

Sept. 25, 1945.

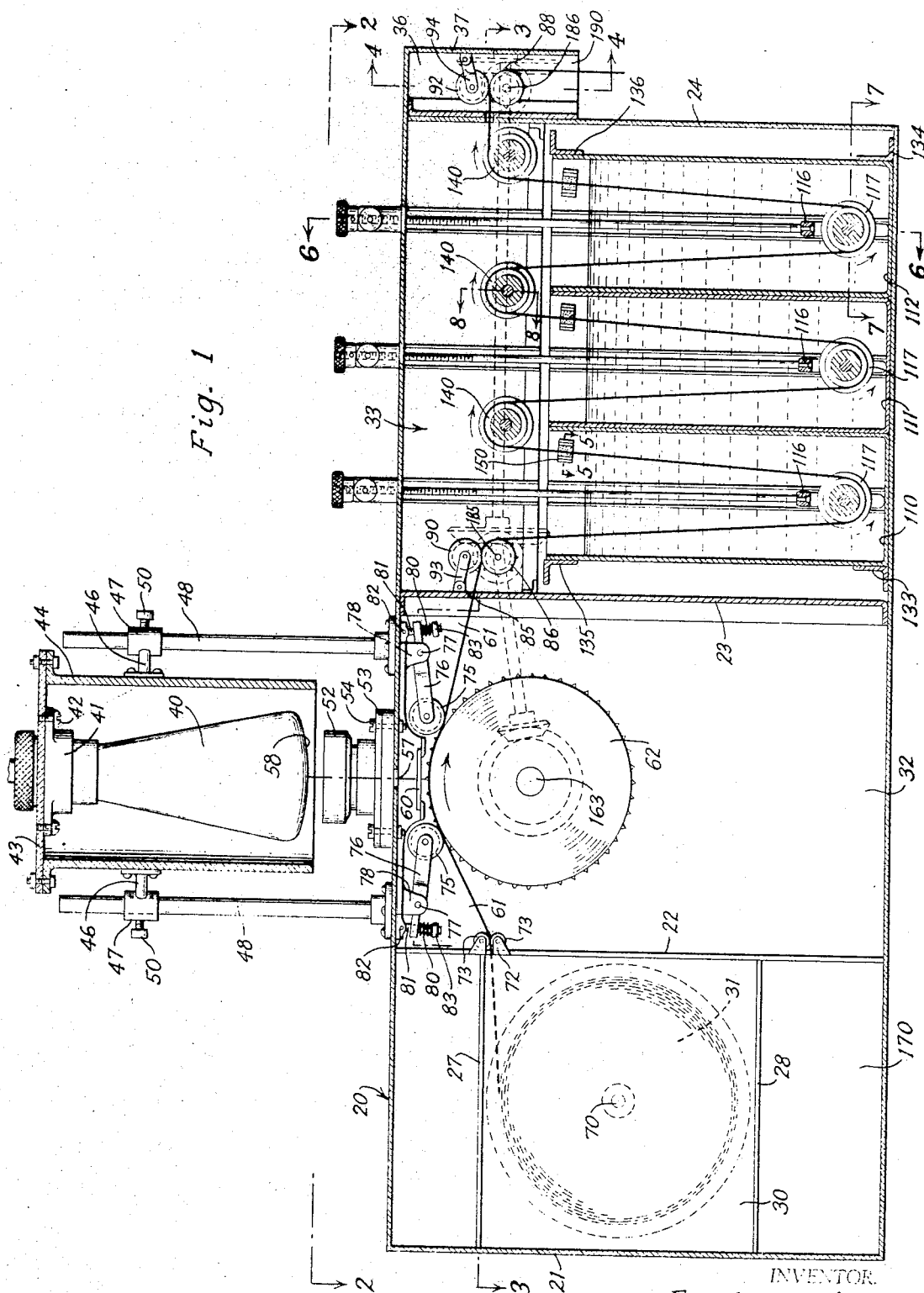
F. R. BRICK

2,385,681

## DEVELOPING APPARATUS

Filed Jan. 27, 1943

3 Sheets-Sheet 1



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Sept. 25, 1945.

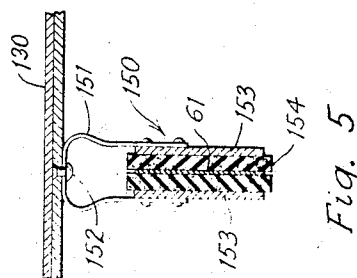
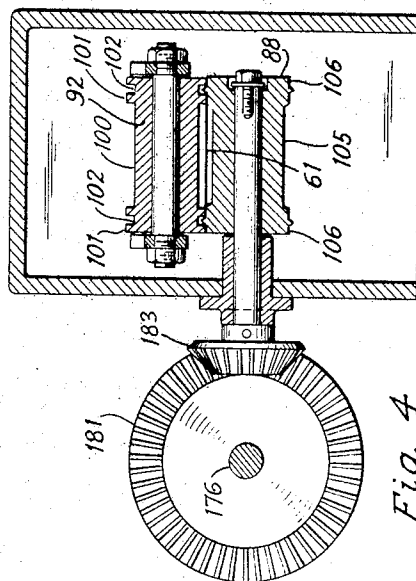
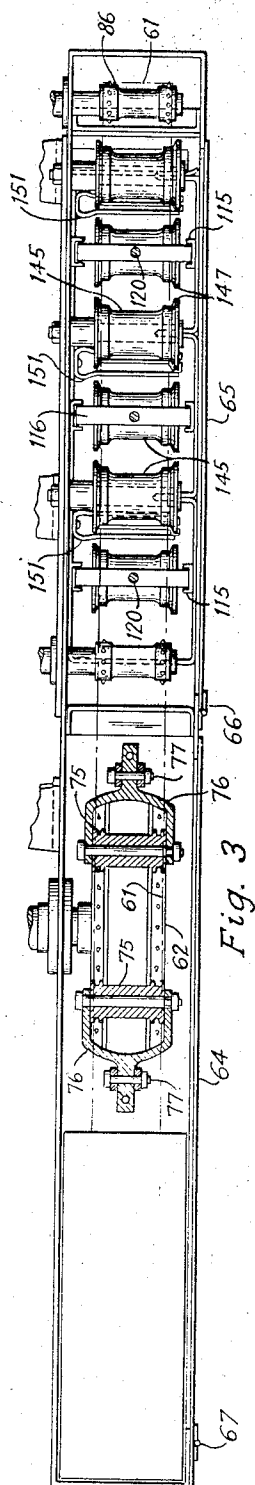
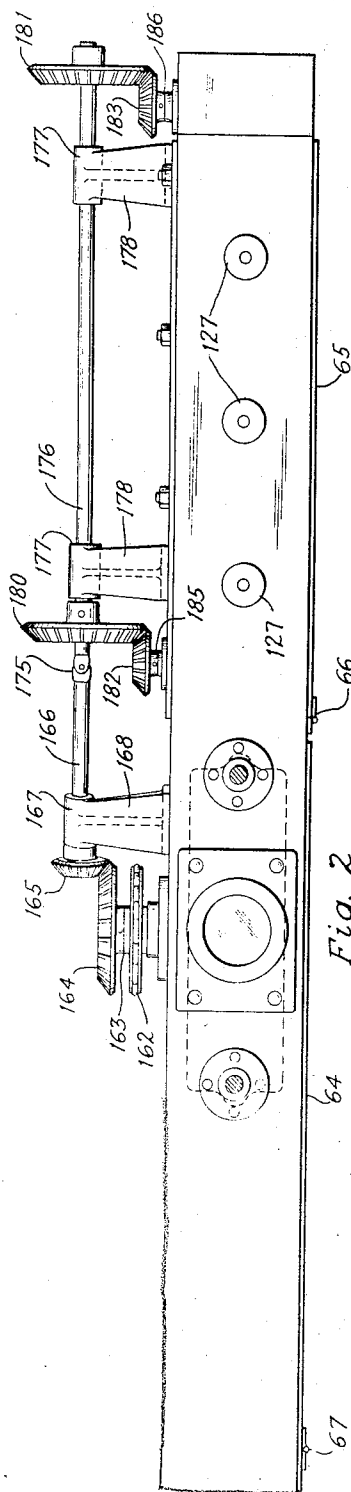
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2,385,681

DEVELOPING APPARATUS

Filed Jan. 27, 1943.

3 Sheets-Sheet 2



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DEVELOPING APPARATUS  
Filed Jan. 27, 1943

2,385,681

3 Sheets-Sheet 3

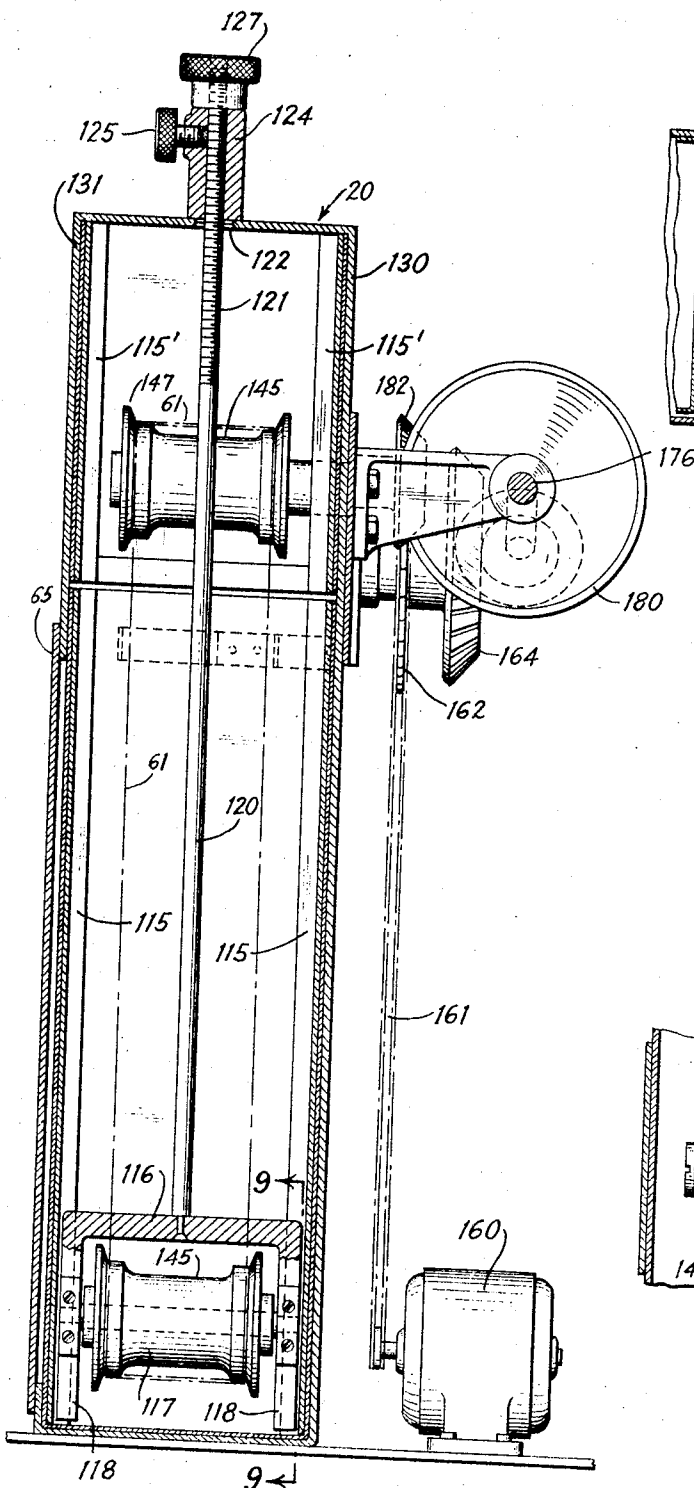


Fig. 6

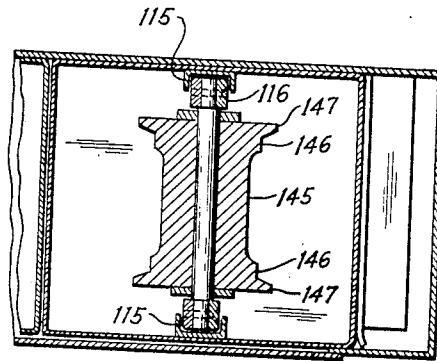


Fig. 7

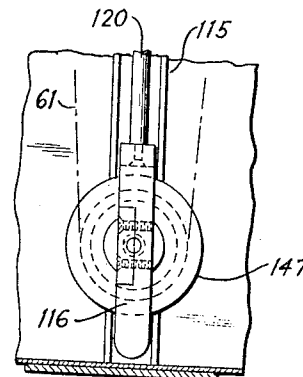


Fig. 9

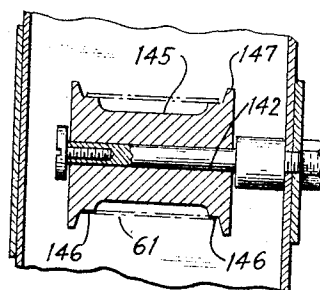


Fig. 8

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## UNITED STATES PATENT OFFICE

2,385,681

## DEVELOPING APPARATUS

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Application January 27, 1943, Serial No. 474,517

3 Claims. (Cl. 95—94)

This invention relates to high speed developing apparatus and more particularly to high speed facsimile systems wherein the received signal impressed upon a cathode ray tube and energizes the same to produce both the scanning of a recording paper and variations in the intensity of the various elemental shades recorded thereon.

In the development of facsimile apparatus of various kinds, the original goal was simply the production of any kind of picture record thereon. This in itself was considered a desirable end.

As the methods of transmission and reception of facsimile signals improved, the mere production of a picture was taken for granted, and all efforts were directed at improvement in the recorded picture itself so that the record made by the facsimile receiver approached closer in accuracy and appearance to the original transmitted image.

Various problems, inherent in the creation of a perfect facsimile reproduction, were solved by the improvement and development of new synchronizing apparatus, as set forth in Patent Nos. 2,296,274 and 2,290,231; by the improvement in scanning systems, as shown in Patent No. 2,212,970 and by improvements in methods of transmission and reception, as shown in Patent Nos. 2,082,692 and 2,290,229.

Recently, however, an entirely new problem arises in the transmission and reception of facsimile reproductions. While accuracy in detail and transmission is important, in many instances, quality of the reproduced image is secondary to the speed of transmission and reception of the image. The prime desideratum in many applications of facsimile transmission and reception is the reception of a recorded image by means of simple and uncomplicated apparatus and at very high speed.

Thus, while in the facsimile systems, set forth in the patents above mentioned, it was possible to obtain a scanning rate as great as one hundred lines per minute, and even more, thus scanning a sheet eight inches per minute (or eight square inches per minute) and even faster; nevertheless, in high speed operation for the facsimile transmission of written messages or of diagrams, it is necessary to operate at a much greater rate, while at the same time maintaining the simplicity of the apparatus itself.

The principal distinction between facsimile transmission and reception and television transmission and reception is that in the first instance a recorded image is directly made which is retained permanently in record form; in television

systems, an instantaneous momentary visual image is made, which is not retained.

The present invention provides for a simplified high speed facsimile reception apparatus which is rugged in construction; and has a minimum of moving parts; is simple in operation; and which is so arranged that high speed may be maintained at all times without any complex operations or adjustments.

While the primary purpose of the apparatus is to provide for high speed reception, it is so arranged, however, that quality reproduction is also possible, and so that the image received may be of a character approaching in its various shades and tones the quality of the transmitted image.

My apparatus embodies mechanism for moving sensitized recording paper rapidly past a cathode ray tube and thereafter rapidly developing the recording paper.

My mechanism further embodies means for moving the electron stream of the cathode ray tube to various successive positions which will determine not merely the intensity of the received image but also the scanning rate thereof.

As the cathode ray beam or electron stream is moved from side to side across the fluorescent screen of the cathode ray tube, the oscillating spot is recorded on the sensitized paper in the form of a scanning line. Also, as the fluorescent spot is moved outwardly or downwardly in a direction normal to the scanning direction, it may move into softer and sharper focus with respect to the sensitized recording paper and thus produce a darker or lighter spot thereon.

The principal object of the present invention, therefore, is the production of a high speed facsimile receiving system.

An additional and corollary object of the present invention is the utilization in a high speed facsimile receiving system of a cathode ray tube as the scanning and recording medium operative on a sensitized record sheet.

Another object of the present invention is the provision of means for moving the sensitized record sheet past the face of the cathode ray tube in order to record the various positions of the fluorescent image thereon.

Materials are known which, when subjected to the influence of light or even of a fluorescent light spot of a type produced by cathode ray tube, will retain an image thereon. However, such images are rather weak and relatively transient; they may suffice for immediate transmission and reception of a signal, but are not efficient where permanent records are to be made.

Where a permanent record is desired, the best method is to utilize a recording paper coated or impregnated with a photo-sensitive emulsion similar to that used in ordinary photographic apparatus and to provide in connection therewith means for rapidly developing the latent image produced by the impingement of light.

Accordingly, another object of this invention is the provision, in connection with facsimile receiving apparatus, of high speed development means for photo-sensitive recording paper whereby a latent image thereon may be rapidly developed for visual examination.

Still another object of this invention is the provision of means for synchronizing the movement of the photo-sensitive recording medium past the face of the cathode ray tube in order to obtain a coherent image thereon.

These and many other objects of the present invention will be apparent and, where not apparent, pointed out in the following description and drawings in which:

Figure 1 is a partly schematic view in cross section showing the facsimile receiving apparatus of the present invention.

Figure 2 is a top plan view taken along line 2—2 of Figure 1.

Figure 3 is a cross sectional view taken along line 3—3 of Figure 1 looking in the direction of the arrows.

Figure 4 is a cross sectional view taken along line 4—4 of Figure 1.

Figure 5 is a cross sectional view taken along line 5—5 of Figure 1.

Figure 6 is a cross sectional view taken along line 6—6 of Figure 1 looking in the direction of the arrows.

Figure 7 is a cross sectional view taken along line 7—7 of Figure 1 looking in the direction of the arrows.

Figure 8 is a cross sectional view taken along line 8—8 of Figure 1.

Figure 9 is a cross sectional view taken along line 9—9 of Figure 1.

Referring now to Figure 1, I have here shown partly in cross section a facsimile receiving machine, in accordance with the present invention, which comprises a main housing 20 having a plurality of vertical supporting cross members 21, 22, 23, and 24, and horizontal partitioning and supporting members 27, 28. The housing itself is divided substantially into three parts by the various vertical partitioning members. Section 30, defined by the vertical members 21 and 22, and the horizontal members 27 and 28, serves to house the supply roll 31 of sensitized paper. Section 32, defined by the top and bottom walls and the vertical partitions 21 and 23, houses the principal guiding and feeding mechanism for the sensitized recording paper. Section 33, defined by the top and bottom walls, and by the vertical partitions 23 and 24, houses the developing apparatus for the sensitized recording paper. Section 36, defined by the vertical outside wall 24 and the outer protective casing 37 houses the feed-out mechanism which delivers the finished developed strip.

The cathode ray tube 40 is secured to its own base 41 which, in turn, is secured in any suitable manner as, for instance, by the screws 42 to the top plate 43 of the circular housing 44 which surrounds and protects the cathode ray tube.

The housing 44 carries on opposite sides thereof a pair of extensions 46, 46 at the ends of

which are secured a pair of sleeves 47, 47 which are adapted to fit over standards 48, 48 secured to the top wall of the housing 20.

Set screws 50, tapped through openings in the sleeves 47, are rotatable into engagement with the standards 48 to fix the position of the housing, and hence of the cathode ray tube 40 with respect to the remainder of the apparatus.

A lens system 52 is mounted on a suitable base 53 which, in turn, is secured in any suitable manner as, for instance, by the bolts and nuts 54 to the top wall of the housing.

A suitable opening 57, in the form of a slot, is provided in the top wall of the housing immediately below the lens system to permit the fluorescent spot on the face 58 of the cathode ray tube to be focused therethrough.

The fluorescent spot is brought to focus through the filter plate 60 (the function of which is hereinafter more specifically described) on the sensitized recording paper 61 which moves over the feeding sprocket 62.

The housing, as may readily be seen in Figures 2 and 3, is provided with two side doors 64 and 65 which may be removed in any suitable manner, but which are preferably swung on the hinges 66 and 67. When the door 64 is swung open on its hinge 67, sections 30 and 32 of the interior of the housing are opened. The supply roll 31 of the sensitized recording material may then be placed on the shaft 70 which extends from the opposite side of the housing. The sensitized recording paper is then threaded through the slot 72 in the vertical partition 22 between the guide rollers 73, 73 and over the sprocket wheel 62.

In order to ensure a positive feed of the sensitized recording paper 61, this paper is provided with a plurality of spaced openings along the side thereof in the manner of motion picture film, which openings are engageable by the teeth of the sprocket. The recording paper is held securely against the face of the sprocket 62 by means of the pressure rolls 75, 75, each of which is mounted at one end of a lever 76 pivoted at 77 on a bracket 78 depending from the upper surface of the housing.

The roller carrying ends of each of the levers 76 is urged downwardly by means of compression spring 80 mounted on the shaft 81, pivoted at 82 on the bracket 78, and captured between the opposite end of the lever 76 and the lock nut 83.

The sensitized recording paper 61 is then threaded through a slot 85 in the vertical partition 23 over the sprocket 86, then over the various pulleys in and above the developing tanks, as hereinafter more fully described, to the feed-out sprocket 88.

Sprockets 86 and 88 may also be provided with pressure rollers 90 and 92 rotatably mounted on the swinging arms 93 and 94. These rollers may be urged downwardly by means of the compression spring 80 mounted on the shaft 81, pivoted at 82 on the bracket 78, and captured between the opposite end of the lever 76 and the lock nut 83. The sensitized recording paper 61 is then threaded through a slot 85 in the vertical partition 23 over the sprocket 86, then over the various pulleys in and above the developing tanks, as hereinafter more fully described, to the feed-out sprocket 88. Sprockets 86 and 88 may also be provided with pressure rollers 90 and 92 rotatably mounted on the swinging arms 93 and 94. These rollers may be urged downwardly in any suitable manner, either by their own weight,

as shown in Figure 1, or by any suitable pressure medium, such as springs.

The pressure rollers 75, 90 and 92 may each have a form, more fully shown in the cross sectional view of Figure 4, where the pressure roller 92 is shown.

It will be obvious that it is important that pressure must be maintained on the sensitized recording paper in order to hold the same in engagement with the socket. However, this pressure need not necessarily be over the entire surface of the recording paper, and it is preferred, indeed, that the pressure be maintained only at the margins. The margins of the paper, however, are engaged by the sprockets of the sprocket wheels.

Accordingly, each of the pressure rollers 75, 90, and 92 are provided, as seen in the cross sectional view of Figure 4, with a central annular recess 100 substantially equal in width to the recording surface of the sensitized record sheet 61. Each roller is provided with outer annular flanges 101 engageable with the margin of the sensitized recording sheet. Each of the flanges 101 is provided with an annular groove 102 which will clear the sprockets of the sprocket wheel (sprocket wheel 88 in the illustration of Figure 4).

In addition, each of the sprocket wheels 62, 86 and 88 of Figure 1 may have the same general form as the sprocket wheel 88, shown more particularly in Figure 4, that is, sprocket wheel 88 may have a central annular recess 105, which clears the recording surface of the sensitized record sheet 61 and thus does not tend to mar it any way, and outer annular flanges 106 carrying sprocket teeth for engagement with the marginal openings in the recording sheet.

When the door 65 is swung on the hinge 66, then the developing tank section 33 of the apparatus is open. This section consists preferably of space for three tanks 110, 111 and 112. Tank 110 is filled with a suitable developer; tank 111 with a suitable fixing solution; and tank 112 with a suitable washing medium such as ordinary water.

Each of the tanks, as is seen in Figures 1, 6, and 7 (particularly Figure 7) is provided with a vertical channel 115 on each side preferably centrally located. The channels 115 provide guide rails for the yoke 116 (see particularly Figure 6) which carries the guide pulley 117 rotatably journaled between the tines 118, 118 thereof. Each of the yokes 116 in each of the tanks has secured thereto at its upper end a vertical rod 120, the upper end of which is threaded at 121 and is adapted to project through the opening 122 in the top surface of the housing. The opposite side walls 130, 131 at the upper portions of the housing (Figure 6) are provided with channel shaft rails 115' registering with the channel member 115, 115 in the tank.

The upper end of each of the rods 120 carries a sleeve 124 thereon, the said sleeve having an outer diameter greater than that of the opening 122 and carrying also a set screw 125. The outermost ends of the rod 120 each carries an adjustable nut 127 threaded on the threaded end 121 of the rod 120. After the door 65 has been opened, the set screws 125 are loosened and the rods 120 are lifted upwardly until the yokes 116 and their associated pulleys 117 ride up onto the rails 115' and clear the tops of each of the tanks 110, 111 and 112. The set screws 125 on each rod may then be tightened with the sleeve 124 bearing against the upper surface of the housing there-

by maintaining the rods 120 and the pulleys 117 in raised position. The tanks 110, 111 and 112 may then be removed. After they have been cleaned and refilled, they are then replaced in the housing.

Section 33's placement and spacing are approximately guided by the flanged cross bars 133, 134, 135 and 136. Bars 133 and 134 are secured to the bottom wall of the housing in appropriate spaced relation. Bars 135 and 136 are supported from at least one of the side walls of the housing.

On replacement of the refilled tanks 110, 111 and 112, the sensitized record sheet, which has already been threaded over the sprocket 62 and over the sprocket 86 is not threaded under the pulley 117 of tank 11. The set screw 125 of the rod carrying this pulley is now loosened, and the yoke 116 carrying the pulley now slides down the rail 115' onto the rail 115 of tank 110. The free end of the sensitized record sheet now is passed over the first guide pulley 140 and again is passed beneath the pulley 117 of tank 11 which is now slid down in the same manner as was the first pulley of tank 110. The recording sheet is then passed over the top of the second pulley 140 between tanks 110 and 112, and then under the pulley 117 which is again slid down, and then once more over the thread of the upper guide pulley 140 onto the delivery or feed-out sprocket 88.

Should it be desirable to adjust the depth of the pulleys 117, then the set screw 125 on sleeve 124 may be loosened, and the nut 127 may be rotated thus raising or lowering the pulleys 117, and the set screw 125 may then be tightened once more.

The pulleys 117 are thus simply guide pulleys and need not be rotated. Likewise, the pulleys 140, as may readily be seen in Figure 8, are simply supported on a stub shaft 142 extending from one of the side walls of the housing. Each of the guide pulleys 117 and 140 may, as seen in Figures 7 and 8, have a central recessed portion 145 substantially equal in width to the recording area of the sensitized record sheet and thus out of contact therewith. They each also have a marginal record sheet supporting area 146 on each side on which the record sheet may bear, and retaining flanges 147, 147 to accurately position the record sheet.

Again, the pulleys are so arranged that no contact is made at any time in the process with the recording surface of the record sheet, and the developing fluids may flow freely about the record sheet even while it is on a pulley 117.

Each of the tanks 110, 111 and 112 is provided with a squeegee 150 at its upper end. The squeegee, as seen more particularly in Figure 5, consists of a spring metal member 151 suitably secured to the side wall of the tank in any appropriate manner, preferably by the rivet 152.

The tines of the spring metal member carry secured thereto squeegee support members 153, 153 to carry the squeegee material 154 which may be sponge rubber, solid rubber, or any other suitable squeegee material.

After the record paper has been threaded over the various pulleys, and the pulleys inserted in the tanks, the sensitized recording paper 61 is slid between the squeegee member 153. This is possible since the squeegee members are located at the tops of the tanks and may be readily reached therefrom. The tanks are here shown so arranged that they may readily be removed and replaced for drainage, cleaning and filling purposes.

It is obvious, however, that various modifications may be made and drains may be inserted in the tanks to permit the draining of exhausted fluids and replacement thereof by fresh developing and fixing fluids.

However, the present method makes possible the thorough cleaning of the tanks before refilling thereof and facilitates the threading of the sensitized recording sheet on the various pulleys which guide the same through the tanks.

The only members which must be driven in this present device are the feed sprockets 62, 86 and 88. The feed sprocket 62 is driven from the motor 160, mounted on a platform at the base of the apparatus (see Figure 6). This motor, if desired, may be mounted in the compartment 170 beneath the supply roll 31, or may be mounted in the base of compartment 32 which is the preferable location. However, for purposes of simplicity in illustration, this motor has been shown mounted outside the housing. Similarly, the various connecting members, especially the connecting members between the motor and the main sprocket, may also be mounted within the section 32 of the housing; although these connections are shown outside the housing.

Likewise, the various connecting members to the sprockets 86 and 88 may readily be mounted within the housing on either side of the developing tank section although, as in Figures 2 and 6, they are shown mounted outside the housing.

The motor 160 is connected by the chain 161 to the driving sprocket 162 which is mounted on the shaft 163 which carries the main feed sprocket 62. Consequently, rotation of motor 160 results in operation of the feed sprocket 62 and the drawing of the sensitized paper from the supply roll 31. The opposite end of shaft 163 carries the bevel gear 164 which meshes with the bevel gear 165 which, in turn, rotates the shaft 166 journaled in the bearing 167 on the bracket 168 extending from the housing. Shaft 166 is connected by the universal joint 165 to the shaft 176 journaled in bearings 177, 177 mounted on brackets 178, 178 on the side of the housing. Shaft 176 carries bevel gears 180 and 181 which mesh respectively with bevel gears 182 and 183. Bevel gear 182 drives the shaft 185 which carries sprocket 86, and bevel gear 183 drives the shaft 186 which carries feed-out sprocket 88.

The gear ratios are so arranged as to cause the peripheral speed of each of the sprockets 62, 86 and 88 to be substantially the same. In other words, therefore, it will be necessary for sprockets 86 and 88 to rotate at a much greater speed than sprocket 62. Sprocket 62 is of enlarged diameter so that the scanning surface presented for the scanning medium when the recording sheet 61 is on sprocket 62 is relatively plane. Since the scanning area is very narrow, however, it is essential that the recording sheet travel in a perfect plane at the time of scanning. It is sufficient if it is curved on a relatively large diameter which is provided by the increased size of the sprocket 62.

The universal joint 175 between the shafts 166 and 176 will result in some unevenness in the rotation of shaft 176 and consequently in some unevenness in the rotation of sprocket wheels 86 and 88. This is a known characteristic of universal joints. The unevenness occurs twice in each revolution of shaft 176; that is, shaft 176 will reach a maximum and a minimum speed twice in each cycle. However, owing to the high speed drive from shaft 176 to shafts 185 and 186,

such maximum and minimum speed will occur many times in the rotation of sprockets 86 and 88 and will occur to a much less extent in each case thus tending to iron out the rotation thereof to a substantially constant average speed, and thus diminishing any excessive pull on the sensitized recording sheet 61.

Such rapid variations between a slightly elevated and slightly lessened speed will not, therefore, tend to pull the paper unduly. However, in order to obviate any possibility of the tearing of the paper, a small amount of slack may be left between the sprockets 62 and 86 so that the sensitized recording sheet 61 will sag slightly therebetween.

The sprockets 86 and 88 have exactly the same characteristics of rotation so that no slack is necessary therebetween although it may be provided. It is preferred, however, in order to ensure the proper movement of the recording sheet 61 through the developing tanks that substantially no slack be provided between the sprockets 86 and 88. This will further ensure that the sensitized recording sheet 61 will always travel on the annular surfaces 146 of each of the pulleys 117 and 140 and will not be removed therefrom.

I have found in actual operation that no short stop bath of any kind is essential in the development of the sensitized sheet. Proper adjustment of the developing bath with respect to the time during which the sheet travels therein coupled with the squeegee action of the squeegee member 150 prevents to a substantial extent any intermixture of the materials of the various baths.

Obviously, all of the doors and openings of the housing 20 are light-tight to prevent any stray images on the recording sheet. Likewise, the housing member 44 for the cathode ray tube may be extended downwardly to the upper surface of the housing 20 to produce a light-tight seal thereat. This is essential since the lens system 52 is so arranged that it will gather light from the face 58 of the cathode ray tube and since the interior of the housing 44 may be coated with a dead black paint to prevent reflections therefrom.

However, to ensure perfect operation and to provide against any possibility of stray light impinging on the recording sheet, an adjustable sleeve may be mounted over the housing 44 to be telescopically pressed down to cover the space between the lower end of housing 44 and the upper surface of the housing 20.

The operation of this device is quite simple. The sensitized recording sheet 61 is drawn from the supply roll 31 by the main sprocket 62; is scanned by the electron beam from the cathode ray tube 40; is then drawn onwardly by the sprocket 86; is then fed under pulleys 117 and over pulleys 140 through the various tanks to the feed-out sprocket 88; and is fed downwardly therefrom through the opening 190 whence it may be drawn off and read.

The recording tape, after it leaves the opening 190, may pass over any suitable platen of any suitable length where it may easily be read and then be led to a wind-up reel where it may be preserved. The latter, however, is not essential.

The flange 37 is provided in order to further ensure the light-tightness of the device. The interior of the flange 37 is coated with a dead black paint to prevent light reflections therein so that it is extremely unlikely that any light will be reflected up through the opening 190 and then through the slot 191 in the end wall 24 into

developing tanks. Again, owing to the squeeze action which occurs, especially after the recording sheet 61 leaves the last tank 112, it has been found that the sheet 71, when it is withdrawn through the opening 190, is only slightly damp and may easily be handled and read.

Various methods may be utilized to operate the cathode ray tube to produce a scanning of the sensitized recording sheet 61. One such method is shown in Patent No. 2,082,692.

Various other methods may be utilized to maintain synchronism between the movements of the sensitized recording sheet 61 and the scanning operation of the cathode ray tube. Such methods may include the tuning fork synchronizing system shown in Patent No. 2,178,394.

In the foregoing I have set forth my invention relating to a high speed sensitized paper feeding medium and development means in one preferred embodiment thereof. Many variations in the various steps of the process and in the various parts of the apparatus should now be obvious to those skilled in the art.

Also, while I have set forth my invention in connection with but one type of transmitting and receiving medium and one simplified form of synchronizing apparatus, various other types of transmitting and receiving apparatus and various other types of synchronizing operations may be used in connection with my present invention. Accordingly, I prefer to be bound not by the specific disclosures herein but only by the appended claims.

#### I claim:

1. In a high speed facsimile recorder adapted to receive and record light impressions on a moving record strip, a developing tank, the said tank having an open top and a closed bottom and a pair of substantially parallel side walls, rail members arranged vertically along the interior of each of said parallel side walls and disposed substantially opposite each other, a yoke member adapted for vertical sliding movement in said rail members and positioned by said rail members between said side walls, a pulley rotatably carried by said yoke, and means for raising and lowering said yoke, said tank being removable from and insertable in the remainder of the apparatus, said apparatus having a frame surrounding and positioning said tank including a pair of spaced wall members above the top opening of said tank and extending in planes substantially parallel to the parallel pair of wall members of said tank, a pair of rail members in said last mentioned wall members of said frame, said rail members being aligned with the respective rail members of the tank when the tank is in position in said frame, said yoke being slidable out of the tank from the rail members of the tank on to the rail members of the frame, said tank being thereby removable from said apparatus while said yoke and pulley remain therewithin.

2. In a high speed facsimile recorder adapted to receive and record light impressions on a moving record strip, a developing tank, the said tank

having an open top and a closed bottom and a pair of substantially parallel side walls, rail members arranged vertically along the interior of each of said parallel side walls and disposed substantially opposite each other, a yoke member adapted for vertical sliding movement in said rail members and positioned by said rail members between said side walls, a pulley rotatably carried by said yoke, and means for raising and lowering said yoke, said tank being removable from and insertable in the remainder of the apparatus, said apparatus having a frame surrounding and positioning said tank including a pair of spaced wall members above the top opening of said tank and extending in planes substantially parallel to the parallel pair of wall members of said tank, a pair of rail members in said last mentioned wall members of said frame, said rail members being aligned with the respective rail members of the tank when the tank is in position in said frame, said yoke being slidable out of the tank from the rail members of the tank on to the rail members of the frame, said tank being thereby removable from said apparatus while said yoke and pulley remain therewithin; said means for raising and lowering said yoke comprising a rod attached to said yoke, said rod passing upwardly between the spaced walls of the tank and the spaced walls of the frame, a support mounted across the top of the spaced walls of the frame, means in said support for slidably receiving said rod, and additional means in said support for locking said rod in selected position.

3. In a high speed developing system, a frame having a top wall, end walls, side walls and a bottom wall, a slot in each of the end walls for permitting the passage thereof of a sensitized record strip, openings in one of the side walls and covers therefor, a developing tank, means associated with the bottom wall for positioning said tank in said apparatus through the openings in said side wall, a pulley carried within said apparatus above the top of said tank, means in said tank for positioning a pulley adjacent the bottom thereof, said pulleys comprising means for guiding said record strip from the slot in one end wall through the tank to the slot in the opposite end wall, said means for positioning a pulley adjacent the bottom of the tank comprising a pair of spaced substantially vertical channel shaped members in the interior of the tank, a yoke spanning the distance between said channel shaped members and slidable vertically therein, said yoke carrying said pulley, the parts of the side walls of the apparatus above said tank also carrying a pair of spaced channel members, the spaced channel members in said tank being alignable with the spaced channel members on said side walls of said apparatus, said yoke being slidable from the channel members of said tank out of the tank and onto the spaced channel members carried by the side walls of said apparatus.

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