

G. E. HOGLUND.  
 APPARATUS FOR REPRODUCING PICTURES OR CHARACTERS.  
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2 SHEETS—SHEET 1.

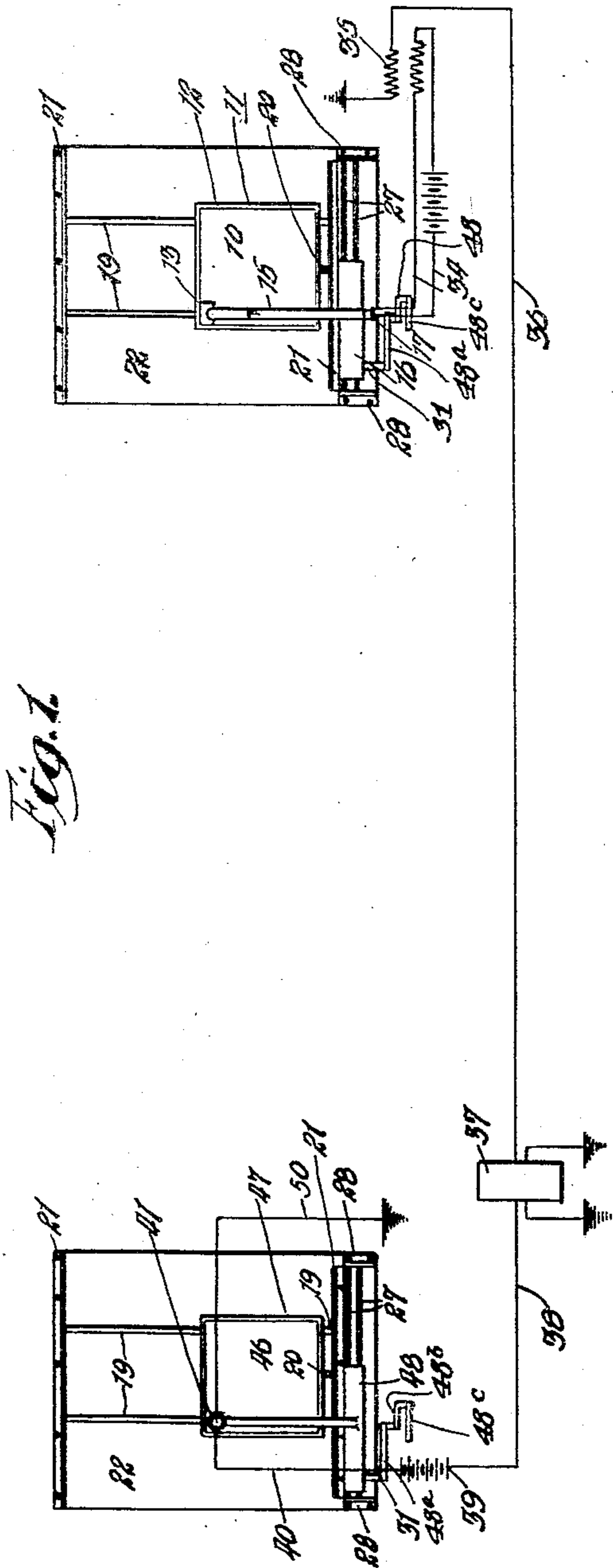


Fig. 1

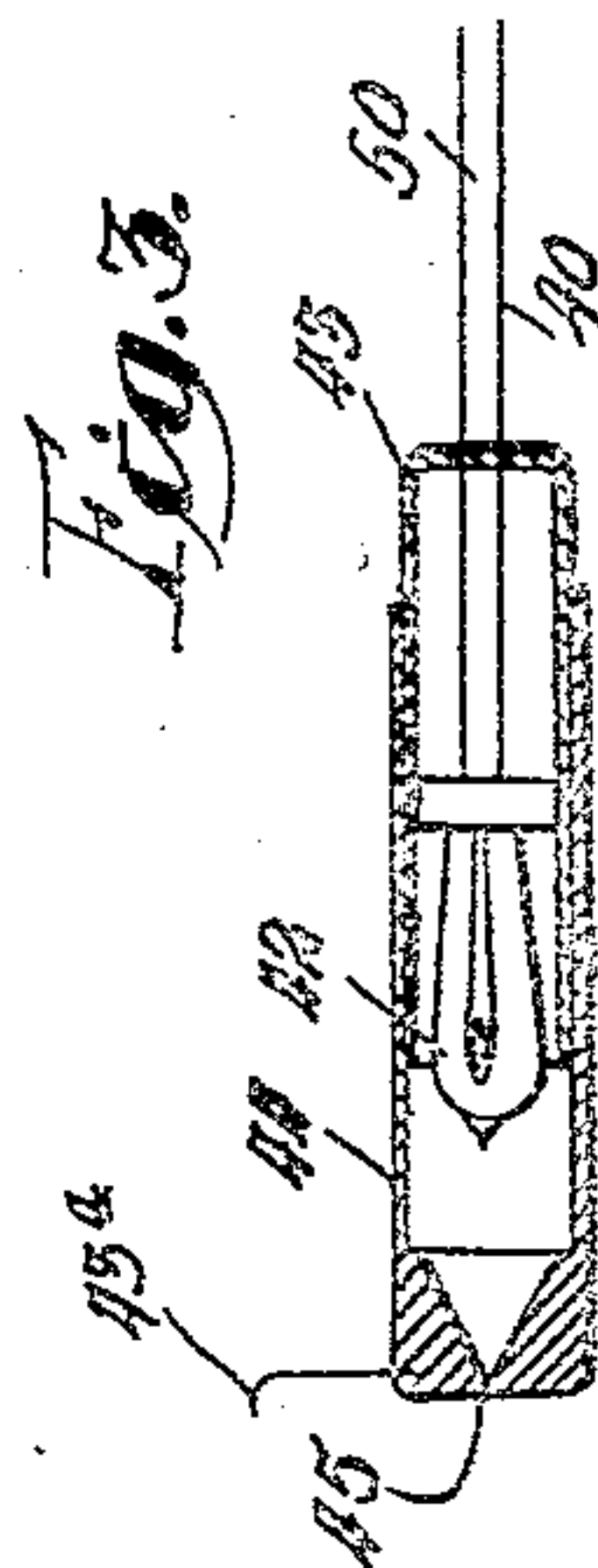


Fig. 3

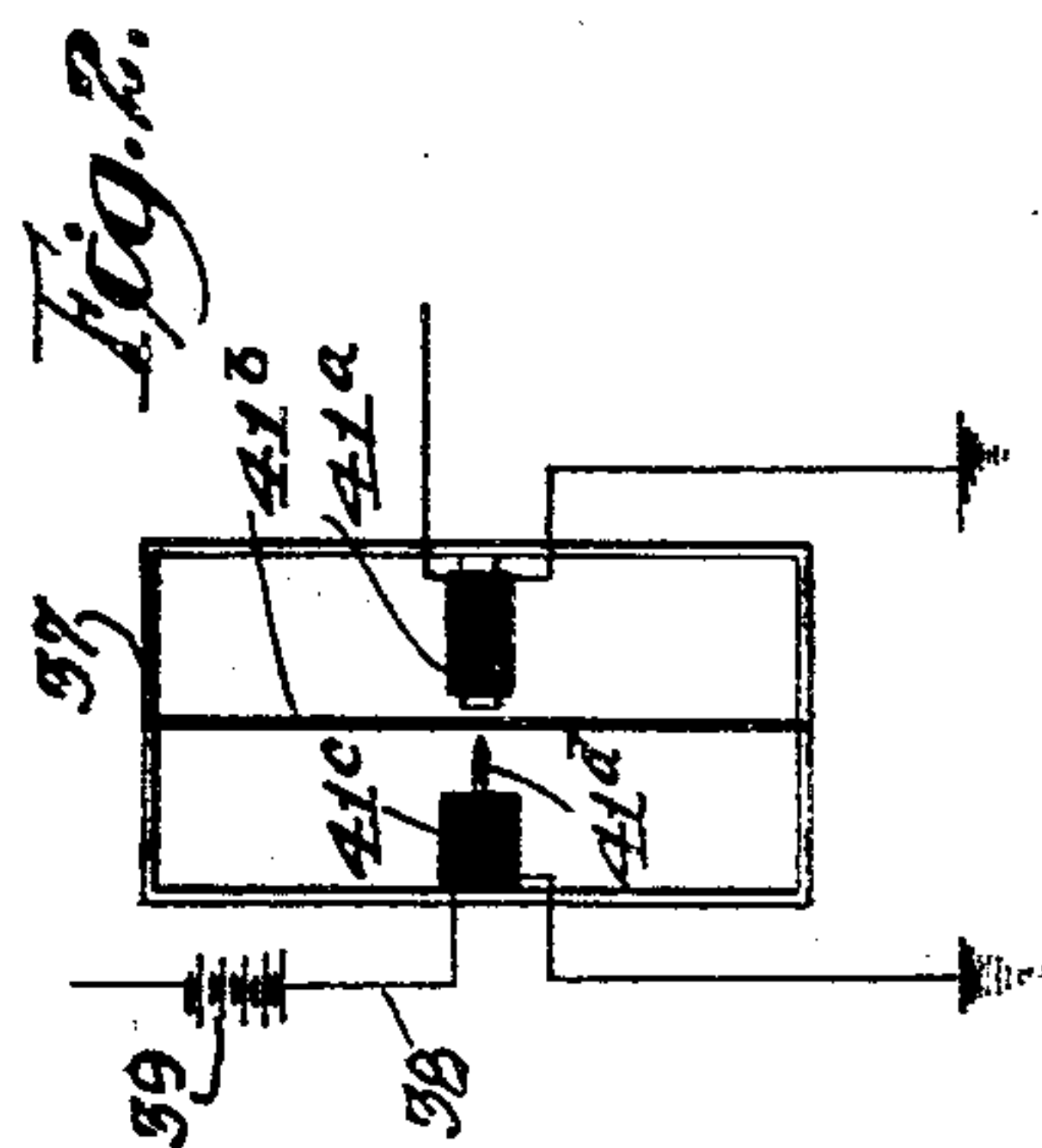


Fig. 2

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# UNITED STATES PATENT OFFICE.

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## APPARATUS FOR REPRODUCING PICTURES OR CHARACTERS.

970,820.

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*To all whom it may concern:*

Be it known that I, GUSTAV E. HOGLUND, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Apparatus for Reproducing Pictures or Characters, of which the following is a specification.

The present invention relates to the transmitting and reproducing of pictures or characters between points distant from one another, and is accomplished by moving an instrument over a roughened surface, such as is evident in engravings, wood cuts, or other reproductions of like nature, and transmitting the vibrations thus obtained by electrical transmitting devices to a receiving station, where they are recorded on a sensitized plate or other device prepared for that purpose.

The objects of the present invention are, to construct a device which will produce at the receiving station an impression embodying all of the graduated shade effects of the original; to construct electrical means for transmitting the vibrations which are capable of being operated at a high rate of speed without rendering the impression imperfect; to construct means for feeding the instruments back and forth across the surfaces on which they are operating; to construct means for operating the mechanism at the transmitting and receiving station synchronously; to construct means for determining when such mechanism is running synchronously; and to construct means for transmitting the vibrations in a softened state, so that no harsh or violent action will be received at the receiving station.

The invention further relates to the features of construction and combination of parts hereinafter described and claimed.

In the drawings, Figure 1 is a diagrammatic view, showing the mechanism at the receiving and transmitting stations and the electrical connections between the same; Fig. 2, an instrument used at the receiving station for transmitting the vibration to the recording instrument; Fig. 3, a sectional elevation of the lamp used for making the visual record; Fig. 4, a longitudinal section of the mechanism used at the transmitting station for transmitting the vibrations; Fig. 5, a section on line 5—5 of Fig. 4; and Fig. 6, a section on line 6—6 of Fig. 4.

In Fig. 1 is shown a surface 10 having thereon a picture to be reproduced, which picture may be of the nature of a wood cut, engraving, or other form in which the dark and light portions are raised one from the other, producing a roughened surface. The picture is mounted in a frame 11, which is in the form of a carriage 12, shown more in detail in Fig. 4; and located in a suitable position above the picture is an instrument 13, such as is ordinarily used for reproducing sound effects in a graphophone, the needle 14 of which contacts the surface of the plate. The mouth piece of the instrument enters into a tube 15, which rests on a carriage 16, and the outer end of the tube has positioned therein a sensitive telephone transmitting instrument 17. I consider the use of the graphophone in connection with the telephone transmitter, for the purpose of transmitting vibrations, to be of the utmost importance, as I have found by experiment that if the telephone transmitter is used by itself the vibrations transmitted will be at times too violent, producing too great a disturbance at the receiving station and causing a blur upon the reproduction.

Passing through the side walls 18 of the carriage 12 are guide rods 19 and a screw-threaded rod 20, all of which are held in brackets 21 secured to a base 22. The screw-threaded rod has attached, at one end, a ratchet wheel 23, keyed or otherwise fixedly held on said rod, and adjacent thereto is loosely mounted an arm 24 carrying a pawl 25 adapted to engage the teeth of the ratchet wheel 23. The carriage 16 has passing through its side walls 26, guide rods 27 held in brackets 28 secured to the base 22. The side walls have depending therefrom fingers 29 and 30 adapted to contact and swing the arm 24, the fingers 30 being somewhat longer so as to contact the lower portion of the arm. Attached to the carriage is a pin 31, to which is connected suitable mechanism for operating the carriage in a reciprocating movement. As the carriage 16 is moved back and forth the fingers 29 and 30 will contact the arm 24, causing the ratchet 23 to move one tooth at the end of each movement of the carriage. This movement of the ratchet imparts movement to the screw-threaded rod 20, causing the carriage 12 to move in a step by step movement, thus moving the plate 10 the width of the needle 14 at each



end of the movement of the carriage 16. Thus the movement of the carriage 16 causes the needle to traverse the surface of the plate, and the movement of the carriage 12 causes the movement of the plate step by step. Attached to the arm 24 is a spring 32 for returning it to normal position, and stops 33 are suitably positioned adjacent thereto to prevent undue movement of the arm in either direction. This type of mechanism is particularly adapted for use with devices of this character because of its rapidity and accurateness of operation, and because it is easily adjusted when such adjustment becomes necessary, in order that the instruments may move synchronously.

Attached to the telephone transmitter 17 are wires 34 leading to an ordinary induction coil 35, from which induction coil leads a main wire 36 to the receiving station. At the receiving station the main wire enters on the transmitter side of a highly sensitized combined telephone transmitting and receiving instrument 37; and a wire 38 leads from said instrument to a source of electrical supply 39, which is connected by a wire 40 to a recording instrument 41. As the incoming current from the sending apparatus energizes the receiver coil 41<sup>a</sup> of the instrument 37, vibrations are set up in the diaphragm 41<sup>b</sup> of said instrument, which in turn act upon the carbon granules 41<sup>c</sup> in the transmitter 41<sup>d</sup>, thus changing the strength of the local circuit at the receiving station.

The recording instrument consists of an electric lamp 42, of low voltage, which lamp is held in a tube 43 and is rendered adjustable by having the tube slidably mounted within a casing 44, in the end of which casing is formed a very minute opening 45 through which the rays of light from the lamp pass. The lamp is set in position at a suitable point above a photographic plate 46, the film side of which is placed upward. As the impulses are sent out from the receiving station they will, through the medium of the combined telephone transmitter and receiver 37 be transmitted to the light in the same relative degree of strength with which they are sent out from the transmitting station, dimming and brightening the light in accordance with the lights and shadows of the reproduction being transmitted, and thus dispensing with the use of slides or other mechanism for regulating the light opening. The plate and lamp are mounted upon carriages 47 and 48, which are constructed in a manner similar to the construction of the carriages 12 and 16 before described. The carriage upon which the lamp is mounted is moved synchronously with the carriage 16 at the receiving station, and the carriage 48 to which the sensitized plate is secured is moved syn-

chronously with the carriage 12 at the receiving station, so that the transmitting and receiving instruments are moving synchronously with respect to each other and with respect to the plates on which they are operating, and horizontal movement is imparted to the carriages through the medium of a bar 48<sup>a</sup>, which is actuated by a crank arm 48<sup>b</sup>, to which a reciprocating movement is imparted through a link 48<sup>c</sup> operatively connected to suitable mechanism for operating the same. It is, of course, understood that the entire operation at the receiving station takes place within a darkened space.

The operation will be understood from the foregoing, but briefly is as follows: The mechanism for moving the carriage 16 is put in operation, and the needle 14 moved back and forth across the face of the etching, or other picture of like nature to be reproduced. The needle, in passing over the roughened surface of the picture, will transmit waves or vibrations similar to those sent out in reproducing sound effects. The movement of the carriage 16 will cause the movement of the ratchet 23, causing the plate to be moved step by step and permitting the needle to pass over every point on the plate. The impulses or vibrations which are thus sent out are transmitted by means of the telephone transmitter and its electrical connections to the instrument at the receiving station in the same relative degree of strength with which they are obtained at the transmitting stations, so that a variety of impulses will be received at the receiving station, which will act directly upon the light, causing a variation in the degree of brilliancy of the light and producing an impression on the sensitized plate at the receiving station corresponding in light and shade effects to the original at the transmitting station.

I do not desire to limit myself to any specific form of electrical connection between the stations, as there are many modifications which will accomplish the same purpose, among others being the modern wireless telegraph or telephone instruments. By using raised letters of any character, a message can be transmitted by this method as readily as a picture.

I claim:

1. In a device of the class described, the combination of an instrument for transmitting impulses when passed over a roughened surface, said impulses varying in strength according to the varying degrees of roughness of the surface, an instrument comprising a light for making a visual record of such impulses on a sensitized plate, said light being energized from a local circuit, a main transmission line from the transmitting instrument, and a connection between the main line and local circuit, whereby the impulses



created by the transmission instrument and conveyed over the main line affect the strength of the local circuit, whereby the varying strength of the impulses created by the transmitting instrument produces a variation in the degree of brilliancy of said light, substantially as described.

2. In a device of the class described, the combination of an instrument for transmitting impulses when passed over the roughened surface of a plate, said impulses varying in strength according to the varying degrees of roughness of the surface, a telephone transmitter connected to said instrument, means for horizontally moving the roughened plate, an instrument comprising a light for making a visual record of such impulses on a sensitized plate, said light being energized from a local circuit, means for reciprocally moving said recording instrument, means for horizontally moving said sensitized plate, a main line from the transmitting instrument, a connection between the main line and local circuit, whereby the impulses created by the transmitting instrument and conveyed over the main line affect the strength of the local circuit, whereby the varying strength of the impulses created by the transmitting instrument produces a variation in the degree of brilliancy of said light, substantially as described.

3. In a device of the class described, the combination of an instrument for transmitting impulses when passed over the roughened surface of a plate, said impulses varying in strength according to the varying degrees of roughness of the surface, a telephone transmitter attached to said instrument, an instrument including a lamp for making a visual record of such impulses on a sensitized plate, a mounting for the plate at the transmitting station, and a mounting for the plate at the receiving station, each consisting of a movable carriage, a mounting for the instrument at the transmitting station, and a mounting for the instrument at the receiving station, each consisting of a movable carriage, means for automatically moving each of said carriages on which the instruments are mounted synchronously, means for automatically moving each of said carriages on which the plates are mounted synchronously, the lamp of the receiving instrument being energized by a local circuit, a main line from the transmitting instrument, and a connection between the main line and the local circuit, whereby the vibrations sent over the main line by the transmitting instrument act to vary the strength of the local circuit, whereby the degree of brilliancy of the light is varied, substantially as described.

4. In a device of the class described, the combination of an instrument for transmitting impulses when passed over a rough-

ened surface, said impulses varying in strength according to the varying degrees of roughness of the surface, an instrument for making a visual record of such impulses on a sensitized plate, said instrument being energized from a local circuit, a main line from the transmitting instrument, and a combined telephone transmitter and receiver, comprising a receiver coil, a diaphragm and a transmitter coil, said instrument forming a connection between the main line and local circuit, the main line being connected to the receiver coil of said instrument, and the local circuit being connected to the transmitter coil, whereby the impulses sent out over the main line by the action of the transmitting instrument produce a variation in the strength of the local circuit, whereby the receiving instrument is affected to produce various impressions corresponding in density to the strength of the current set up in the local circuit, substantially as described.

5. In a device of the class described, the combination of an instrument for transmitting impulses when passed over a plate having a roughened surface, said impulses varying in strength according to the varying degrees of roughness of the surface, a telephone transmitter attached to said instrument, an instrument for making a visual record on such impulses on a sensitized plate, comprising a light energized by a local circuit, an electrical connection between the two instruments, a mounting for the plate at the transmitting station, and a mounting for the plate at the receiving station, each consisting of a movable carriage, a mounting for the instrument at the transmitting station, and a mounting for the instrument at the receiving station, each consisting of a movable carriage, means for reciprocally moving the carriages on which the transmitting and recording instruments are mounted over the surfaces of the plates on which the instruments are operating, and means for horizontally moving the carriages on which the plates are mounted, to bring the different portions of their surfaces into engagement with the instruments, a main line from the transmitting instrument, and a connection between the main line and local circuit, whereby the vibrations transmitted over the main line act to affect the strength of the local circuit, thereby varying the density of the light of the receiving instrument in accordance with the strength of the impulse sent out by the transmitting instrument, substantially as described.

6. In a device of the class described, the combination of an instrument for transmitting impulses when passed over a plate having a roughened surface, the impulses varying in strength according to the varying de-



degrees of roughness of the surface, a telephone transmitter attached to said instrument, an instrument for making a visual record of such impulses on a sensitized plate, an electrical connection between said instruments, a mounting for the plate at the transmitting station, and a mounting for the plate at the receiving station, each consisting of a movable carriage, a screw-threaded stem attached to said carriage, a mounting for the instrument at the transmitting station, and a mounting for the instrument at the receiving station, each consisting of a movable carriage, means attached to said carriages, for automatically rotating the screw-threaded stem and horizontally moving the carriages on which the plates are mounted, and means for automatically moving the carriages on which the instruments are mounted with a reciprocal movement, substantially as described.

7. In a device of the class described, the combination of an instrument for transmitting impulses when passed over a plate having a roughened surface, the impulses varying in strength according to the varying degrees of roughness of the surface, a telephone transmitter attached to said instrument, an instrument for making a visual record of such impulses on a sensitized plate, an electrical connection between said instruments, a mounting for the plate at the transmitting station, and a mounting for plate at the receiving station, each consisting of a movable carriage, a screw-threaded stem attached to said carriage, a ratchet wheel on said stem, a mounting for the instrument at the transmitting station, and a mounting for the instrument at the receiving station, each consisting of a movable carriage, means attached to said carriages, for automatically rocking said arm back and forth and operating said pawl, and means for automatically moving said carriages on which the instruments are mounted, with a reciprocal movement, substantially as described.

ing station, each consisting of a movable carriage, means attached to said carriages for automatically operating said ratchet, and means for automatically moving the carriages on which the instruments are mounted, with a reciprocal movement, substantially as described.

8. In a device of the class described, the combination of an instrument for transmitting impulses when passed over a plate having a roughened surface, the impulses varying in strength according to the varying degrees of roughness of the surface, a telephone transmitter attached to said instrument, an instrument for making a visual record of such impulses on a sensitized plate, an electrical connection between said instruments, a mounting for the plate at the transmitting station, and a mounting for the plate at the receiving station, each consisting of a movable carriage, a screw-threaded stem attached to said carriage, a ratchet wheel on said stem, an arm on said stem, a pawl on said arm in engagement with the teeth of the ratchet, a mounting for the instrument at the transmitting station, and a mounting for the instrument at the receiving station, each consisting of a movable carriage, means attached to said carriages, for automatically rocking said arm back and forth and operating said pawl, and means for automatically moving said carriages on which the instruments are mounted, with a reciprocal movement, substantially as described.

GUSTAV E. HOGLUND.

Witnesses:

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EPHRAIM BANNING.