

April 28, 1931.

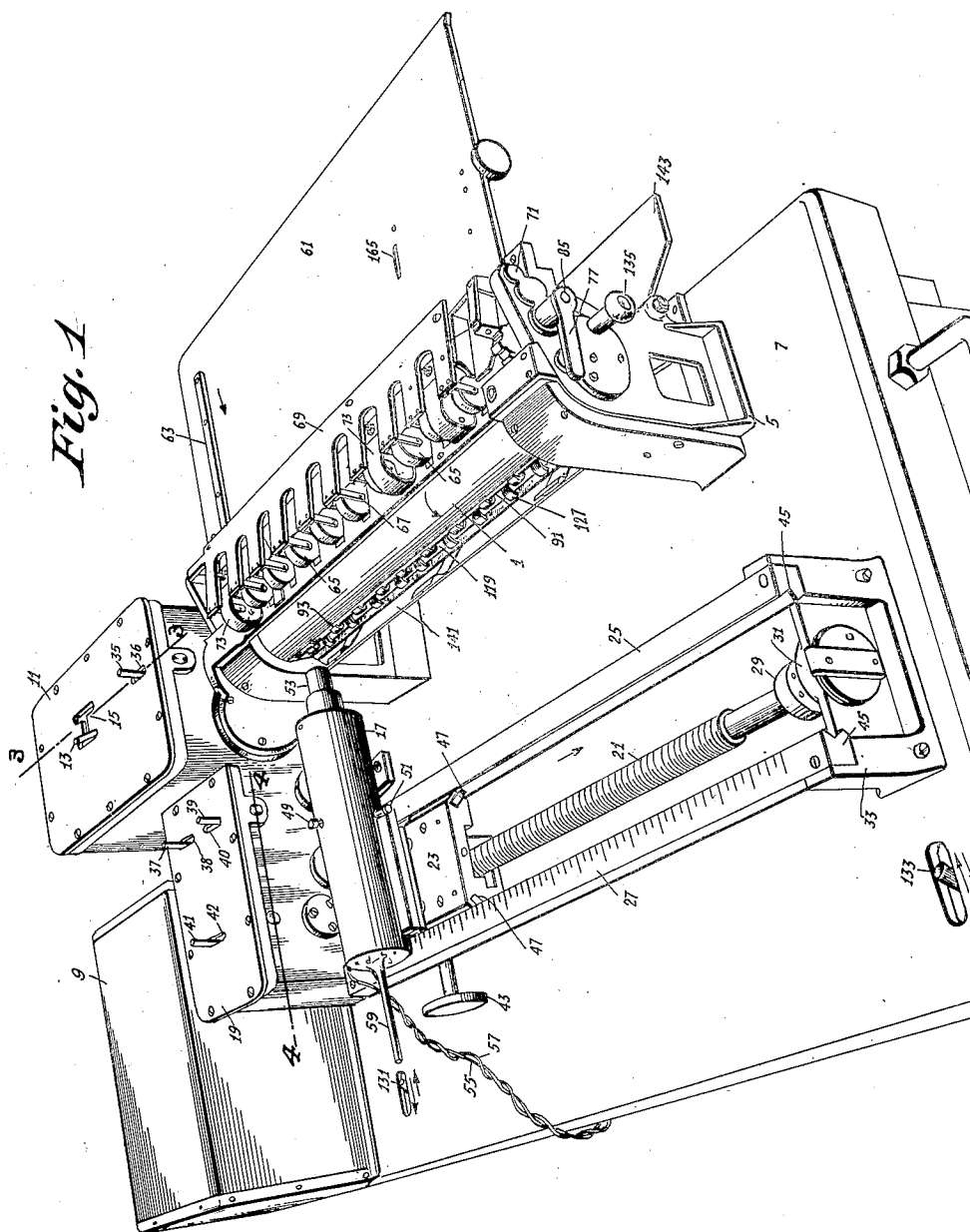
R. H. RANGER

1,803,133

FACSIMILE SYSTEM

Filed May 3, 1929

3 Sheets-Sheet 1



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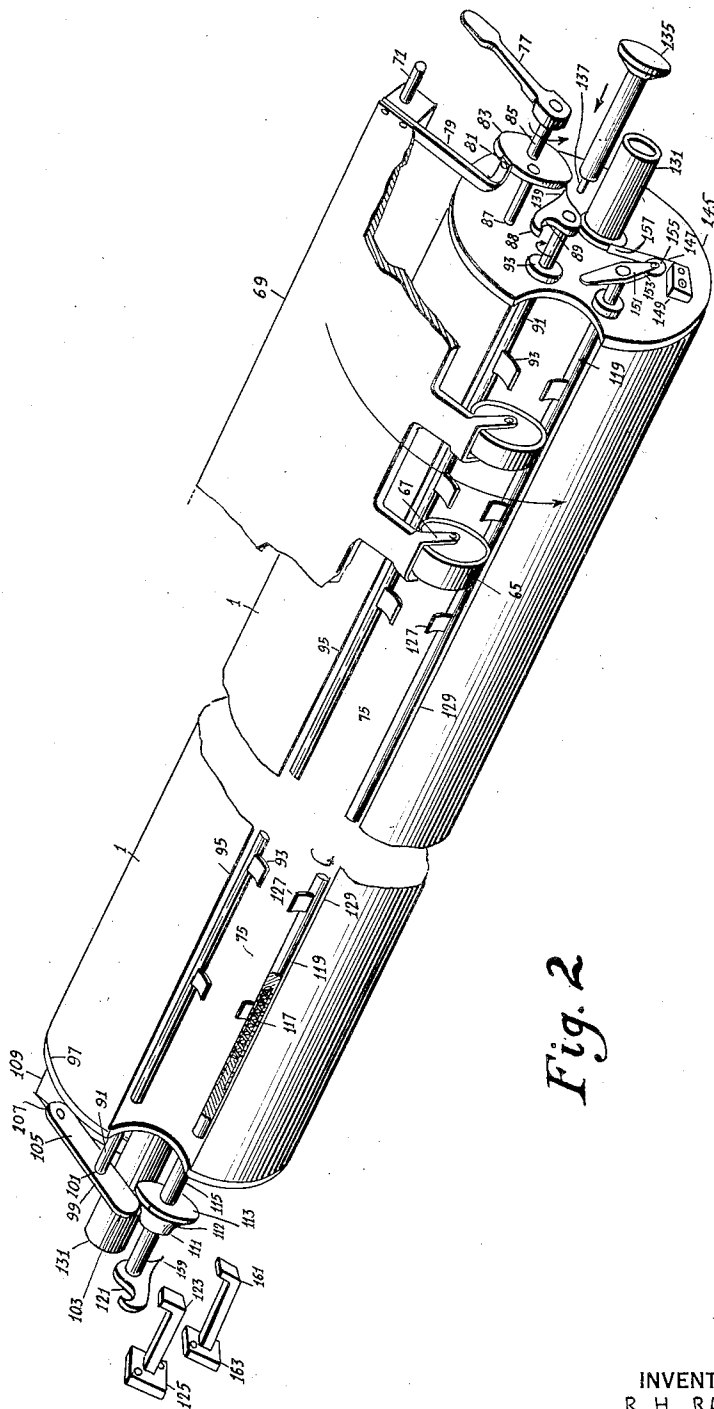
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FACSIMILE SYSTEM

Filed May 3, 1929

3 Sheets-Sheet 2



April 28, 1931.

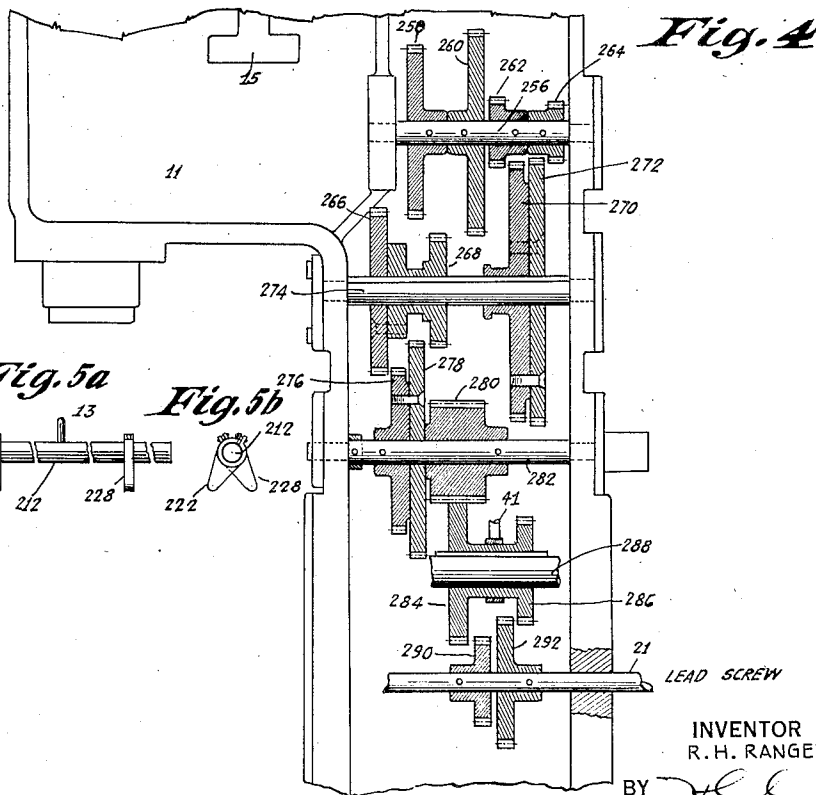
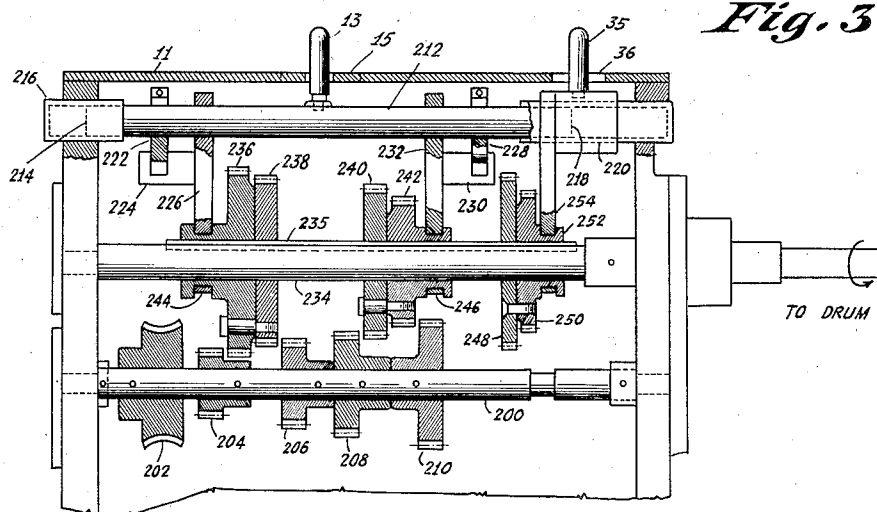
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FACSIMILE SYSTEM

Filed May 3, 1929

3 Sheets-Sheet 3



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FACSIMILE SYSTEM

Application filed May 3, 1929. Serial No. 360,065.

The present invention relates to facsimile systems and the like, and in particular to a system for transmitting and receiving facsimiles either as single channel messages or as multiplex communication channel messages.

Further, the invention relates to a method and means for transmitting and receiving pictures and the like in which arrangement may be made for increasing or decreasing the speed of transmission and reception in accordance with conditions affecting the communication channel, and at the same time means are provided by which the system may be rapidly changed from a single channel transmitting or receiving system into a multiplex transmitting or receiving system.

The invention further relates to a method and means by which pictures (by which term I mean to include, views, printed matter, checks, finger prints, photographs, financial statements, newspaper articles, advertisements, fashion plates, magazine articles, moving pictures, and the like) at the transmitting station, or suitable recording paper at the receiving station, may be fed upon a transmitting or receiving drum for the purpose of transmission and reception, and further relates to a method and means for gripping the picture record or recording paper or surface during the period when either is carried and supported by the transmitting and receiving drum.

As a primary object of my invention, I have sought to develop a method and means by which pictures and the like may be transmitted and, at the same time, a picture transmitting and receiving apparatus which is, in general, applicable to use in connection with all of the known types of transmitting and receiving apparatus.

Still another object of my invention is to provide a method and means by which a single channel transmitting and receiving apparatus may be readily changed into a multiplex transmitting and receiving apparatus.

Still another object of my invention is to provide a method and means by which the speed at which the picture is transmitted or received may be varied, and increased or de-

creased in accordance with atmospheric or local conditions effecting the efficiency of transmission.

Still another object of my invention is to provide a method and means by which the picture record or suitable recording surface may be fed upon a transmitting or receiving drum during the time of transmitting or receiving the picture.

Still another object of my invention is to provide a system by which the picture or picture record fed upon the transmitting or receiving drum may be tightly gripped and held in a predetermined and fixed position upon the drum during the entire operation.

Still another object of my invention is to provide a system wherein the gripping action upon the paper takes place automatically and precludes all possibility of error due to the personal element from destroying an efficient picture transmission.

Still another object of my invention is to provide a system for automatically releasing the picture from the transmitting or receiving drum at the time of completion of the picture.

Still other objects of my invention are to provide a picture transmitting and receiving system which is relatively simple in its construction and arrangement of parts, a system which is compact, conveniently operated, readily installed and set up, efficient in its use, and substantially fool-proof in its operation.

Still other and ancillary objects of my invention will become apparent and at once suggest themselves to those skilled in the art to which the invention relates by reading the following specification in connection with the accompanying drawings forming a part of my present disclosure.

By the accompanying drawings, Fig. 1 illustrates a perspective top view of a suitable embodiment of my invention showing a receiving system;

Fig. 2 illustrates in further detail a preferred means for gripping and releasing the picture or received record from the transmitting or receiving drum;

Fig. 3 is a diagrammatic illustration of a

sectional view on line 3—3 of Fig. 1 through one form of suitable gear changing mechanism contained within a housing for changing the speed of rotation of the picture carrying drum;

Fig. 4 is a sectional view on line 4—4 of Fig. 1 showing one form of gear changing mechanism suitable for changing the speed of rotation of the lead screw for carrying the scanning system; and,

Fig. 5 is a detail view of the rocker-arm carrying the gear shifting lever for changing the speed of rotation of the drum, of which portion *a* is a longitudinal view of the sliding shaft and portion *b* is a sectional view looking to the right of portion *a*.

To refer now first to Fig. 1 of the drawings, I have shown therein a picture receiving drum 1 carried and supported at its end by supporting standards 3 and 5 carried in any suitable manner upon a base member 7.

The drum 1 is preferably driven from a motor contained within a housing 9 so as to drive the drum through a gear reduction system contained within a second housing member 11 so as to rotate the drum 1 in the direction shown by the arrow thereon.

For the purpose of changing the speed of rotation of the drum, I have provided a gear shift system which is controlled as to its position by means of a gear shift lever 13 capable of movement in the H slot 15 in any desired and appropriate manner so long as the gear shift lever 13 is at one end of the H slot. By shifting the lever 13, the speed of the drum 1 is changed in much the same manner as the speed of any moving mechanism is changed by well known and appropriate types of gear shift mechanism as has been shown, for example, by Fig. 3.

To refer now to Fig. 3 showing a suitable system for driving the picture carrying drum 1, it is possible to arrange a convenient form of gearing which may be controlled by movement of the lever 13 in the H slot 15 (see Fig. 1) to produce different rotational speeds of the picture drum 1. For this purpose, a worm gear 202 carried upon the shaft or spindle 200 has been arranged to be driven from the motor shaft of the motor carried within the housing 9 so that upon rotation of the worm gear 202 the gears 204, 206, 208 and 210, all keyed to the shaft 200, are adapted to be rotated. In order to provide more than one speed of rotation of the drum, so as to control the time of transmission, as has been above stated, a suitable shift lever 13 has been provided for shifting different gears and thus controlling the speed of the drum shaft. The lever 13 which is capable of movement in the H slot 15 is preferably carried and supported upon a spindle 212 having its ends 214 and 218 mounted for longitudinal movement in the sleeves 216 and 220 which are carried in the ends of the housing 11. Thus, upon

movement of the lever 13 backward or forward and on either side of the H slot 15, the spindle 212 is rocked and also advanced either backward or forward. Carried toward the end of the spindle 212 are a pair of projecting lugs 222 and 228 which are mounted at different angles with respect to each other (see Fig. 5b), so that upon movement of the lever 13 to the left hand side of the H slot, for example, and to the rear of the slot, as has been shown by Fig. 1, the projecting lug 228 is adapted to engage with the U-shaped projecting member 230 so as to move the gears 240 and 242 to the right on the shaft 234 and cause the gear 242 to engage with the gear 210, and thus drive the shaft 234 at a predetermined speed determinable by the position of the lever 13 in the H slot. This movement of the gear is accomplished by means of the sliding member 232 carried about a collar 246, and the gears 240 and 242 are mounted upon a key-way 235 so as to slide longitudinally of the shaft 234. Upon movement of the shift lever 13 to the front of the left hand position of the H slot, the gears 240 and 208 will be in mesh so that the speed of the drum shaft is changed proportionately.

Assuming now that the lever 13 is moved to the other side of the H slot, then the lug 222 will engage with the U-shaped member 224 so as to move gears 236 and 238 either to the right or to the left by means of the slidable member 226 engaging with the collar 234. Thus for forward movement of the lever 13 in the right hand side of the H slot, the gears 236 and 204 will be engaged, whereas for movement of the lever 13 to the back of the right hand side of the H slot, the gears 238 and 206 will be engaged.

In any of the above cases, therefore, the shaft 200 serves as a driving shaft, and the shaft 234 serves as the driven shaft and the speed of rotation of the driven shaft 234 is determined by which of the gears of the driving and driven shafts are in mesh.

In the position which the shift lever 13 is shown in the H slot 15 by Fig. 1, the gear 238 carried on the shaft 234 will mesh with the gear 206 carried upon the shaft 200 so that when the motor contained within the housing 9 is rotated so as to drive the worm gear 202, the drum shaft will be driven from the gear 206 at a speed determined by the gear reduction between the gear 206 and the gear 238 which is keyed for longitudinal movement upon the shaft 234.

Mounted adjacent to the drum member 1 and arranged to project light thereon in any desired and suitable manner is a housing member 17 containing within the same a light source, which, in connection with a receiver, may preferably be a glow lamp of any well known and suitable type. In case the system is adapted to single channel transmission only, a single glow lamp will be contained

within the housing member 17, but if the system is adapted to multiplex transmitting and receiving systems, a plurality of independent and distinct light sources or glow lamps may be provided as shown and described in connection with my copending application, Serial No. 360,068, filed May 3, 1929, wherein a plurality of glow lamps has been shown and described together with a means for separating the glow produced therefrom in such a manner that the separate light sources direct the light issuing therefrom to separate and distinct tracks or paths on a record surface carried by a drum member, such as the drum 1 shown.

For the purpose of carrying the illumination system 17 longitudinally of the drum member 1, as the drum 1 is rotated in the direction shown by the arrow, I have provided a drive gear mechanism contained within a housing member 19 and deriving rotational movement from the motor contained in housing 9 so as to drive the lead screw 21 in such a manner as to carry the illumination source, mounted upon the slidable support member 23, longitudinally of the guide tracks 25 and 27 in the direction shown by the arrow. The lead screw 21 is carried at its end 29 in any preferred and suitable type of bearing member 31 and mounted upon a support member 33 carried by the base member 7.

When the system shown is changed from single channel transmission and reception to a multiplex system or when a change in picture detail is desired, the gear shift levers, 35, 37, 39 and 41, may be appropriately shifted either to the right or left for the purpose of adjusting the speed of the lead screw 31 with respect to the speed of rotation of the drum member 1. When the gear shift levers, 35, 37, 39 and 41, are shifted either to the right or left, the different gears contained within the gear housings 11 and 19 are put into engagement with each other, and for the purpose of determining the line advance for each individual condition, I have provided on the cover plates of the housings 11 and 19 a series of numbers at the left and right ends of the shift of each of the aforesaid gear shift levers so that by shifting each lever to the right or left so as to make the number corresponding to the line advance correspond in the case of all of the levers, the system may be adjusted for varying line advances. Thus, assuming one hundred lines to the inch, the lever 35 may be, as shown, to the right of its slotted member 36, the lever 37 may be to the left of its slotted member 38, the lever 39 to the right of the slotted member 40, and the lever 41 to the left of the slotted member 42. Supposing, however, that one hundred and fifty lines to the inch were desired, the position of the levers 35, 37 and 39 may be proper for such an advance, but the

lever 41 may need to be shifted to the right of the slotted member 42 so as to provide this amount of advance, and supposing that this adjustment has been made, if it is desired to further change the line advance to two hundred lines per inch, for example, all of the adjustments last named may be correct but the adjustment of the shift lever 35, for example, and in such case, the lever 35 would be shifted to the left of the slot 36. It will thus be seen that by approximately designating the line advance corresponding to the shift of each of the gear shift levers to either end of the slot that any appropriate advance may be at once attained without the need of calculation by merely observing the position of the various gear shift levers and changing such as are necessary in order to procure whatever line advance is desired.

To describe now a suitable means for changing the speed of rotation of the lead screw 21, reference may be had to Fig. 4 wherein the gears 258 and 260 carried upon the spindle 256 are adapted, upon movement of the shift lever 35 contained in the slot 36 causing a motion of the gears 248 and 250 to the right or left (see Fig. 3) by a movement of the connecting link 254 engaging in the collar 252 so as to slide these gears 248 and 250 longitudinally upon the shaft 234, to be engaged with either gear 248 or 250 respectively, and the shaft or spindle 256 will be driven at an appropriate speed determinable by which of the gears are in mesh from the driving shaft 234. The gears 258 and 260 are keyed to the shaft 256 and drive thereby the gears 262 and 264 which are preferably mounted adjacent thereto and keyed upon the same shaft or spindle 256.

Upon movement of the shift lever 39 (see Fig. 1) to the right or left, gears 270 or 272 keyed for longitudinal movement upon the shaft 274 may be made to mesh with either gears 262 or 264 so as to drive the shaft 274 at an appropriate speed therefrom. The means for shifting the gears 270 and 272 has not been shown in detail by Fig. 4 for convenience of illustration but is the same as has been provided for shifting the gears 248 and 250, for example (Fig. 3), by means of the shift lever 35.

Thus, the shaft 274 may now be controlled as to its speed of rotation by determining which of gears 270 and 272 mesh with the gears 262 and 264 driven upon the shaft 256 so as to turn the shaft 274 at an appropriate speed. Similarly, the gears 266 and 268, also keyed for longitudinal movement upon the shaft 274, are adapted to be moved by the shift lever 37 (see Fig. 1) so that they may mesh with either gears 276 or 278 which are keyed upon the shaft 282 so as to drive the shaft 282 at an appropriate and desired speed. Mounted adjacent to the gear 278 on the shaft 282, a wide-faced gear 280 has been provided,

and this gear is keyed upon the shaft so that it cannot be moved longitudinally thereof.

As was shown in Fig. 1, a third shift lever 41 has been provided for movement in the slot 42 so as to control still further the speed of rotation of the lead screw 21, and this shift lever is adapted to move the gears 284 and 286 keyed upon the shaft 288 so that they may be moved longitudinally thereof. For example, with the shift lever 41 moved to the left, as shown by Fig. 1, the gear 284 will be moved to the left from the position shown by Fig. 5, so that it slides along the face of the wide-faced gear 280 and the gear 286 carried upon the same shaft will mesh with gear 292 which is carried by the lead screw shaft 21. Upon movement of the shift lever 41 in the other direction (to the right from the position shown in Fig. 1) the gear 284 will be moved to the right side of the wide-faced gear 280 so as to drive directly the gear 290 and thus rotate the lead screw at a predetermined speed.

To review now the position of the gear shift levers 35, 37, 39 and 41, shown by Fig. 1, it will be seen that the following gears will be in mesh: gear 250 carried on shaft 234 will mesh with gear 260 carried on shaft 256; gear 264 carried on shaft 256 will mesh with gear 272 carried on shaft 274; gear 268 also carried on shaft 274 will mesh with gear 278 carried on shaft 282; and gear 284 meshing on the left hand edge of the teeth of wide-faced gear 280 will drive the gear 286 carried on shaft 288 so that it meshes with gear 292 carried by the lead screw 21 so as to drive the lead screw. From this it will be observed that different speeds of rotation of the lead screw shaft 21 are obtainable by shifting one or any number of the shift levers 35, 37, 39 and 41 to opposite sides of the slots 36, 38, 40 and 42.

For convenience of illustration in both Figs. 3 and 4, all gears have been shown in neutral position so that the gear trains may be more clearly observable.

As the lead screw 21 is rotated, as above explained, and the adjustable advance or feed nut (not shown) is put into engagement therewith by turning the thumb nut 43, the entire assembly including the illumination housing 17 carried upon the base member 23 will be moved longitudinally on the tracks 25 and 27 in the direction shown by the arrow. The means of engaging the feed nut for advancing the supporting member 23 longitudinally on the tracks 25 and 27 has not been shown but may consist, for example, of a feed nut arranged to normally engage with the threads on the lead screw 21 and a cam means connected at the end of the thumb nut 43 so that upon turning the thumb nut or hand wheel 43, the nut may be disengaged from the lead screw by the cam so that it will be forced away from the lead screw against the pressure of

suitable springs mounted beneath the advance nut, and thus the feed of the illumination housing will be stopped. However, upon again turning the thumb nut 43 in the opposite direction, the springs mounted beneath the advance nut may force the same to engage with the threads on the lead screw 21 and advance the illumination system longitudinally on the tracks.

For the purpose of providing ease of longitudinal movement of the light carrying housing on the tracks 25 and 27, I have provided each of the tracks with V-shaped slotted portions 45 into which rollers 47 carried by the base member 23 are adapted to engage so that there may be a rolling contact between the slidable support member 23 and the tracks 25 and 27.

Carried upon the illumination system housing 17, I have provided adjustable screws 49 and 51 for the purpose of adjusting the diaphragm openings for separating the individual light beams projected from the illumination system contained within the housing as has been disclosed in my copending application, Serial No. 360,068, filed May 3, 1929, or Serial No. 321,821, filed November 26, 1928. By turning the screws 49 and 51 to the right, for example, the size of the diaphragm opening may be decreased, and by turning the screws to the left, the size of the opening of the diaphragm may be materially increased in any desired manner. Also contained at the end of the housing 17, I have provided within a shield member 53, for example, a lens (not shown) for focusing the light issuing from the housing 17 upon the record drum 1 in any appropriate and desired manner. Incoming signals for actuating the glow lamps contained within the housing member 17 may be applied through the conductors 55 and 57, and a convenient means for removing the entire glow lamp assembly from the housing 17 may be provided by a handle 59 mounted upon and supporting all of the lamps within the housing, so that by grasping the handle 59 the entire light assembly may be withdrawn from the housing. The same mechanisms function either for transmitting or receiving pictures. For transmitting, the original picture is fed to the machine; for receiving, the recording paper is fed to the machine.

To describe now the means for feeding the paper upon the drum member 1 (assuming the machine to be a recording machine, as illustrated), I have provided a paper supporting plate 61 having at one edge thereof a guide strip 63 against which the recording sheet may be positioned. The recording sheet is then manually or automatically pushed forward adjacent the guide strip in the direction shown by the arrow until it comes beneath the rollers 65 carried and supported by brackets 67 from a support plate

69 which is carried in any appropriate and desired manner by the end supports 3 and 5, as, for example, by means of a pivoted spindle 71. The supporting plate 69 carrying the rollers is preferably spring pressed by means of springs 73 so that at periods when the plate 69 is depressed, in a manner to be hereinafter set forth and described, the plate and its associated rollers will press down against the picture carrying drum 1 with considerable force so as to crease the paper and position the same in the slotted portion 75 of the drum 1. As shown by the accompanying drawings, the supporting plate 69 is, however, raised away from the drum 1 so that a sheet of recording paper mounted upon the supporting plate 61 and positioned against the guide strip 63 may be pushed forward beneath the rollers 65 carried by the plate 61.

To describe now in detail the means for gripping the paper fed to the drum 1 from the support plate 61, as the paper is pushed forward in the direction shown by the arrow, the handle 77 may be moved in the direction shown by the arrow on Fig. 2 (making special reference to the showing of Fig. 2) so that the support plate 69 which has been held away from the paper against the pressure of the springs 73 by means of the L-shaped arm 79 having a roller 81 positioned at the end thereof resting upon the cam surface 83 may be depressed and permit the springs 73 to force the plate 69 and its associated rollers downwardly against the paper and the picture carrying drum 1. The cam 83 is preferably supported from the end support member 5 by means of a spindle 85 to which the handle 77 is attached externally of the frame member 5. As the handle 77 is moved in the direction shown by the arrow on Fig. 2, the pin 87 carried thereby is rotated in a corresponding direction and will then project towards the center of the drum 1 in such a manner that a stop or cam shaped member 88 carried by the drum will have its surface 89 engaged therewith as the drum rotates in the direction shown by the arrow. The cam shaped stop 89 is preferably carried at one end of a spindle 91 extending longitudinally of the slot portion 75 of the drum 1 and is mounted and supported in the end thereof by a bearing surface 93¹.

Positioned at various points along the shaft or spindle 91, I have provided a number of gripping claws 93. As the surface 89 of the cam shaped stop 88 is turned so as to contact with the pin 87 of the cam 83 when the drum rotates the shaft 91 will be turned in the direction shown by the arrow thereon and cause the gripping claws 93 to correspondingly turn. Therefore, as the paper carried by the plate 61 has been fed beneath the rollers 65 which are, at this time, depressed so as to cause the paper to bear against the roll or drum 1 at the time when the slotted portion

75 of the drum has turned beneath the rollers 65, the edge of the paper will be forced into the slot and creased against the edge 95 thereof by means of the spring pressure upon the plate 69 carrying the rollers 65. At this time, the cam shaped stop 88 has engaged with the pin 87 and the claws or gripping teeth 93 will then come to rest upon the edge of the paper pressed into the slot 75 and securely grip the same. It will, of course, be observed that the rollers 65 and gripping teeth 93 are slightly spaced apart from each other so that they do not interfere one with the other.

The spindle 91 is arranged to extend beyond the end 97 of the drum member 1 and as the drum is rotated, a rocker arm 99 rigidly mounted at the end 101 of the spindle 91 is rotated correspondingly in a clockwise direction (corresponding to the direction of rotation of shaft 91) so as to raise the end 103 thereof upwardly in the direction shown by the arrow. The end 105 of the arm 99 is provided with a roller 107 which engages with a spring member 109 rigidly carried upon the end 97 of the drum member 1 so that, as the arm 99 is turned in a clockwise direction, the roller will come to rest on the inner portion of the spring 109 and thus hold the arm 99 in its rotated position.

As the arm 99 is raised, the end 103 thereof which normally engages with the lower portion 111 of a cam member 113 carried upon a shaft or spindle 115 permits the cam roller 113 to be forced to the left (as shown) by means of the pressure of spring member 117 carried within the spindle 119 which is keyed with the spindle 115 so that the spindle portion 115 will be moved to the left, as shown. As the spindle 115 is moved to the left, a second cam shaped member 121 of a type similar to that shown and described as 88 is permitted to engage with a stop 123 carried by means of support bracket 125 on the end supporting plate 3 for the drum member 1, and thus the shafts or spindles 115 and 119 are turned by the engagement of the cam shaped member 121 with the stop 123 in a counter clockwise manner, as shown by the arrow, so as to cause the gripping teeth or members 127 to engage with the edge 129 of the drum 1.

Carried at the end 145 of the drum 1, I have provided a spring member 147 held by means of a supporting member 149 so that, as the arm 151 carried by the shaft or spindle 119 and rotated in a counter clockwise direction upon the closing of the gripping teeth 127 over the edge of the paper carried along the edge 129 of the slotted portion 75 in the drum 1, the arm 151 will be so turned that the end 153 carrying the roller 155 will be held securely by the upper end 157 of the spring member 147 and the gripping teeth 127 will be securely held against the paper. At the time when the gripping teeth 127 are turned in a counter clockwise direction by a corre-

sponding motion of the shafts or spindles 115 and 119, the drum 1 has been turned a complete revolution by means of the rotary drive motion imparted thereto by means of the support spindle 131 for supporting the same within the end support members 3 and 5 and deriving its rotational power from the motor contained within the housing member 9, in the manner above described, so that the paper which has been initially gripped by the means of the gripping teeth 93 has been moved around the drum surface 1 to cover all of the drum except the portion left open by the slotted portion 75, and thus when the gripping teeth 127 engage with the paper which has been creased over the edge 129 of the slot 75 by means of the rollers 65 still engaging with the drum, the paper is held securely to the drum surface 1 at both ends thereof.

Now the handle or lever 77 may be moved in the opposite direction from that above described so that the rollers 65 carried by the support plate 69 are raised upwardly from the drum surface 1 against the pressure of the spring members 73 so as to lessen the amount of friction on the drum surface and provide ease in operation.

The complete receiving apparatus is now ready to analyze or reproduce the picture. Similarly, if the apparatus were arranged to transmit a picture, the transmitting operation may be commenced.

After proper adjustments have been made to ascertain whether or not the receiving apparatus, as shown, is in synchronism with a corresponding apparatus at the transmitting station, the switches 131 and 133 are then moved in the direction shown by the arrow and signals will be received. The switch 131 may, for example, be for the purpose of starting the motor contained within the housing 9 and the switch 133 may, for example, be for the purpose of connecting the receiving apparatus with the source of illumination contained within the housing member 17. Thus, the drum 1 will now be continuously rotated in the direction shown by the arrow thereon, and, likewise, the illumination system contained within the housing 17 will be carried longitudinally of the support tracks 25 and 27 until the entire picture has been received.

After the entire picture has been received, it is necessary to remove the record surface which has been fastened upon the drum member 1 by means of the gripping teeth 93 and 127 in the manner above described. Therefore, in order to provide for simplicity of operation and ease of removing the paper from the drum 1, I have provided a simple and efficient means whereby this may be accomplished automatically. Carried by the end support member 5, I have provided a pin 135 which may be moved inwardly in the direc-

tion shown by the arrow on Fig. 2 against the pressure of springs (not shown) so that a portion 137 thereof may engage with the end 139 of the cam shaped stop 88 and move this stop in the opposite direction from which it was moved by engagement with the pin 87 projecting outwardly from the cam surface 83. Thus, the gripping teeth 93 are opened to the position shown by Figs. 1 and 2, and the paper which has been held thereby is released at one end, and as the drum rotates in the direction shown by the arrow the paper is caught by means of a semi-circular plate member 141 so that it will ultimately come to rest upon a support plate 143 arranged beneath the support plate 61 from which the paper was originally fed to the drum.

As the pin 135 has been pushed in the direction shown by the arrow so as to turn the shaft or spindle 91 in a counter clockwise direction and release the gripping teeth 93 from the paper surface, the arm 99 carried thereby is then also moved in a counter clockwise direction and the end 103 thereof resting upon the cam face 112 of the cam 113 will force the cam to the right, as shown by Fig. 2, against the pressure of the spring 117 and cause the end 103 of the arm 99 to rest against the edge 111 of the cam 113. The arm 99 is caused to remain in such position by means of the spring pressure imparted to the end 105 of the arm 99 by reason of the roller 107 resting against the outer edge of the spring 109. Thus, the shaft or spindle 115 has been moved to the right, as shown by Fig. 2, and the cam shaped member 121 rigidly carried by the end of this shaft 115 has likewise been moved to the left and in such position that the edge 159 thereof will come to rest against the stop portion 161 carried by a support member 163 from the end support member 3 of the drum 1, and cause the spindles 115 and 119 to rotate in a clockwise direction and open the gripping teeth 127 and entirely release the paper from the drum so that the finished picture or record may be taken from the support plate member 143. At this time, the arm 151 carried by the end of the shaft 119 opposite the end carrying spring member 117 will also be moved in a clockwise direction and cause the roller 155 carried by the end 153 of the arm to rest against the inner portion of the spring 147 and thus remain in this position.

At this time, the entire picture record has been received and the apparatus is ready to handle still another record assuming that operations similar to those above described are followed.

While I have described my present invention particularly in its application to receiving systems for picture and facsimile work, it is to be understood that the arrangement is likewise applicable to transmitting, and that the only difference existing between the

transmitting and receiving apparatus resides in the fact that instead of the housing 17 containing an illumination system the housing 17 contains a light pick-up system of the general type shown and described in connection with my copending application, Serial No. 360,066, filed May 3, 1929, and that a picture record carried by the drum 1 and fed upon the drum 1 in a manner similar to that set forth and described in connection with a sheet for recording the picture may then be illuminated by an illumination system of the type shown and described in connection with my copending application, Serial No. 321,821, filed November 26, 1928. In such a case, the number of channels of communication in use will, of course, determine the number of separate light beams reflected through the lens system contained within the housing 53 of the support means 17 back to an appropriate number of photo cells or the like, and, where desired, in connection with transmitting systems, the reflected light beams may be split into a number of their component parts by means of any appropriate and chosen form of light chopping arrangement, such as, for example, a disk provided with a series of holes or apertures cut into a metallic plate which is made highly reflecting as has been disclosed by my copending application, Serial No. 360,067, filed May 3, 1929, and also by a light chopping disk of the glass type wherein a plurality of V-shaped notches have been cut into the periphery of the disk as disclosed by my copending application, Serial No. 349,076, filed March 22, 1929.

In view of the above, it is, of course, obvious that my arrangement is not limited to receiving systems of the character described but may also, by simply substituting an illumination system for projecting light on a picture so that it may be reflected to light sensitive mediums for the illumination system for influencing light sensitive recording papers of the type described as being fed upon the roller or drum 1 be adapted to transmission systems.

Also, it is obvious that instead of using a light sensitive recording medium, I may substitute for the illumination system contained within the housing 17 a jet of heated air suitable for influencing a heat sensitive record surface carried upon the drum member so that daylight operation may be provided, as has been claimed and described in connection with my copending application, Serial No. 245,350, filed January 9, 1928 and also by my copending application, Serial No. 128,720, filed August 12, 1926, each disclosing a system for recording pictures and the like by the use of a projected stream of heated air.

Also, by an arrangement of the character herein illustrated and described, it is obvious that the transmitting machine for use in

connection with the receiver of the type herein shown, or a receiving machine applicable for use in connection with a transmitting machine of the type herein illustrated may be of the general type which traces the picture longitudinally line for line on the record drum, since I have provided a system wherein a record surface may be recorded in such a relationship that the circumference of the drum herein provided is substantially equal to the length of the average transmitting cylinder, and, therefore, the only effect produced by utilizing a different form of transmitting or receiving apparatus, would be to shift the entire picture through 90 degrees.

Also, supposing that a picture more closely approximating a half-tone than could be obtained with an arrangement of the type herein illustrated and described were desired, I have provided a means by which the picture after it has been completely recorded may be again received, but in the second receiving operation, the picture may be turned at right angles to the original position so that the lines recorded or transmitted will be also at right angles to the lines of the previous transmitting and receiving action. For such a purpose, I have provided a second guide stop 165 upon the record or recording plate 61, and by using this edge as a guide for receiving the picture or record may be again fed forward to the drum 1 so as to be recorded in a manner similar to that above described and set forth. In the second transmission, care must be exercised that absolute synchronism be maintained, and the transmissions must be started on signal, so that there will be complete overlapping of the two transmissions. The purposes and methods of such double transmission are more particularly described in my copending applications, Serial Nos. 235,431 and 245,350, filed November 25, 1927, and January 9, 1928, respectively.

While my invention has been described particularly in connection with one of its preferred embodiments, the scope thereof is not limited to the particular embodiment shown and described but certain modifications may be made therein, and I believe myself to be entitled to make all such modifications and changes as fall fairly within the spirit and scope of the invention as set forth in the hereinafter appended claims.

Having now described my invention, what I claim and desire to secure by Letters Patent is the following:

1. A system for transmitting or receiving pictures, which includes a picture carrying drum, a scanning system adjacent thereto, means for rotating said drum, means for moving said scanning system longitudinally with respect to said drum and tracing a helical path on said drum, means for varying the speed of rotation of said drum, and means for varying the speed at which said scan-

ning system moves longitudinally of said drum for a varying number of independent scanning paths traced on said drum.

2. A picture transmission system including a picture carrying drum, variable speed means for rotating said drum, a scanning system adjacent said drum, means for moving said scanning system longitudinally with respect to said drum during the rotation thereof, and means carried by said drum for securely gripping a picture surface thereon during the period of travel of said scanning system longitudinal thereof.

3. In a picture transmission system, a record carrying drum, means for feeding a picture surface upon said drum, and claws for gripping said picture surface and holding the same securely upon said drum.

4. In a picture transmission system, a picture carrying drum, a plurality of sets of gripping claws upon said drum for gripping the picture surface thereto, and means for causing said claws to grip each end of a picture surface carried about said drum.

5. In a picture transmission system, a rotatable picture carrying drum having a notched portion extending longitudinally thereof, means for feeding a picture surface thereon, a plurality of sets of gripping claws carried in the notched portion of said drum, a cam means for causing one of said sets of claws to grip one edge of said picture during the rotation of said drum, and means controlled by said gripping action of said first named set of gripping claws for causing the second set of said gripping claws to grip the other edge of said picture after said drum has turned through approximately a complete revolution.

6. In a picture transmission system, a picture carrying drum having a groove extending longitudinally thereof, a plurality of sets of gripping claws carried in said grooved portion of said picture drum, a picture supporting plate carried above said drum, a plurality of rollers above said drum, a cam means for dropping said rollers to rest upon said drum and thereby crease a picture surface supported from said plate in the grooved portion of said drum, means for simultaneously gripping said picture surface and holding the edge thereof securely from the grooved portion of said drum, and means provided by said first named gripping action for causing said second set of gripping claws to grip the other end of said picture surface after said drum has turned through approximately a complete revolution.

7. A picture transmitting system and the like, including a rotatable picture carrying drum having a grooved portion extending longitudinally thereof, a plurality of sets of gripping claws carried in said grooved portion of said drum and extending longitudinally thereof for gripping both the front and

back end of a picture surface carried upon said drum, means for causing said claws to sequentially grip the front and back portion of said picture surface, and means for automatically dis-engaging said gripping claws at the completion of a picture transmission.

8. In a picture transmission system, a rotatable picture carrying drum having a grooved portion extending longitudinally thereof, a support plate mounted above said drum for providing a guide surface for feeding a picture surface upon said drum, a plurality of guide rollers supported above said drum, means for releasing said guide rollers and causing said guide rollers to bear against said drum for creasing said picture surface in said grooved portion of said drum during the rotation thereof, a plurality of sets of gripping claws carried in said grooved portion of said drum, and means for causing one set of gripping claws to grip the said picture surface as said surface is creased in said grooved portion by said rollers, and means operable from said first named set of gripping claws for causing said second set of gripping claws to grip the other end of picture surface after said drum has turned through a complete revolution.

9. The system claimed in claim 8, including in addition, automatic means for releasing said gripping claws from said picture surface after the completion of a complete transmission.

10. In a picture transmission system, a variable speed rotatable picture carrying drum, a scanning system adjacent said drum, means provided by said source of rotational power for said drum for moving said scanning system longitudinally with respect to said drum during the rotation thereof, and a plurality of sets of inter-changeable gears for varying the speed of movement of said scanning system longitudinally with respect to said drum for varying amounts of detail transmitted and received, and for varying numbers of communication channels simultaneously in operation for transmitting and receiving the said picture.

11. In a picture transmission system, a variable speed rotatable picture carrying drum having a notched portion extending longitudinally thereof, a scanning system adjacent said drum, means for causing said scanning system to longitudinally traverse said drum during the rotation thereof, a plurality of sets of gripping claws pivotally mounted in said notched portion of said picture carrying drum, means for causing each of said sets of gripping claws to grip each end of a picture surface wrapped about said picture carrying drum, and means for automatically dis-engaging said gripping claws from said picture surface and releasing the same.

12. In a facsimile system, in combination a picture carrying drum, a pair of gripping

members for gripping a record surface about the periphery of said drum, variable speed means for rotating said drum, a scanning element adjacent said drum for scanning the record surface carried upon said drum, and variable speed means for producing relative movement between said drum and said scanning element and carrying the element system longitudinally of said drum.

13. In a facsimile system, in combination a record carrying drum, a pair of gripping members for gripping a record surface about the periphery of said drum, means for producing rotational movement of said drum and varying the speed of rotation thereof at predetermined time periods, a scanning system adjacent said drum for scanning the record surface carried upon said drum, means for producing relative movement between said drum and said scanning system to cause the scanning system to travel longitudinally of said drum, and means for varying the speed of said longitudinal motion of said scanning system with respect to the drum.

14. In combination, a record supporting drum, means for rotating said drum, means carried by said drum for gripping both ends of a record sheet thereon for securely holding the record during rotational movement of the drum, a longitudinally movable scanning means adjacent said drum for scanning the record surface carried thereby, and means for moving said scanning system longitudinally of said drum at a plurality of predetermined and selected speeds.

15. In combination, a record supporting drum, means for gripping both ends of a record sheet about said drum, a longitudinally movable scanning means for scanning the record surface carried upon said drum, variable speed means for rotating said drum, and variable speed means for moving said scanning system longitudinally of said drum.

16. In combination with a picture reproducing system for transmitting and receiving records, a scanning system for scanning a record surface to be transmitted or received, and means for moving the scanning system longitudinally of the record surface at a plurality of varying speeds.

17. In combination with a picture reproducing system for transmitting and receiving records, a scanning system for scanning a record surface to be transmitted or received, and means for moving the scanning system relative to the record surface at a plurality of predetermined speeds.

18. In combination with a picture transmitting and receiving system, a scanning system for scanning a record surface to be transmitted or received, and means for moving said scanning system relative to said record surface at a plurality of different speeds for varying the scanning detail of said record surface.

19. In combination with a picture transmitting and receiving system, a scanning system for scanning a record surface to be transmitted or received, and means for moving said scanning system longitudinally of said record surface for causing said scanning system to trace a spiral path across said record surface, and means for producing a plurality of different controllable longitudinal speeds for said scanning system across said record surface for varying the pitch of the spiral path traced and thereby varying the scanning detail.

20. In combination with a facsimile transmitting or receiving system having a scanning system for analyzing a record surface, a record carrying drum, means mounted on said drum for gripping both ends of a record surface to be transmitted or received, and means for rotating said drum at a plurality of different speeds for providing flexibility of operation during different transmission and reception conditions.

21. In combination with a facsimile system, a record carrying drum for mounting a record sheet to be transmitted or received, means carried by said record carrying drum for gripping both ends of the record surface securely about said drum, a scanning system adjacent said drum for analyzing the record to be transmitted or received, a lead screw for moving said scanning system longitudinally with respect to said drum during the rotation thereof, and means cooperating with said lead screw for varying the speed of rotation thereof so as to vary the amount of scanning detail on said record surface.

22. In combination with a facsimile system, a record carrying drum for mounting a record sheet to be transmitted or received, means carried by said record carrying drum for gripping both ends of the record surface securely about said drum, a scanning system adjacent said drum for analyzing the record to be transmitted or received, a lead screw for moving said scanning system longitudinally with respect to said drum during the rotation thereof for causing said scanning system to trace a spiral path across the record surface, and means for varying the rotational speed of said lead screw for varying the pitch of the traced spiral path for varying the amount of scanning detail on said record surface.

23. In combination with a picture transmitting system, a record carrying drum, a plurality of sets of gripping members carried on said drum, means for causing one of said sets of gripping members to grip one end of a record surface carried by said drum, and means operable at a predetermined time after the operation of said first set of gripping members for causing the second set of gripping members to grip the other end of the record surface carried upon said drum.

24. In combination with a picture trans-

mitting system, a record carrying drum, a plurality of sets of gripping members carried on said drum, means for causing one of said sets of gripping members to grip the front edge of a record surface carried by said drum, and means operable after substantially a complete revolution of the record drum for causing the second set of gripping members to grip the rear edge of the record surface carried upon said drum.

25. In combination with a picture transmitting system, a record carrying drum, a plurality of sets of gripping members carried upon said drum for gripping the record surface thereto, means for causing one of said sets of gripping claws to grip one end of the record surface, and means for causing the other set of gripping claws to grip the other end of the record surface.

26. In combination with a facsimile transmission system, a record carrying drum having a slot extending longitudinally thereof, a pair of spindles extending longitudinally of said drum in said slot, a plurality of gripping claws carried upon each of said spindles for gripping a record surface upon said drum, means for feeding a record surface upon said drum, and means operable upon feeding said record surface upon said drum for rotating one of said spindles through a predetermined angle in one direction for causing one of said sets of gripping claws to grip the front end of the record surface and the other spindle in another direction for causing the second set of gripping claws to grip the other end of the record surface.

27. In combination with a facsimile transmission system, a record carrying drum having a slot extending longitudinally thereof, a pair of spindles extending longitudinally of said drum in said slot, a plurality of gripping claws carried upon each of said spindles for gripping a record surface upon said drum, means for feeding a record surface upon said drum, means operable upon feeding said record surface on said drum for creasing one edge of the record against one side of said slot, means for causing one of said sets of gripping claws to grip the creased edge of the record surface, and means operable after substantially a complete revolution of the record drum for causing the second set of gripping claws to grip the other end of the record surface.

28. In a picture transmission system, a rotatable picture carrying drum having a slotted portion extending longitudinally thereof, a plurality of sets of gripping claws pivotally mounted in said slotted portion of said drum, means for causing each of said sets of gripping claws to grip one edge of a record surface carried upon said drum during the transmission of the record carried thereby, and means for causing each of said sets of gripping claws to release said record

upon completion of the transmission thereof.

29. In combination with a facsimile system, a record carrying drum having a slotted portion extending longitudinally thereof, a pair of sets of gripping claws carried in said slotted portion of said drum, means for causing said gripping claws to grip opposite edges of the record surface in a predetermined order of operation, and means for causing said sets of gripping claws to release the record from said drum in the inverse order of gripping the record upon said drum.

30. In combination with a facsimile system, a record carrying drum having a slotted portion extending longitudinally thereof, a pair of sets of gripping claws carried in said slotted portion of said drum, means for causing said gripping claws to grip opposite edges of a record surface carried thereby in a predetermined order of operation for holding said record upon said drum, and a spring controlled means for causing said sets of gripping claws to release the record from said drum in the inverse order of gripping the record upon said drum.

31. In combination with a picture reproducing system for transmitting or reproducing picture records, a traversing mechanism adapted to carry interchangeably a scanning system either for scanning a surface to be transmitted or recording a record to be received, and means for moving said mechanism to the record surface at a plurality of varying speeds.

32. In combination with a picture reproducing system for transmitting or reproducing records, a surface for carrying the record surface to be transmitted or a surface upon which the image is to be reproduced, a traversing mechanism adapted to carry interchangeably a scanning system either for scanning the surface to be transmitted or recording an image received upon the recording surface, and means for moving said mechanism relative to said record surface at a plurality of varying speeds.

33. In combination with a picture reproducing system for transmitting image representations of records for transmission or recording image representations for reproduction, a support for supporting the subject an image of which is to be transmitted or supporting a record surface upon which an image is to be reproduced, a traversing mechanism adapted to carry interchangeably a scanning system either for scanning the subject to be transmitted or recording impulses of a received image, and means for moving said mechanism relative to the support surface at a plurality of predetermined speeds.

RICHARD HOWLAND RANGER.

11.

CERTIFICATE OF CORRECTION.

Patent No. 1,803,133.

Granted April 28, 1931, to

RICHARD HOWLAND RANGER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 10, line 98, claim 31, before the word "to" insert the word relative; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 5th day of April, A. D. 1932.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.