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AUTOMATICALLY ADJUSTABLE RECORDING MEANS

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FIG. 1

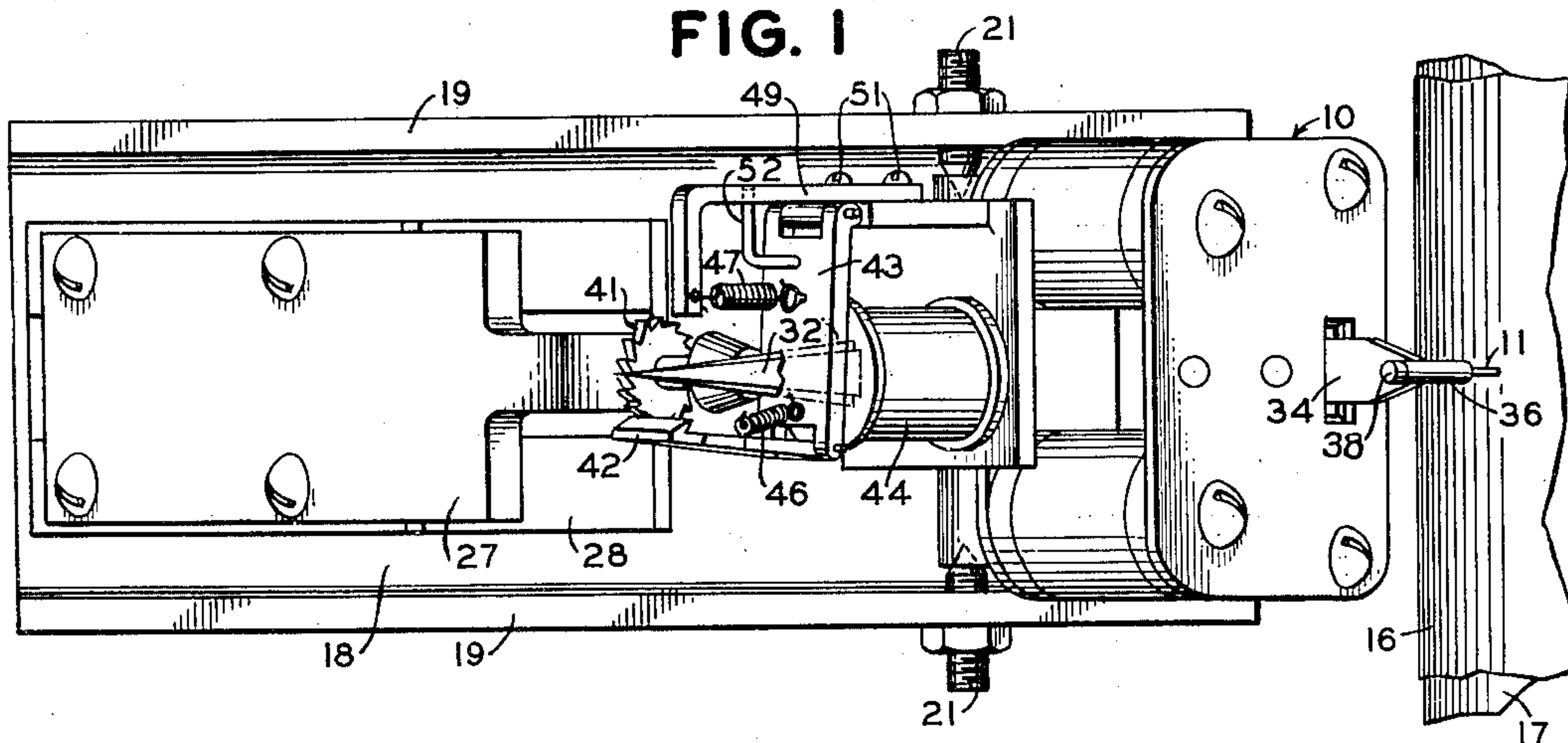
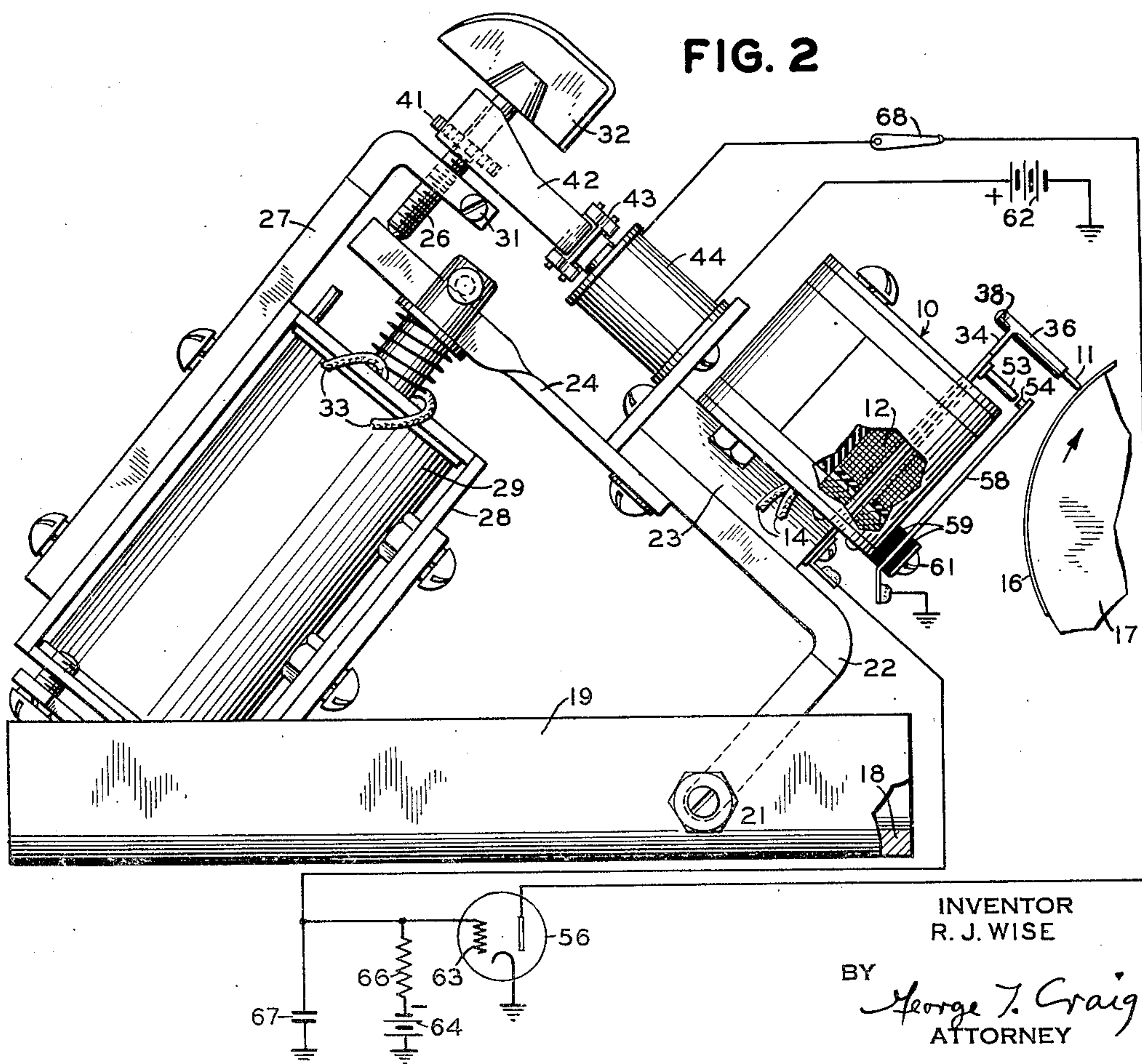


FIG. 2



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AUTOMATICALLY ADJUSTABLE RECORDING MEANS

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6 Claims. (Cl. 234—70)

The present invention relates to electrically operated facsimile telegraph or copying systems of the type employing a marking point operatively engageable with a recording surface and more particularly to means for automatically maintaining the marking point in signal tracing relationship with respect to the recording surface.

Systems of this type usually include a supporting means such, for example, as a flat or curved platen for receiving a record sheet or web, or a recording cylinder around which a record sheet is wrapped. Relative movement between the record sheet and the marking point may be obtained by various means to produce scanning of the record sheet by the marking point for recording purposes. Such movement produces friction so that the marking point is worn away, with the result that the recorded marking on the blank varies in character as the recording proceeds. Where the marking point is in the form of a pencil of marking medium to be deposited upon the recording surface, the pencil wears away rapidly and unless the recorder is continually adjusted by an attendant the character of the marks will change. Where the marking point is in the form of a cutting stylus or engraving point, wear may be less rapid but, because of the nature of the recorded copy, the system is particularly subject to defects in recording caused by the wear of the marking point. These remarks apply more particularly to systems for producing master copies and also to embossing and engraving systems. In systems of the type including an electrically conductive supporting surface for the recording blank and a marking point in the form of an electrified stylus, the result of wear is not so marked as in the previously mentioned systems, since the stylus is usually resiliently mounted. However, the degree of pressure exerted upon the recording surface by the resiliently mounted stylus should be maintained substantially constant until the useful portion of the stylus is substantially worn away, a condition which is obtained by employing the novel adjusting arrangement of this invention.

In practising the present invention, the ill effects of wear of the marking point in a particular system in which the invention is used are overcome by automatically maintaining a definite spacing of the marking point, in its idle position, with respect to the recording surface, or by maintaining a substantially constant pressure of the marking point on the recording surface in sys-

tems where the marking point is maintained at all times in contact with the recording surface.

An object of this invention, therefore, is to provide compensation for wear of the marking point during recording in a facsimile telegraph or copying system and thereby to maintain the condition of signal tracing relationship of the marking point and the recording surface at an optimum value.

A further object of the invention is to provide a novel and improved recording device which is self-acting to maintain the relationship of the stylus and recording surface substantially constant during recording.

A still further object of the present invention is to provide an improved stylus adjusting arrangement which is automatic in operation.

More specific objects of the invention defined by the terms of the appended claims, in addition to the broader objects set forth above, will be apparent from the following description taken in connection with the accompanying drawing, in which:

Fig. 1 is a top plan view, to an enlarged scale, of a recording unit and its mounting embodying an illustrative form of the present invention; and

Fig. 2 is a view in side elevation of the mounting disclosed in Fig. 1.

The embodiment of the invention illustrated by Figs. 1 and 2 of the drawing is similar in its general arrangement to the electromagnetic recording unit and recording unit mounting disclosed in Patent No. 2,260,862, granted to F. L. O'Brien et al., on October 28, 1941. It will be understood that the invention may be employed in connection with a piezo-electric or any type of transducer or recording unit. The recording unit 10 is designed to operate a marking point 11 in accordance with facsimile signals derived in any known manner (not shown) and applied to the coil 12 of the recorder by way of conductors 14. The recording point 11 which, in the example shown, may comprise a pencil of marking pigment, such as the lead of a pencil, produces marks on a sheet of recording paper 16 mounted on the surface of a rotary recording drum 17. The recording unit 10 and the supporting parts by which it is carried are mounted upon a channel-shaped plate 18 which is movably carried in any known manner to cause the marking point 11 to trace a helical path on the drum 17 as the drum is rotated. The up-standing flanges 19 of the channel-shaped plate are provided with trunnion screws 21 which pivotally

support an angular bracket 22, upon which the recording unit 10 is secured by an insulating block 23. The bracket 22 has an extension 24 secured thereto which is adapted to engage the end of a micrometer stop screw 26 threaded into a stationary member 27. The screw 26 abuts the extension 24 so as to provide for adjustment of the marking point 11 with respect to the surface of the paper 16 in position on the drum 17. The stationary member 27 in the illustrated embodiment is secured to the frame or shell 28 of a solenoid electromagnet 29. The portion of the member 27 which carries the screw 26 is slotted and apertured to receive a screw 31 which functions frictionally to maintain adjustment of the screw 26. The head of the screw 26 is provided with a knob or thumb piece 32 so that manual adjustment of the marking point 11 may be obtained when desired. The electromagnet 29 may be energized by current from any desired source controlled by a suitable switch or the like. The circuit for accomplishing this is connected to the leads 33. It will be understood that in telegraph or facsimile recorders, the electromagnet 29 will usually be automatically controlled for the purpose of positioning the stylus in operative or inoperative position with respect to the surface of the paper 16.

The recording unit 10 may be of any desired type suitable for the recording system in which it is employed and, as mentioned previously, includes the operating coil 12 which serves to vibrate a tongue or armature 34 to which the marking point 11 is secured. The point 11, in the arrangement shown, is contained in a barrel 36 provided with a removable screw 38 to facilitate its removal and replacement.

In order to provide for adjustment of the marking point 11 in accordance with the invention, the screw 26 carries a ratchet wheel 41 which is engageable by a pawl 42 pivotally mounted on the armature 43 of an electromagnet 44. A spring 46 maintains the pawl 42 operatively in engagement with the ratchet wheel 41 and another spring 47 maintains the armature 43 in its deenergized position. A bracket 49 secured by screws 51 to the frame of the electromagnet 44 provides a stationary anchorage for the spring 47. The bracket 49 also carries a stop 52 which limits movement of the armature 43 under the influence of the spring 47 to an amount such that the pawl 42 advances the ratchet wheel angularly by one tooth for each energization of the electromagnet 44.

The stop 52 may be adjusted by bending it or, if adjustment for a larger range of movement of the pawl is desired, an adjusting screw may be provided in a well-known manner so as to permit the pawl 42 to move the ratchet wheel 41 through an annular distance of one or more of its teeth for each energization of the electromagnet.

Energization of the electromagnet 44 is controlled by a pair of contacts 53 and 54 through a vacuum tube relay 56. It will be understood that these contacts may operate a space discharge or electromagnetic relay of any type which may be interposed between them and the electromagnet 44. The contact 53 is carried by the recorder armature 34, while the contact 54 is secured to a spring arm 58 which is secured to but insulated from the recording unit 10 by insulating members 59 and a fastening screw 61.

The electromagnet 44 is connected in the anode circuit of the tube 56 together with a suitable

source of anode current 62. The grid 63 of the tube is biased negatively by a source of biasing potential 64 so that substantially no anode current flows in the coil of the electromagnet 44 when the contacts 53 and 54 are open. A resistor 66 of relatively high ohmic resistance is inserted in the grid circuit of the tube and a condenser 67 shunts the biasing source 64 and the resistor 66. A switch 68 is provided so that the automatic adjustment feature may be cut out when desired. When the grid 63 of the tube is grounded by momentary engagement of contacts 53 and 54, the plate current of the tube increases to energize the magnet 44, and upon separation of the contacts 53 and 54 this plate current is maintained during a portion of the time taken to recharge the condenser 67.

With the cylinder rotating in the direction of the arrow on Fig. 2 of the drawing, the marking point 11 will mark the surface of the recording sheet 16 in a helical path, as explained above, in accordance with facsimile signals applied to the conductors 14. As recording proceeds and the marking point 11 wears, contacts 53 and 54 will engage to energize the magnet 44, as explained above. The condenser 67 insures that the magnet 44 will be energized for a period sufficiently long to obtain a full stroke of the pawl 42 even though the contacts 53 and 54 only touch momentarily and are separated almost immediately. The movement of the pawl 42 results in rotation of the screw 26 through a small angular distance equal to the angular spacing of the teeth on the ratchet wheel 41, thus bringing the recording unit 10 together with the marking point 11 nearer to the surface of the record sheet by an amount which may be made substantially equal to the amount of wear on the marking point 11.

In systems provided with this invention and employing an embossing or cutting point, the depth of the embossing or the depth of cut will not vary materially as recording proceeds so that the embossing or engraving may be used to reproduce copies of the original by a mechanical method such as printing with ink.

As stated above, the invention may be applied to electrical recording systems wherein signals to be recorded are applied across the recording cylinder 17 with the marking point 11 serving as an electrified stylus. When the invention is applied to apparatus of the form just described, an adjusting screw 26 having a thread of very fine pitch is preferred, and also the teeth on the ratchet wheel 41 should have a small annular pitch. In this manner the relatively minute amount of stylus wear will be compensated for by a minute amount of movement of the angular bracket 22 with respect to the drum 17 when wear becomes sufficient to cause the contact 53 to engage the contact 54.

When the invention is applied to an electrical recording system wherein the signals to be recorded are applied between the cylinder and the marking point serving as an electrified stylus, a very fine adjustment for the minute wear on the stylus point is sufficient and the condenser 67 may be omitted, if desired. Fine adjustment is possible because even though the contacts 53 and 54 are separated almost immediately by partial movement of the pawl 42, the ratchet wheel 41 will remain in its partially adjusted position by reason of the frictional effect of the screw 31 until further wear has been experienced by the stylus, whereupon the pawl 42 will or may repeat its partial stroke, and this will continue until the

pawl 42 completes its stroke and returns under the action of the spring 47.

From the foregoing it will be seen that this invention provides a ready means for compensating for the wear of the marking point in an electrically operated copying system so that conditions effecting recording will remain substantially unchanged throughout the life of the copying point.

While the invention has been described and shown in connection with an illustrative embodiment thereof, it will be understood that many modifications and changes may be made in the structure shown without departing from the essential attributes of the invention, and all such changes are contemplated as coming within the scope of the appended claims.

What is claimed is:

1. The combination in a telegraph recorder of mechanism for marking a recording blank including a recording stylus having a point adapted to engage said blank for producing a record thereon in accordance with received signals, means for holding said stylus in operative position with respect to said blank for relative scanning movement across the surface thereof, and means for compensating for the effect of wear on the stylus point comprising an electromagnet and structure controlled thereby for advancing said stylus holding means in steps towards said recording blank and circuit means controlling said electromagnet comprising switch contact elements automatically operative when the point of said stylus has worn down a predetermined extent for energizing said electromagnet.

2. The combination in a telegraph recorder of mechanism for marking a recording blank including a recording stylus having a point adapted to engage said blank for producing a record thereon in accordance with received signals, means for holding said stylus in operative position with respect to said blank for relative scanning movement across the surface thereof, and means for compensating for the effect of wear on the stylus point comprising an electromagnet and pawl and ratchet structure controlled thereby for advancing said stylus holding means in steps towards said recording blank and circuit means controlling said electromagnet comprising switch contact elements automatically operative when the point of said stylus has worn down a predetermined extent for energizing said electromagnet.

3. The combination in a telegraph recorder of mechanism for marking a recording blank including a recording stylus having a point adapted to engage said blank for producing a record thereon in accordance with received signals, means for holding said stylus in operative position with respect to said blank for relative scanning movement across the surface thereof, and means for compensating for the effect of wear on the stylus point comprising an electromagnet and structure controlled thereby for advancing said stylus hold-

ing means in steps towards said recording blank and circuit means controlling said electromagnet comprising at least two switch contact elements, one of said contact elements being mounted to move with the stylus and to engage the other contact element when the point of said stylus has worn down a predetermined extent for energizing said electromagnet.

4. The combination in a telegraph recorder of mechanism for marking a recording blank including a recording stylus having a point adapted to engage said blank for producing a record thereon in accordance with received signals, a pivotally mounted support for holding said stylus in operative position with respect to said blank for relative scanning movement across the surface thereof, and means for compensating for the effect of wear on the stylus point comprising an electromagnet and structure controlled thereby for rotating said pivotally mounted stylus support in steps towards said recording blank and circuit means controlling said electromagnet comprising switch contact elements automatically operative when the point of said stylus has worn down a predetermined extent for energizing said electromagnet.

5. In a recorder, a record receiving medium, a marking point, a holder for said point capable of adjusting the position of said point with respect to the surface of said medium, means including electrical contacts controlled by said marking point and said surface and automatically operative in accordance with the extent of wear of said marking point, electromagnetic means for producing adjustment of said holder, a vacuum tube relay interposed between said contacts and said electromagnetic means to control the latter, and means operatively connected with said vacuum tube relay to prolong the effect of the operation of said contacts.

6. In a recorder, a marking device, a movable support for said marking device, means to support a member having a record receiving surface in operative position with respect to said marking device, means including an electromagnet for adjusting the position of said marking device with respect to said record receiving surface, a marking point forming an operative part of said marking device, electrical contact means controlled by said marking point and said record receiving surface and automatically operative in accordance with the extent of wear of said marking point, a vacuum tube relay having an input circuit and an output circuit, said electromagnet being included in the output circuit of said relay, and a source of biasing potential included in the input circuit of said vacuum tube relay normally to prevent current flow in said output circuit, said contacts being connected to said input circuit to short-circuit the same at intervals as said stylus wears during operation of said recorder.

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