pawl 129 is cammed away from the ratchet 126 until it is held entirely clear. The periphery of cam 201 is provided with two notches 206 which a jockey detent 204 is adapted to enter when the cam is presented in either of its two positions. The jockey detent 204 is pivoted coaxially with pawl 129 on plate 128 and when the plate is rocked by link 132 jockey detent 204 imparts a corresponding rocking movement to cam 201 so that the cam remains in whatever relation to pawl 129 it has been manually presented.

The disablement of pawl 129 by cam 201 permits shaft 122 to be rotated manually in either direction. Therefore a knob 207 is secured to one end of shaft 122 for manual rotation of the shaft. For example, if messages are contained in the magazine with the lowermost presented in position to be transferred to the transmitter, and it is desired to transmit a rush message of the page size which the magazine accepts, cam 201 may be rocked counterclockwise to disable pawl 129, shaft 122 may be rotated counterclockwise one step to retract the messages in the magazine a corresponding distance, and the rush message may be placed under pressure rolls 142 on top of the messages in the magazine, and in position to be next transferred to the transmitter, whereupon pawl 129 is restored to operative condition by reverse operation of cam 201.

In operating to advance the rush message in the transfer operation the magazine mechanism will advance the other messages in the magazine to the positions they occupied before being re-

tracted. Should there be several rush message pages the pages then in the magazine may be retracted a number of ratchet steps equalling the number of rush pages and the rush pages put in the magazine on top in echelon arrangement with the lowermost and foremost in position to be transferred. The pawl is then restored to operative condition and the regular messages will follow the rush messages into the transmitter automatically.

When a message carried by a long page is to be transmitted it is desirable not to restore the feed pawl to operative condition after the ratchet has been back-stepped because the feeding of the long page into the transmitter would not be completed before the next message transfer operation occurs. The pawl should, therefore, remain retracted and if the switch 194 is opened the transmitter will come to rest after the long page has been ejected therefrom.

The message feed function mechanism of the transmitter, whether set in operation by selection of function bar 98 or by operation of electromagnet 197, is arrested by cam 99 at the time that a pair of claw-shaped pins 119 have been advanced to a position to present the first line of a message page in scanning location. It follows from this that lever 157 controlling contact springs 161 should be released to test for the presence or absence of a page in the transmitter at the time that the feed mechanism is arrested under the above outlined condition. This operating condition is indicated in Fig. 3 wherein the recess in cam 163 is shown presented to follower pin 162 which is prevented from entering the recess to permit separation of contact springs 161 because rolls 152 and 155 are held apart by a message page. As indicated, the message page has not been drawn entirely out of the magazine, the distance from the message pick-up position to the scanning position being less than a page length. Therefore, claw-shaped pins 119 for receiving the next message page have not yet reached receiving position and magazine message feed pin 139 and the recess in cam 117 are correspondingly remote from lever 133 and follower arm 116 respectively.

In Fig. 4 the message pick-up mechanism is shown with the claw-shaped pins 119 advanced to message receiving position. The message which had been extending into the magazine has been drawn entirely clear and its trailing edge is seen to be just clear of the leading edge of the lowermost page in the magazine. Cam follower 116 has entered the recess in cam 117 and bail 114 has depressed the leading portion of the lowermost page in the magazine into the path of pins 119. Pin 139 is about to operate the magazine message feed mechanism and the recess in cam 163 is remote from follower pin 162.

From the foregoing description it will be observed that the transmitter will automatically eject a message page after the transmission of the signal combination contained therein has been completed and will automatically receive page after page of message material from a message page storage magazine as rapidly as the transmission of message material from a page is completed, regardless of the length of message material contained upon a page and without delay, so that substantially continuous transmission of signals may be accomplished without continuous supervision. As long as there is any message page contained in the message storage magazine, regardless of how remote its leading

edge may be from the right-hand end of frame 112, it will be advanced step-by-step until it is brought into position for transfer and is transferred to the message page supporting bands in the transmitter. When the last message page has been transferred to the transmitter and the message contained thereon has been transmitted the apparatus will be brought to rest.

Although a particular embodiment of the invention has been shown in the drawings and described in the accompanying specification it will be understood that the invention is not limited to the particular arrangement of parts and the details of construction herein disclosed but that the invention is capable of modification, rearrangement and substitution of parts, and alteration in other respects within the scope of the appended claims.

What is claimed is:

1. In a sheet storing and the transferring mechanism a storing platform, a unidirectionally rotatable sheet feeding element associated with said platform, a conveyor, means controlled by said conveyor for transferring sheets individually to said conveyor, and means also controlled by said conveyor for rotating said sheet feeding means periodically.

2. In a sheet storing and transferring mechanism adapted to handle marginally perforated sheets, a storing platform, a plurality of sprockets rotatably supported by said platform and having radially disposed pins for engaging the marginal perforations in said sheets, a conveyor, means associated with said platform and controlled by said conveyor for bringing sheets carried by said platform into engagement with said conveyor individually for conveyance thereby, and ratchet feed means operated by said conveyor for rotating said sprockets to advance all of said sheets as a particular sheet is applied to and advanced by said conveyor.

3. A method of storing and feeding sheets having spaced marginal perforations, which comprises arranging the sheets in superposed relation and in longitudinally displaced relation to the extent that the foremost perforations of each sheet are in registry with perforations more remote from the leading edge of the sheet below it, advancing all of the sheets thus arranged together, and drawing out the lowermost and foremost sheet when its foremost edge reaches a predetermined position.

4. A method of storing and feeding sheets having spaced marginal perforations which comprises arranging the sheets in superposed relation and in longitudinally displaced relation to the extent that the foremost perforations of each sheet are in registry with those immediately following the foremost perforations of the sheet below it, advancing all of the sheets thus arranged together, and drawing out the lowermost and foremost sheet when its foremost edge reaches a predetermined point.

5. A method of storing and feeding sheets having spaced marginal perforations which comprises arranging the sheets in superposed relation and in uniform longitudinal displacement each to each, positively holding said sheets in said arrangement, advancing said sheets together, relaxing said hold during the advancement of said sheets and renewing said hold upon all except the lowermost and foremost sheet, and drawing out the last mentioned sheet concurrently with the advancement of all of said sheets.

6. In a sheet storing and transferring mechanism, a storing platform, means associated with said platform for directly engaging each of a plurality of sheets where they rest upon said platform whereby to advance said plurality of sheets, a conveyor, and means controlled by said conveyor for operating said sheet engaging and advancing means a predetermined extent periodically.

7. In a sheet storing and transferring mechanism, a storing platform, means for engaging and advancing a plurality of sheets simultaneously, a conveyor, means controlled by said conveyor for engaging sheets individually with said conveyor, and means controlled by said conveyor for operating said sheet engaging and advancing means simultaneously with the conveyance by said conveyor of the sheet engaged therewith.

8. In a sheet storing and transferring mechanism, a conveyor for supporting and conveying sheets, a storing platform supported adjacent to one end of said conveyor, means associated with said storing platform for engaging and periodically advancing a plurality of sheets, means also associated with said storing platform for engaging sheets individually with said conveyor, means associated with said conveyor for controlling the operation of said last-mentioned means, and means actuated by said conveyor for operating said sheet engaging and advancing means.

9. In a sheet storing and transferring mechanism, a storing platform, means associated with said platform for engaging and advancing a plurality of sheets, a conveyor, means controlled by said conveyor for transferring sheets individually from said platform to said conveyor, means controlled by said conveyor for actuating said sheet advancing means, and manually operable means for rendering said advancing means unresponsive to said operating means.

10. In a sheet storing and transferring mechanism, a conveyor for supporting and conveying sheets, a storing platform supported adjacent to one end of said conveyor, means associated with said storing platform for engaging each sheet of a plurality of sheets at one point on each edge thereof only for advancing said sheets simultaneously, means also associated with said platform for engaging and applying the sheets individually to said conveyor, means associated with said conveyor for controlling the operation of the last mentioned means, and means actuated by said conveyor for operating said sheet advancing means.

11. In a sheet storing and transferring mechanism, a conveyor for supporting and conveying sheets, a storing platform supported adjacent to one end of said conveyor, and having an aperture near each edge in transverse alignment, a sheet feed pin wheel rotatably supported below said platform in alignment with each aperture and in position for its pins to project through said apertures and above the surface of said platform for engaging superposed sheets having marginal feed perforations, means for rotating said pin wheels to advance said sheets, means associated with said platform for engaging and applying the sheets individually to said conveyor, means associated with said conveyor for controlling the operation of the last mentioned means, and means actuated by said conveyor for operating said pin wheel rotating means.

12. In a sheet storing and transferring mechanism, a conveyor for supporting and conveying sheets, a storing platform supported adjacent to one end of said conveyor, means associated with said storing platform for engaging each sheet of a plurality of sheets for advancing said sheets simultaneously, a bail associated with said platform in proximity to the conveyor for engaging and applying the sheets individually to said conveyor, spring means for operating said bail, means associated with said conveyor for controlling the operation of said bail by said spring means, and means actuated by said conveyor for operating said sheet advancing means.

13. In a sheet storing and conveying mechanism, a conveyor for supporting and conveying marginally perforated sheets including endless bands having spaced sheet engaging pins, claw-shaped pins carried by said bands at spaced intervals as great as the lengths of sheets to be conveyed by said bands, a storing platform supported adjacent to one end of said conveyor, means associated with said storing platform for engaging and periodically advancing a plurality of sheets, means also associated with said storing platform for depressing the foremost ends of said sheets individually onto said conveyor to engage the foremost perforations thereof with a claw-shaped pin of each band, means associated with said conveyor for controlling the operation of the last mentioned means, and means actuated by said conveyor for operating said sheet engaging and advancing means.

14. In a sheet storing and conveying mechanism, a conveyor for supporting and conveying sheets, means associated with said conveyor for detecting the absence of a sheet to be supported and conveyed, a storing platform supported adjacent to one end of said conveyor, means associated with said storing platform for engaging and periodically advancing a plurality of sheets, means associated with said storing platform for detecting the absence of sheets therein, means actuated by said conveyor for operating said sheet engaging and advancing means, and means controlled by both of said detecting means when detecting absence of sheets in said conveyor and on said platform for estopping operation of said conveyor.

15. In a sheet storing and conveying mechanism, a conveyor for supporting and conveying sheets, means associated with said conveyor for detecting the absence of a sheet to be supported and conveyed, a storing platform supported adjacent to one end of said conveyor, means associated with said platform for engaging and periodically advancing a plurality of sheets, means associated with said storing platform for detecting the absence of sheets therein, means actuated by said conveyor for operating said sheet engaging and advancing means, and means controlled by both of said detecting means when the first and second mentioned detecting means detect absence and presence of a sheet respectively for effecting substantially continuous operation of said conveyor.

16. In a sheet storing and conveying mechanism, a conveyor for supporting and conveying sheets individually, means for driving said conveyor, means for arresting said driving means to arrest said sheet in a predetermined position, means for detecting the absence of a sheet in said conveyor, and means controlled by said conveyor for timing the operation of said de-

testing means with the arrestment of said driving means.

17. In a sheet storing and conveying mechanism, a conveyor for supporting and conveying sheets individually, a storing platform supported adjacent to one end of said conveyor, means associated with said storing platform for engaging and periodically advancing a plurality of sheets, means associated with said storing platform for engaging sheets individually with said conveyor while said conveyor is in motion, and means actuated by said conveyor for operating said sheet advancing means at a linear speed substantially equal to the linear speed of said conveyor.

18. In a sheet storing mechanism, a conveyor for supporting and conveying sheets individually, a normally restrained spring operable sensing roller for feeling for the presence or absence of a sheet in said conveyor, and means operated by said conveyor for relaxing the restraint upon said feeling means to enable the spring operation thereof.

19. In a sheet storing and transferring mechanism adapted to handle marginally perforated sheets, a storing platform, means associated with said platform for engaging marginal perforations in a plurality of said sheets simultaneously, a conveyor, means associated with said platform and controlled by said conveyor for bringing

5 sheets carried by said platform into engagement with said conveyor individually for conveyance thereby, and means operated by said conveyor for actuating said sheet engaging means of said platform to advance all of the sheets engaged by said engaging means as a particular sheet is applied to and advanced by said conveyor.

20. In a sheet storing and transferring mechanism adapted to handle sheets, a storing platform, means associated with said platform for engaging a plurality of said sheets simultaneously, a conveyor, means associated with said platform and controlled by said conveyor for bringing sheets carried by said platform into engagement with said conveyor individually for conveyance thereby, and means operated by said conveyor for actuating said sheet engaging means of said platform to advance all of the sheets engaged by said engaging means as a particular sheet is applied to and advanced by said conveyor.

21. In a sheet storing and conveying mechanism, a conveyor for supporting and conveying sheets individually, cooperating sensing rollers for feeling for the presence or absence of a sheet in said conveyor, and means operated by said conveyor for rendering one of said rollers operative to move toward said other roller.

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