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FORM-PRINTING FACSIMILE RECEIVER

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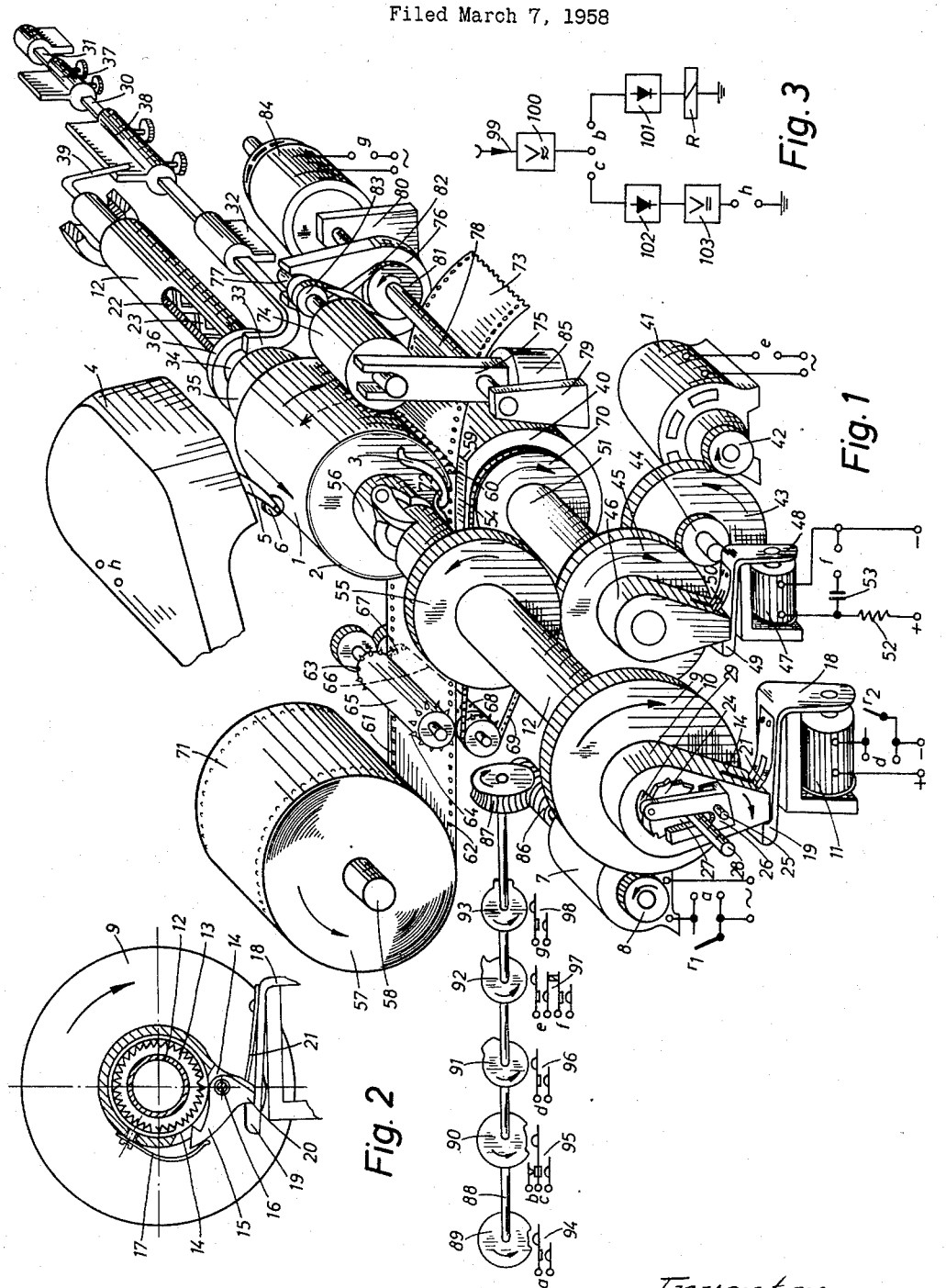

Fig. 1

Fig. 2

Fig. 3

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FORM-PRINTING FACSIMILE RECEIVER

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This invention is concerned with a facsimile receiver for receiving and for printing the contents of copies or forms such as tickets issued to travellers, checks and the like.

A great number of facsimile methods and receivers are known, comprising a writing or printing system which responds only to current with two different constant amplitudes for registering upon a record carrier in purely black and white recordings, line drawings, written texts and the like, corresponding to information transmitted from a facsimile transmitter, to provide a visible recording or a recording that may be made visible subsequently. The record carrier may, for example, consist of ordinary paper upon which the recording is impressed by means of an electromagnetic writing or printing system. Special paper impregnated with an electrolyte is also being used, upon which a visible recording is effected due to chemical discoloration incident to passage of current from a positively actuated writing electrode. Special metallized or graphitized paper is further being used upon which recordings are effected by arcing, thereby leaving visible recording in the form of burned-in markings.

The apparatus usually provides for rotating drums carrying the record carrier wound thereon, and a writing system adapted to execute relative to the superficies of the drum a continuous or intermittent advance motion, thereby effecting the recording in the form of a composite helical line or within similarly spaced circular lines.

There are also known facsimile page printers in which the recording is effected upon ordinary paper, by means of a rotating continuously inked spiral or, requiring special paper, by means of writing or printing electrodes carried by a movable endless tape or chain.

Finally, there is a facsimile page printer known, in which individual lines are impressed upon an endless band serving as an intermediate carrier, the entire line being subsequently recorded upon a paper page by means of a printing mechanism which operates against the intermediate carrier.

A demand has recently arisen for transmitting from a central office or from several offices, by facsimile transmsision, to different places which may frequently be quite distant, the contents of or information entered upon certain forms, for example, tickets issued to travellers, checks and the like.

In the case of issuing tickets for railway or air travel, within a farflung network, at way stations serving as stops, the usual practice is to order the tickets, for example, at a travel bureau, which must first obtain information from a central place, as to the availability of accommodations of the desired class and kind, for the intended trip and the designated date. On the other hand, tickets are being issued or held in readiness, at ticket counters of stations where express trains stop, a procedure which is not feasible for travel means such, for example, as air planes or sleeping cars, adapted to

accommodate only limited numbers of travellers that cannot be exceeded. In very large countries such, for example, as the United States of America and the Soviet Union, where trips may take extended times, there are in the transport lines always only a limited number of accommodations, for example, sleeping car places which are readied for seating during the day. It is similar in the case of air travel, where the reservation of available seats is still more critical. Now, since every way station or airport cannot be informed about the reservations on a train or on an airship, the issuance of tickets at such way stations or airports, without having information concerning the availability of accommodations, becomes very problematical.

There is, therefore, a need for equipping the way stations and airports with facsimile receivers connected with a central office or several central offices, that can transmit, responsive to telephone request or written request, the data to be entered in standardized ticket forms kept at the corresponding location, including station name, date, class of service, distance, kind of seat, seat number, number of seats, price, etc., thus excluding duplication in the sale of seats and at the same time facilitating sale of available seats.

Following this procedure, the way stations will be enabled to eliminate costly ticket printers or keeping an inventory of a great number of different tickets. The requirement is in such a case, that the transmission is quick and that it should contain only the absolutely required information, ignoring in the corresponding recording printed text portions provided on the forms. In addition, the ticket forms must either be perforated and taken successively from a roll or the like, or the individual forms or tickets must be fed to the facsimile receiver from a stack, by a suitable feed mechanism, without requiring wrapping of each individual form about a receiver drum. Finally, the receipt and printing of the text to be entered must be fully automatic and free of any manipulations requiring an operator.

According to the invention, this object is realized by the provision of a facsimile receiver, comprising at least one drive motor, a rotating receiver drum provided with a foil adapted to accept inking and to transfer it to paper, an electromagnetically controlled phase clutch between the drive motor and the receiver drum, which keeps the receiver drum in declutched condition in a defined zero-position, an electromagnetic writing or printing system adapted to execute a relative steady or stepwise advance motion with respect to the superficies of the drum and can upon energization give off ink to the drum surface, a printing drum disposed parallel to the receiver drum and provided with a flattened portion or several flattened portions in an axial spacing which equals the sum of both radii, drive means for imparting to the printing drum and the receiver drum, after conclusion of the recording, a rotation or several complete rotations such that the drums are rotated one with respect to the other, whereby the facsimilogram is printed once or several times upon a form automatically introduced between the receiving drum and the printing drum, a cylindrical wiping roller disposed in parallel to the receiver drum and provided with a felt covering, a pressure-executing and drive device for the wiping roller adapted to move it after conclusion of the printing operation to contact with the receiving drum and thereafter to rotate it, thus effecting between the receiving drum and the wiping roller a relative wiping motion and causing the wiping roller to move after conclusion of the wiping operation away from the receiving drum and to stop, an automatic transport and feed device for the forms which is controlled by the rotation of the printing drum, an adjustable program control with a plurality of cams and contact sets, driven by

the drive motor of the receiver drum, for successively switching the individual operations, a receiver circuit, comprising preamplifier means the output of which branches in two amplifier channels, one branch comprising mainly a rectifier and a receiver relay and the other consisting essentially of a rectifier, a direct current amplifier, and an electromagnetic drive for the writing or printing system.

In accordance with another object and feature of the invention, the relative advance of the writing or printing system, with respect to the receiver drum, is effected faster at places where no recordings are to be made upon the receiver drum in axial direction than at places where recordings are to be effected.

In accordance with a further object and feature of the invention, parts of the recording which are spatially separated in the circumferential direction are upon printing reproduced by variable paper advance, with another spacing than that of the drum.

The various objects and features of the invention will appear from the description which will be rendered below with reference to the accompanying drawing, showing an embodiment of the invention. In the drawing,

Fig. 1 is a perspective view of an embodiment of the printing facsimile receiver;

Fig. 2 shows the phase coupling; and

Fig. 3 shows a circuit for the receiver.

In Fig. 1, numeral 1 indicates the receiver drum carrying a foil 2 adapted to accept ink and to give off ink to a paper. The foil may be made of rubber or suitable synthetic material. The foil is exchangeable and is fixed upon the drum 1 by means of a pivotally disposed lever 3. The writing or printing head 4, which may be constructed in accordance with the disclosure contained in the U.S. Patent No. 2,843,670, dated July 15, 1958, is pivotally disposed and has a printing or writing lever 5 carrying a printing or writing roller 6. Upon energization of the electromagnetic writing or printing system (not visible) disposed inside of the head 4, the roller 6 will give off ink to the foil 2 disposed upon the drum 1. The receiving drum 1 executes a continuous rotating motion and after each rotation an axial stepwise advance motion, so that the received signals are recorded along closely successively following circular lines equally spaced one from the other. The recording upon the receiving drum 1 is, due to the writing or printing operation, to be presently described, effected in mirror relationship with respect to the scanning of the information on the transmitter drum, which is achieved either by opposite operation of the advance motions in the transmitter scanning system and the writing or printing system in the transmitter or by causing the transmitter and the receiver drums to rotate in opposite directions.

The synchronous motor 7 drives by means of a gear wheel 8 the gear wheel 9 and therewith the toothed clutch 10 adapted to effect in predetermined position operative clutching and unclutching of the hollow shaft 12 under control of the magnet 11.

Fig. 2 shows details of the clutch 10. The gear wheel 9 is fixedly connected with the ratchet wheel 13 and rotates in uncoupled condition freely about the hollow shaft 12. The casing 10 of the clutch is fixedly connected with the hollow shaft 12 and embraces concentrically the ratchet 13 at the end thereof. A pawl 15 which is rotatable about the axis 16 is disposed in a slot 14 of the clutch casing 10, a spring 17 pressing the pawl 15 against the ratchet 13 and causing it to engage the ratchet provided it is not prevented by other means to do so. When the pawl 15 engages the ratchet 13, the rotation of the gear wheel 9 will take along and rotate the clutch casing 10 and therewith the hollow shaft 12 which is fixedly connected to the clutch casing. Energization of the clutch magnet 11 causes attraction of its armature 18 and advance of the extension 19 in the direction of the hollow shaft 12. The extension 20 of the pawl 15 which rotates with the clutch casing 10, accordingly engages the extension 19 of the armature 18. The pawl 15 is thereby rotated about its axis 16 somewhat to the left and disengages the ratchet 13, thus uncoupling the hollow shaft 12 by holding it in a predetermined zero position. In order to prevent the spring 17 to press the pawl 15 again against the ratchet 13, after the extension 20 of the pawl has engaged the extension 19 of the armature 18, there is provided a spring 21, on the armature 18, which snaps upwardly, after having been pressed downwardly by the extension 20 of the pawl 15 upon engagement with the extension 19, thereby locking the pawl 15 in declutched position against the pressure of spring 17.

The hollow shaft 12, upon rotating positively carries along the receiving drum 1, by means of a pull-wedge (not visible in the drawing) which is fastened to the drum 1 and engages into the wedge groove 22 formed in the hollow shaft 12. Rotatably disposed within the hollow shaft 12 is a cross-thread spindle 23 for producing the axial advance or shift motion. The spindle 23 is provided with a two-way thread having turns going in opposite directions. The drum 1 is provided with a shift member (not visible in the drawing), which is disposed within the drum for guiding it positively with respect to the cross-thread spindle. The ratchet 24 is fixedly connected with the cross-thread spindle concentrically therewith. A rocking lever 26 is rotatably journalled for displacement about the bolt 25 which is disposed eccentrically of the axis of the ratchet 24. This rocking lever 26 has a slot 27 formed therein, into which projects a bolt 28, the latter being fixedly mounted on a structural part, for example, on a part of the housing (not shown); the bolt 28 extending eccentrically of the axis of the ratchet 24 and the cross-thread spindle 23. Rotation of the clutch casing 10 produces a reciprocating motion of the rocking lever 26, about its axis 25, due to the eccentric position of the bolt 28, causing the lever to move its slot 27 up and down with respect to the bolt 28. The rocking lever 26 carries a spring 29 which acts as a pawl in engagement with the teeth of the ratchet 24. Due to the reciprocating motion of the rocking lever 26 about the axis 25, the resilient pawl 29 will engage in back of a tooth of the ratchet 24, during motion of the rocking lever in one direction, and incident to motion of the rocking lever in opposite direction, the pawl 29 will rotate the spindle 23 by one tooth, thus producing after each revolution of the hollow shaft 12 a small difference rotation of the spindle 23 with respect to the hollow shaft 12. The spindle 23 is for each revolution of the hollow shaft 12 rotated in return direction by one or more teeth, depending upon the amount of eccentricity of the bolt 28, thus permitting adjustment of the advance of shift of the drum 1. The difference motion thus effected produces by means of cooperation between the shift member in engagement with the threads of the cross-thread spindle, positive axial shifting of the drum 1 by the adjusted stepping amount.

Numeral 30 indicates a rail which is movably journalled in fixed journals or bearings 31 and 32. The rail 30 is provided with a hook-like extension 33 which engages into an annular guide groove 34 disposed between an extension 35 of the drum 1 and a disk 36 which is fixedly connected with the drum 1. The rail 30 is carried along with the drum 1 incident to the axial shift or advance motion thereof. The rail 30 carries followers 37, 38 which are adjustable thereon. The threaded spindle 23 carries a hooklike member 39 extending axially therefrom, such hooklike member rotating with the spindle 23 concentrically with respect thereto. Upon engagement of the hooklike member 39 with one of the followers 37 or 38, the spindle 23 will be held against rotation along a shifting or advance distance which corresponds in length to the length of the respective follower. During this time, there is effected a rapid ad-

vance at a speed which exceeds the normal advance speed by an amount corresponding to the number of teeth or teeth groups on the ratchet 24.

Assuming that the ratchet 24 has fifty teeth, the spindle 23 will after each revolution of the drum 1 execute 1/50 rotation with respect to the hollow shaft 12, corresponding, with the thread pitch provided on the spindle, to the shifting or advance step. In the course of fifty revolutions of the drum 1, the spindle 23 will, accordingly, rotate once relative to the hollow shaft 12, effecting during the corresponding time interval an axial advance of the drum 1, which equals the pitch of the spindle thread. Now, when the spindle 23 is held against rotation by one of the followers 37 or 38, due to engagement of the follower by the hooklike member 39, the pawl 29 will glide clockwise upon the teeth of the ratchet 24, without effecting rotation of the spindle 23. This effects incident to one revolution of the drum 1 a shifting or advance step by an amount corresponding to the pitch of the thread on the spindle 23. The purpose of the increased advance or shifting speed, at selectable points (position and length of the followers 37 and 38) is, to bridge in the recording those areas of the copy to be transmitted, which do not contain any notation in axial direction, thereby saving time for the transmission.

A greater number of followers such as 37 and 38 may be provided. It is understood, of course, that the arrangement of the followers at the receiving end must accurately agree with that at the transmitting end.

The printing drum 40 is driven by the printing motor 41 through the medium of gear wheels 42, 43, 44, 45 and a toothed clutch contained in a casing 46, which operates in the same manner as the toothed clutch contained in the casing 10. The clutch 46 can be released by means of the magnet 47, armature 48, extension 49 and spring 50, only in a definite position of the shaft or axis 51 of the printing drum 40. Included in the circuit of the magnet 47 are a resistor 52 and a capacitor 53, the purpose of which will presently be explained.

The printing drum 40 is provided with a flat section 54. The diameter of the printing drum 40 and the gear ratio of the drive therefor are such, that the printing drum 40 rolls upon the receiving drum 1 upon rotation of the latter. The printing drum 40, which is likewise provided with a layer or coating of rubber or synthetic material, is held in uncoupled condition in a defined zero position by the extension 49 on the magnet armature 48. The receiving drum 1 is driven for one revolution by means of the gear wheel 55 which is in mesh with the gear wheel 45, via the pull wedge clutch 56, thereby effecting the printing operation. Upon printing, the drum 1 is rotated in opposite direction, without axial advance, as in case of the recording.

Numeral 57 designates a supply roller or drum for printed form blanks, which is rotatable about the axis 58. The printed form blanks may appear on a tape or strip 71 wound upon the drum 57. The written text or information which is to appear on the form blanks is printed thereon by the operation of the printing members 1 and 40. The band or strip of form blanks may or may not be perforated transversally to separate the individual blanks. If transverse perforations are provided, individual form blanks are, after the printing operation, severed at the edge 59 of the flat portion 54 of the printing drum 40. In case there are no transverse perforations, individual blanks are, after the printing thereon, pulled downwardly against a row of points 60 extending in parallel with the edge 59 of the flat portion 54, to produce a transverse perforated line for facilitating the severing of the processed individual blanks.

The band or strip of form blanks 71 is along the opposite margins provided with perforations 61, 62 for engagement with sprocket teeth 63, 64 projecting from the upper transport roller 65. The lower transport roller 66 has recesses 67, 68 formed therein corresponding to the sprocket teeth 63, 64, such teeth entering these recesses during the transport operation. The transport roller 66 is driven through the medium of a chain 69 controlled by the chain gear 70 which is carried by the shaft 51 for the printer drum 40.

The above described drive for the form blanks effects a positive positioning of the individual blanks with respect to the position of the printing members 1 and 40, such that the information to be printed on each individual form blank will always appear in the proper places provided therefor.

The form blank strip 71 on the form supply reel 57, unwinding therefrom, is inserted between the printing drum 40 and the receiving drum 1 which is provided with a groovelike recess for a tensioning lever 3, such recess standing in normal or zero position of the flat portion 54 of the printing drum 40 exactly opposite the flat portion. The flat portion serves to free the form blank, during the recording or printing operation, from the receiver drum 1. The drums 1 and 40 are upon rotation, effected for the printing, in close proximity and carry along the form blank 73 on which the information is to be printed, the printing on the form 73, of the information recorded on the drum 1, being effected by the pressure of the printer drum 40 exerted against the form 73. The printing operation is completed upon conclusion of a full revolution of both drums when the drums are again in their initial positions. The processed and printed form 73 now extends from the drums to the right and can be severed at the edge 59 or by using the points 60, as described before.

Repeated printing of one and the same information, upon several form blanks, may be carried out by corresponding setting of the program control which will presently be described, for example, when several identical travel tickets are to be issued to several persons. The wiping device, which will presently be described, will in such case be operated, for example, only after each second, third, etc. ticket. It is possible, by moistening the form blank strip with a color solvent, to transfer the inking of a recording to several form blanks, in a manner known from reprint devices; however, this is to be considered as an exceptional case, because a single ticket form noting several seat numbers may be issued for several persons belonging to a group.

The cleaning or wiping device comprises a felt roller 74 which is removably disposed in bearing members 75 and 76, the roller 74 being rotatable about the axis 77 and the bearing or journal members 75, 76 being rotatable about the axis of shaft 78 which may be rotatably journalled in the mounting members 79 and 80. The shaft 78 carries a pulley 81 for driving by means of a crossing belt 82 the pulley 83 which is fastened to the shaft 77, thereby driving the wiping roller 74 in a direction of rotation opposite to the rotation of shaft 78. Numeral 84 indicates the motor for driving the shaft 78. A weight 85 depends from the journal member 75 for holding the pivoted members 75 and 76 in vertical position when the motor 84 stands still, the felt roller 74 being thus held spaced from the receiver drum 1 by a few millimeters. The stator of the motor 84 is fixedly connected with the mounting member 80. When the motor 84 is switched-in, the force of reaction of the freed torque moves the vertically extending system 75, 76 toward the receiver or recording drum 1 and the felt roller 74 which rotates in a direction opposite to the rotation of the drum 1 will wipe off or delete the recording on the drum 1. The wiping roller 74 is shorter than the recording drum 1 because such drum, after completion of the recording and printing, when the drum is in its terminal position, will rotate during the wiping operation along a helical line in identical sense of rotation as during the recording, but will be advanced axially in a direction opposite to the advance thereof during the recording, thus moving into its initial or normal position.

In a facsimile receiver in which the receiving drum executes only rotary motion but no axial advance motion, and in which the printing or writing system is advanced with respect to the recording drum, the length of the wiping roller **74** must correspond to that of the recording drum **1**, because the relative advance motion between the parts is in such case lacking.

The shaft of the drive motor **7** carries a worm **86** for driving a worm wheel **87** carried by a shaft **88**, the latter carrying five differently shaped cams **89, 90, 91, 92, 93** disposed respectively for actuation of contacts or sets of contacts **94, 95, 96, 97, 98**. Reference characters *a, b, c, d, e, f* and *g* indicate terminals for the contacts **94** to **98**, such reference characters also appearing respectively in connection with the terminals of motors **7, 41** and **84**, the magnets **11** and **47**, and also in lines of the receiver circuit shown in Fig. 3. Accordingly, contact **94** is connected via terminals marked *a* in the circuit of motor **7**; one of the contacts **97** is connected via terminals marked *e* in the circuit of motor **41**; contact **98** is connected via terminals *g* in the circuit of motor **84**, etc. There are in addition terminals *h* on the head **4**, for the connection of the writing or recording system members **5** and **6** in the receiver circuit according to Fig. 3. Correspondingly marked terminals are, of course, interconnected by suitable wiring which has been omitted from the drawing to keep it simple.

In the receiver circuit, Fig. 3, **99** indicates the incoming line and **100** an A.C. input amplifier for the incoming start and element signals which are modulated on a carrier frequency of constant amplitude. The receiver circuit branches by way of terminals *c* and *b* (see contacts **95** controlled by cam **90**) into two channels, one channel comprising a rectifier **101** and the receiver relay R and the other channel comprising a rectifier **102** and a D.C. amplifier **103** connectable via terminal means *h* to the electromagnetic drive (not visible in the drawing) contained in the head **4** for the control of the recording system **5** and **6**. The channel **101–R** is during the transmission of the start signal connected with the amplifier **100** by way of a circuit including terminal *b*, the circuit including terminal *c* being open at such time. The circuit over terminal *b* will be opened upon termination of the start signal and the circuit over terminal *c* will be closed to switch the receiver channel **102—103–*h*** to the receiver amplifier **100**. Two contacts r_1 and r_2 controlled by the receiver relay R are respectively disposed in the circuits of the drive motor **7** and the clutch control magnet **11**.

The various operations, including starting, phasing, recording, printing, deleting and return to initial position are effected as follows:

1. Begin of the start signal

The receiver, with the recording drum **1** in start position at the right may be put in operation by a start signal from the transmitter. The cam contact **95** controlling the circuit extending by way of terminal *b* is in initial position of the apparatus closed since the cam **90** is in the illustrated position. The receiver relay R energizes in a circuit including the amplifier **100** and rectifier **101**, thus closing its contact r_1 to start the drive motor **7**. Contact **94** controlling the circuit extending by way of terminals *a* will be closed by the cam **89** to provide after subsequent restoration of relay R an operating circuit for the motor **7**. Contact r_2 of relay R closes a circuit for the energization of the clutch magnet **11** and therewith operative release of the clutch **10**. The recording drum **1** rotates from any initial angular position into a defined starting position in which it will be held, for the duration of the start signal, by the extension **19** of the relay armature **18**.

2. End of the start signal

Relay R restores. The circuit for motor **7** is maintained by way of contact **94** controlling the circuit extending by way of terminals *a*. Contact r_2 opens, releasing the magnet **11**, thus causing restoration of armature **18**. The clutch **10** now clutches the drum **1** for rotation. The identical phasal relationship between the transmitter and receiver drum is now established. The positive phase identity is secured by interruption of the start signal transmitted from the transmitter only at an instant when the transmitter drum is in a predetermined initial position corresponding phasally with the initial position of the recording drum **1**. The recording drum now begins to rotate and due to the advance shift also moves axially to the left.

3. Begin of recording

Contact **95** controlling the circuit extending by way of terminal *b* will be opened, disconnecting relay R and rectifier **101** from the amplifier **100**, and contact **95** controlling the circuit extending by way of terminal *c* will be closed, thereby connecting the amplifier **100** through to the inking recording system **5—6** by way of rectifier **102** and amplifier **103**. The recording now begins.

4. End of recording

Upon conclusion of the transmission and recording, the recording drum **1** will be in its left terminal position. The cam **91** actuates contact **96** controlling the circuit extending by way of terminals *d*, causing re-energization of the clutch magnet **11** and therefore release operative of the clutch by displacement of the extension **19**. The drum **1** is now held in a predetermined angular position corresponding to the initial position thereof.

5. Begin of the printing

After stopping of the drum **1**, contact **97** controlling the circuit extending by way of terminals *e* will be closed by the cam **92**, completing a circuit for the operation of the printer motor **41**. The winding of clutch magnet **47** is continuously connected to current by way of resistor **52**. Cam **92** also actuates contact **97** controlling the circuit extending by way of terminals *f*, thereby connecting the capacitor **53** in parallel to the winding of magnet **47**. The capacitor **53** is now charged in the circuit including the resistor **52**, thus briefly disconnecting current from the winding of the clutch magnet **47**, causing brief restoration of such magnet and, accordingly, restoration of the armature **48**. The printing drum **40**, being thus connected for rotation by the clutch, begins to rotate. However, it remains operatively connected only for one revolution because the magnet **47** receives current again quickly after charging of the capacitor **53**, causing attraction of the armature **48**. The recording drum **1** is now rotated by the printing drum **40** which is driven by gear wheels **45** and **55** and through the medium of the pull-wedge clutch **56**, by one revolution, without axial advance, and in a direction opposite to the direction of rotation during the recording. The form blank strip is thereby transported by an amount corresponding to the length of one form blank and the information recorded upon the recording drum **1** is incident thereto transferred to and printed on the form blank **73**.

6. End of the printing operation

Upon conclusion of the printing operation, contact **97** controlling the circuit extending by way of terminals *e* will be opened, disconnecting the printing motor **41**.

7. Beginning of the deletion operation

Cam **93** closes contact **98** controlling the circuit extending by way of terminals *g*, thereby operatively connecting the motor **84**. Contact **96** controlling the circuit extending by way of terminals *d* is at the same time

closed, the clutch magnet **11** is energized, causing attraction of the armature **18** and coupling or clutching of the recording drum **1** to the drive controlled by the continuously rotating motor **7**. The drum rotates again in the same direction as during the recording. The direction of advance is, however, reversed from left to the right, by the action of the oppositely disposed thread on the spindle **23**. The rotating wiping or deletion roller **74** is pressed against the recording drum **1** and deletes the recording thereon, the drum being incident thereto advanced to the right until it is again in its initial position.

8. Completion of deletion operation

Cam contact **93** controlling the terminals *g* opens, stopping the deletion or wiping motor **84**. The wiping roller **74** moves away from the recording drum **1**.

9. Readiness for renewed operation

Cam **90** opens contact **95** controlling the circuit extending by way of terminal *c* and closes the contact controlling the circuit extending by way of terminal *b*, thereby disconnecting from the amplifier **100** the drive switched-in at terminals *h* for the recording system **5—6** and at the same time reconnecting rectifier **101** and relay R with the amplifier **100**.

10. Disconnection of the receiver

Cam **89** opens contact **94** controlling the circuit extending by way of terminals *a*, thereby disconnecting the drive motor **7**. The recording drum **1** is now again in the initial position and ready for reoperation.

In case the recording drum should be manually rotated into any intermediate axial position, the program control will become instantly automatically effective to rotate it again into its initial position in which the apparatus is ready for renewed receiving, executing incident thereto some of the described functions depending upon the off-normal position into which the drum may have been placed.

The illustrated and described facsimile receiver represents only an example of the invention which may be modified in various ways.

Among the possible modifications may be mentioned substitution of the toothed phasing clutch or coupling by friction clutch means. In place of the axial shift or advance motion of the recording drum and the relatively stationary writing or inking recording system there may be used a movable recording system adapted to execute an axial advance motion and a recording drum disposed for rotation only. It is also possible to use a recording system and a recording drum adapted to execute advance motion in opposite directions.

The paper transport device may be modified so as to permit printing upon the forms information separated by printed matter, in a spacing differing from the spacing of the recorded information on the recording drum. To effect such operation, the printing drum will be provided with several flat (phasing) sections, and at the instant when such section is during the printing operation disposed opposite the recording drum, the form blank will be transported by a gripping device at a speed different (faster or slower) from the speed of transport during the actual printing.

In case relatively stiff precut cardlike forms are to be used instead of forms that may be wound upon a reel, such forms will be advantageously assembled in a vertical stack enclosed in a receptacle or frame with guide walls close to the forms and provided at the bottom with oppositely disposed slots for a discharge slide controlled by the printer drum, such slide delivering the forms to the printing mechanism. Means exerting spring pressure upon the uppermost form in the stack will secure the form-by-form downward feed thereof to the slide-controlled discharge slot.

The program and the operation times may be changed by exchanging the cams for cams adapted to provide for the desired different actuation of the control contacts.

A single drive motor may take the place of the three separate drive motors provided respectively for the recording drum, the printing drum, and the wiping drum, shown and described, but a more complicated gearing will in such case be required.

Changes and modifications may accordingly be made within the scope and spirit of the appended claims.

I claim:

1. Facsimile telegraph receiver for processing form blanks to record thereon information transmitted from a central station, comprising a rotatable recording drum and means for rotating it from an initial position thereof, inking recording means controlled from said central station and cooperating with said rotating recording drum for inking thereon the information which is transmitted from said central station, means effective upon conclusion of said inking recording on said recording drum for returning such drum to its initial position, a rotatable printing drum disposed for cooperation with said recording drum, means for inserting a form blank for passage between said printing drum and said recording drum carrying said information inked thereon, means for thereafter causing said recording drum to execute one revolution for the purpose of transferring to said form blank the inked recording carried thereon, means for thereupon deleting the recording inked on said recording drum, and means for thereafter returning said recording drum to initial position.

2. Facsimile telegraph receiver for processing form blanks to record thereon information transmitted from a central station, comprising a rotatable recording drum and means for rotating it from an initial position thereof, inking recording means controlled from said central station and cooperating with said rotating recording drum for inking thereon the information which is transmitted from said central station, means effective upon conclusion of said inking recording on said recording drum for returning such drum to its initial position, a rotatable printing drum disposed for cooperation with said recording drum, means for successively inserting individual form blanks for successive passage between said printing drum and said recording drum carrying said information inked thereon, means for thereafter causing said recording drum to rotate successively by one revolution for each form blank for the purpose of successively transferring to the respective form blanks the inked recording carried thereon, means for thereupon deleting the recording inked on said recording drum, and means for thereafter returning said recording drum to initial position.

3. Facsimile telegraph receiver for processing form blanks to record thereon information transmitted from a central station, comprising at least one drive motor, a rotatable recording drum carrying upon its superficies a material adapted to accept inked markings for transfer thereof to the material to form blanks, an electromagnetically controlled phasing clutch between said drive motor and said recording drum, means in said phasing clutch for holding said recording drum in declutched condition thereof in a defined normal position, an electromagnetic recording system controlled from said central station for inking upon said ink-accepting material on said recording drum the information which is transmitted from said central station, a rotatable printing drum disposed in parallel with said recording drum and axially spaced therefrom by an amount which is equal to the sum of the radii of said drums, said printing drum having at least one flat phasing section formed thereon, drive means for rotating said printing drum and said recording drum after the inking recording on said recording drum by at least one revolution, means controlled by said printing drum for automatically feeding a form blank to said drums during such rotation thereof for the purpose of transferring said inked information to said form blank,

a rotatable cylindrical wiping roller disposed in parallel with said recording drum, control means effective after completion of the transfer of said inked information to said form blank for advancing said wiping roller into engagement with said recording drum and for rotating it for the purpose of deleting said information and for thereafter moving said wiping roller away from said recording drum and stopping the rotation thereof, a circuit for said receiver comprising a preamplifier and two circuit branches extending therefrom, one of said branches containing a rectifier and a receiver relay and the other branch containing a rectifier and a direct current amplifier and means for connecting said electromagnetic system in series therewith, and a control device comprising a plurality of cams and contact means cooperating therewith for governing the operations of said receiver.

4. A facsimile telegraph receiver according to claim 3, comprising means for producing a relative axial advance motion between said electromagnetic recording system and said recording drum.

5. A facsimile telegraph receiver according to claim 3, comprising means for producing a relative axial advance motion between said electromagnetic recording system and said recording drum, and means for accelerating said axial advance motion for areas of said recording drum which are to be left free of recordings.

6. A facsimile telegraph receiver according to claim 3, comprising means for imparting variable speed to the means for feeding said form blank for the purpose of transferring thereto information from said recording drum at a spacing which is different from the spacing of such information appearing on said recording drum.

7. A facsimile telegraph receiver according to claim 3, comprising a reel having a strip wound thereon which carries said form blanks.

8. A facsimile telegraph receiver according to claim 3, wherein said phasing clutch comprises a ratchet disposed upon a drive shaft for said recording drum concentric therewith, a pawl connected with said drive shaft and rotatable about an axis which is eccentric with respect to the axis of said drive shaft and rotating with said drive shaft, a spring for pressing said pawl against said ratchet, a relatively stationary electromagnet having an armature carrying an extension for engagement with an extension carried by said pawl, whereby said pawl is caused to rotate against the pressure of said spring so as to disengage the ratchet, and a locking spring carried by said armature for holding said pawl in disengaged position.

9. A facsimile telegraph receiver according to claim 5, comprising a tubular drive shaft for said recording drum, a threaded spindle rotatably disposed within said tubular shaft, a member carried by said recording drum extending through a slot formed in said tubular shaft for threaded coaction with said spindle, a ratchet carried by said spindle concentrically therewith, a slotted lever carried by said tubular shaft, said lever being rotatable with said shaft, and rotatable about an axis eccentric with respect to the axis thereof, a locking pawl carried by said slotted lever for cooperation with said ratchet, a fixedly disposed bolt projecting into the slot of said slotted lever for relative motion thereto responsive to rotation thereof, thereby causing said lever to execute a reciprocating motion relative to the rotating tubular shaft, said pawl on said slotted lever being during such reciprocating motion thereof effective to rotate said ratchet and therewith said spindle to produce during each revolution of said tubular shaft a difference rotation between such shaft and said spindle for moving said tubular shaft and therewith said recording drum axially by a fraction of the pitch of the spindle thread corresponding to the number of teeth of said ratchet.

10. A facsimile telegraph receiver according to claim 9, comprising a hooklike control member extending from said spindle at one end thereof and rotatable therewith, and at least one follower disposed in the path of rotation of said hooklike control member in predetermined axial position of said recording drum for stopping the intermittent rotation of said spindle relative to said tubular shaft.

References Cited in the file of this patent

UNITED STATES PATENTS

1,832,918	Swick	Nov. 24, 1931
2,671,711	Masson	Mar. 9, 1954
2,841,461	Gleason	July 1, 1958

FOREIGN PATENTS

730,906	France	May 23, 1932