

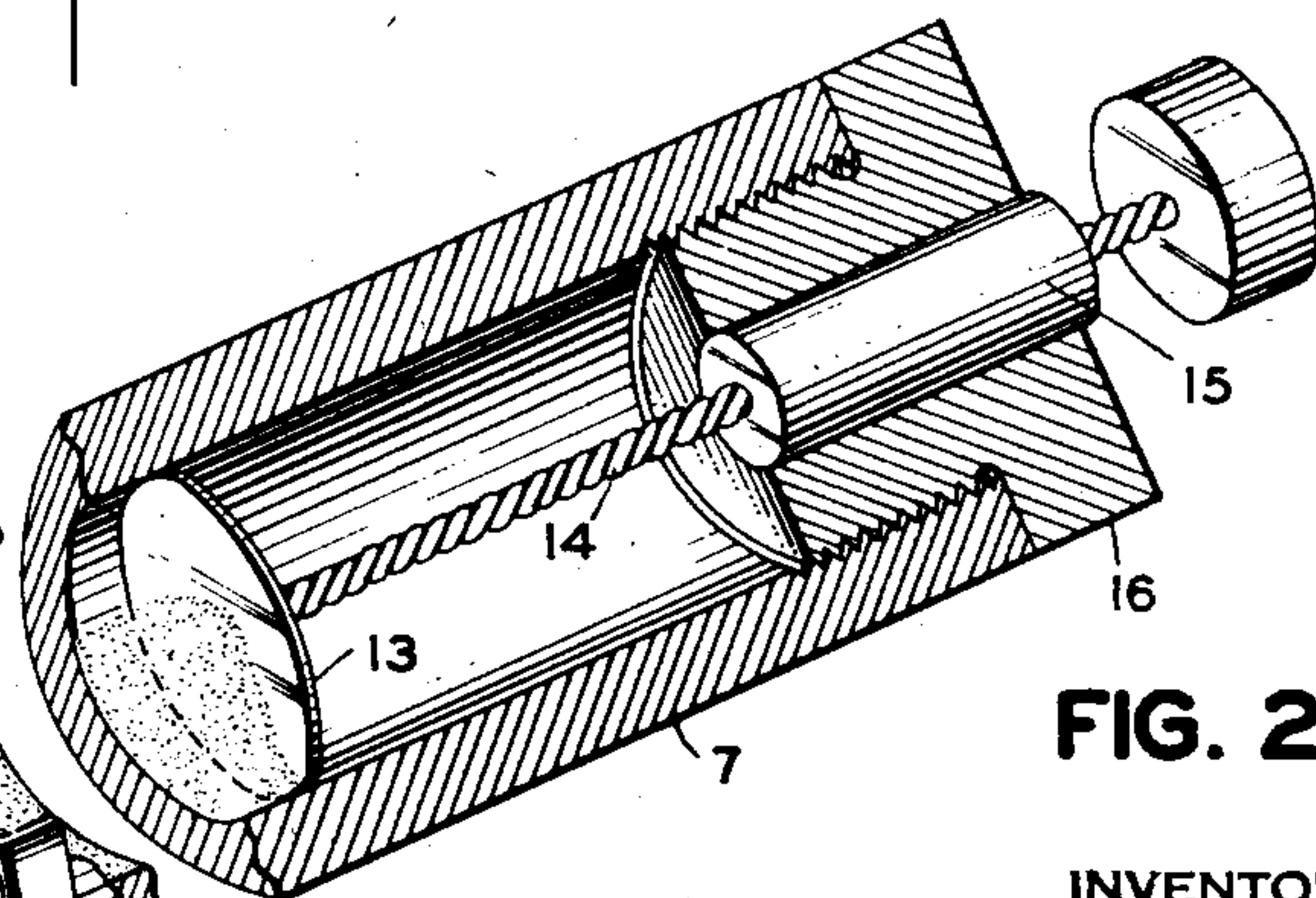
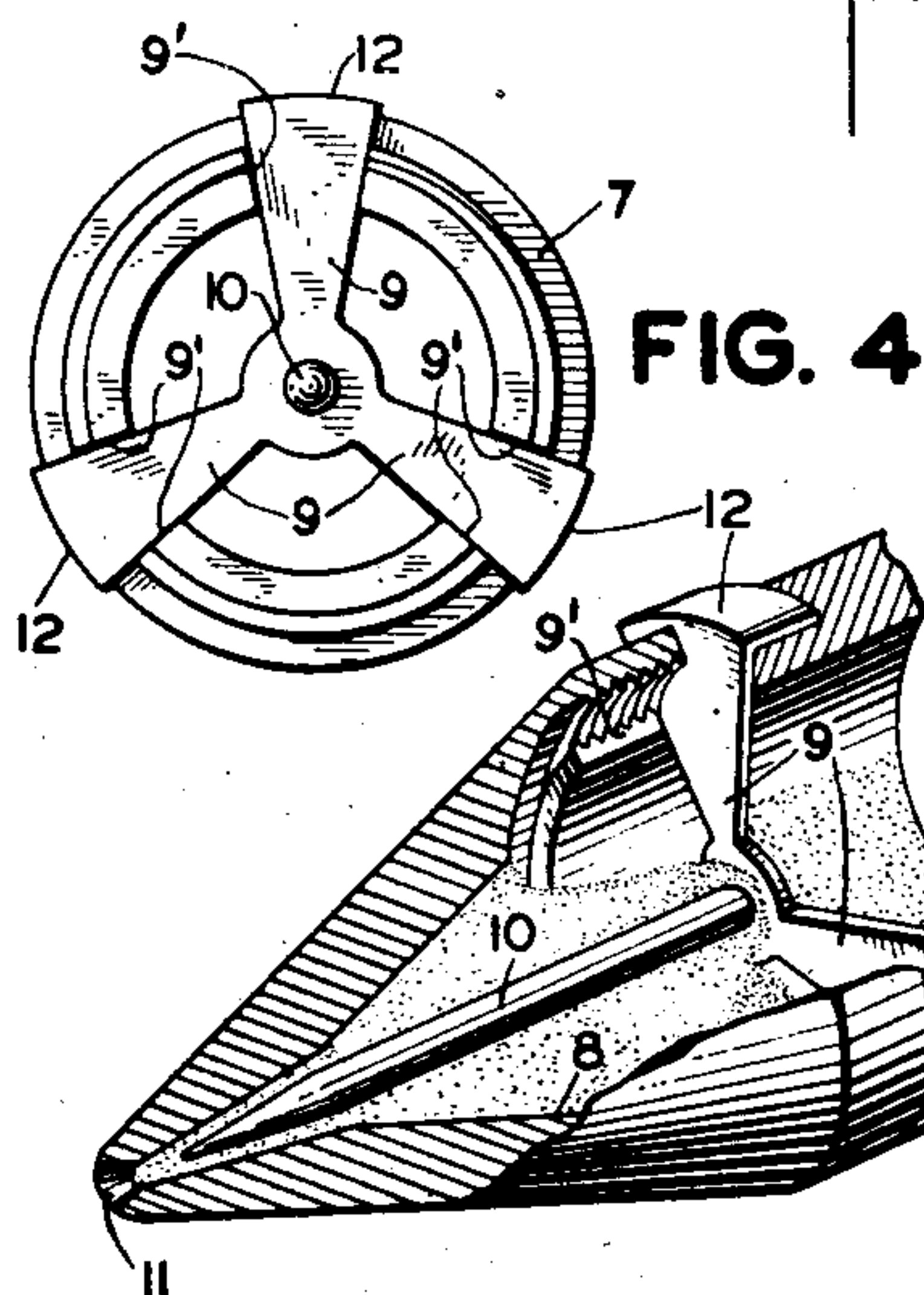
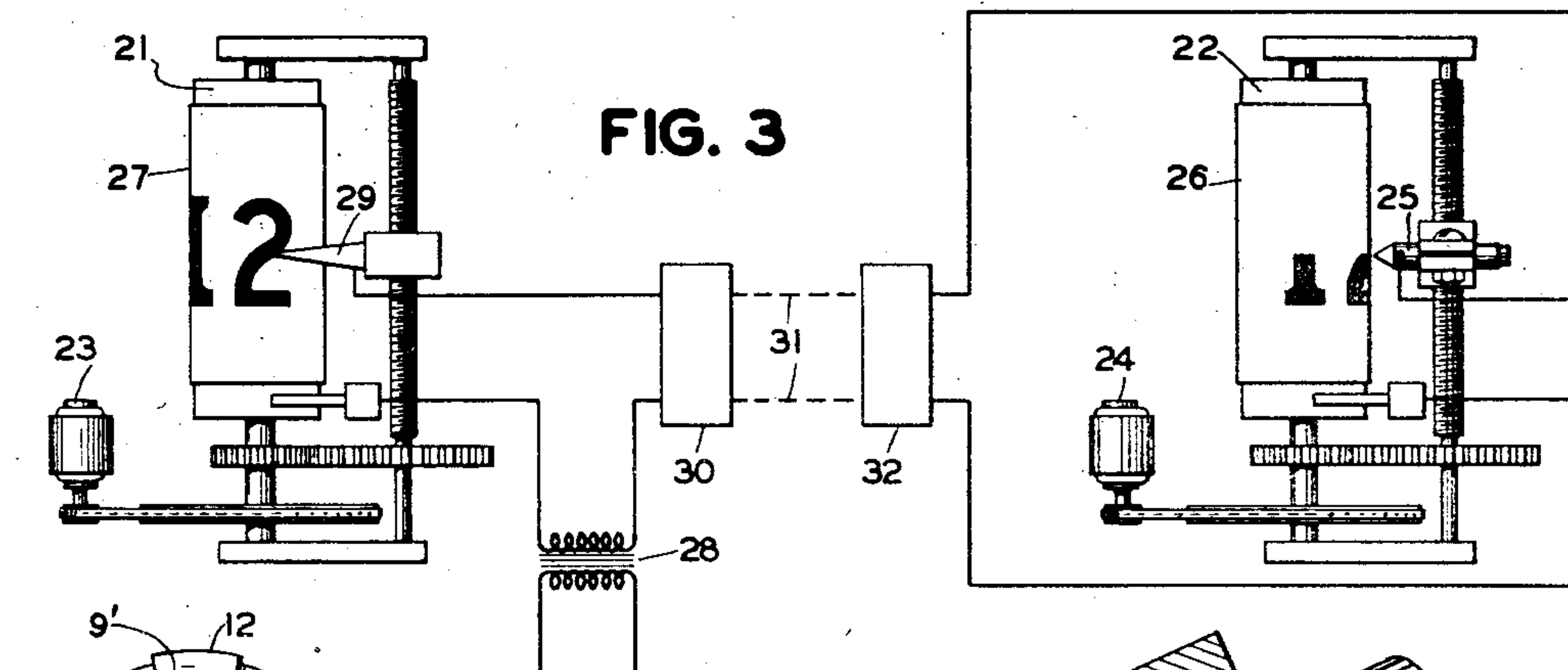
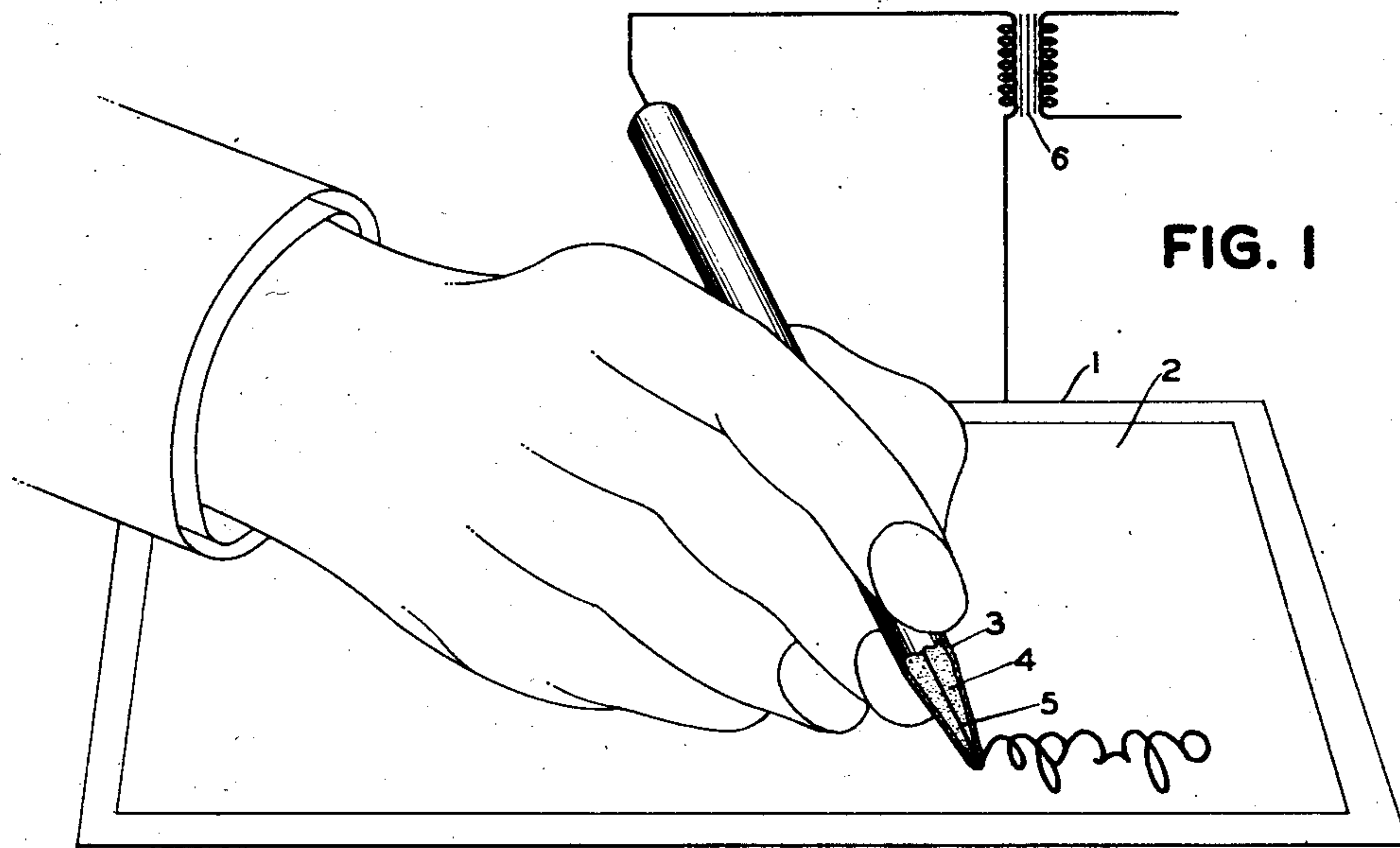
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ELECTROSTATIC RECORDING MECHANISM

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ELECTROSTATIC RECORDING MECHANISM

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4 Claims. (Cl. 234—1.5)

The present invention relates to recording by electrostatic means.

The principal object of the invention is to provide a "pencil" or source of marking materials which can be so controlled by electrical means that the transfer of the marking material to the paper or similar recording medium is independent of mechanical contact or pressure. Such a "pencil" is adapted to many marking and recording devices particularly those used in telegraph and facsimile systems.

Another object is to provide a marking means which is independent of the nature of the surface upon which the marks are to be made and which may therefore be applied to a variety of materials and surfaces.

The present available marking means may be roughly divided into two classes, in the first of which a contrasting appearance of the recording medium is obtained by a change in the chemical or physical properties of the recording medium and in the second of which the contrast is obtained by applying to the recording medium an added material of different appearance. The common pencil and pen are of this latter class. They are frequently used to selectively mark under the control of electric current. These arrangements generally require, however, that either the pencil or the paper be mechanically moved to make and break physical contact between them or to change the pressure of contact. The mechanisms for doing this work are frequently complex and the speed at which they may be operated is limited by the inertia of the various moving parts. In this invention the motion required to mark is restricted to the particles of marking material.

The invention will be understood from examination of the following drawing in which:

Fig. 1 is a perspective view of a recording medium and a simplified form of electrostatic pencil illustrating the principle of the invention;

Fig. 2 is a sectional view of a pencil embodying the invention;

Fig. 3 shows a facsimile telegraph system utilizing a recording pencil such as that illustrated in Fig. 2; and

Fig. 4 is an end view of the pencil shown in Fig. 2, with the end cap removed.

In Fig. 1 is shown a platen 1 of conducting material upon which is placed a recording medium 2, which may be an ordinary sheet of writing paper. The pencil or funnel 3, which may be made by drawing a glass tube to a small orifice, is assumed to be filled with a marking material

4 which may be lamp black, finely divided Bakelite, titanium dioxide or similar suitable material.

If the point of the pencil or funnel 3 were not connected to any electrical power source, it could be moved in a plane slightly above that of the recording medium 2 without marking the latter. If, however, the platen 1 and the wire 5, which extends through the pencil, are connected to the power source 6 an electric field is established between the end of the wire 5 and the platen 1. This field will cause some of the particles of the marking material 4 to be moved toward the recording medium or paper 2. With a suitable strength of electric field these particles will be firmly embedded into the paper, thus producing a permanent mark. Therefore any legend may be written upon the paper without bringing the pencil and paper into physical contact.

Fig. 2 shows the construction of a pencil adapted to electrostatic recording. In this figure a cylindrical barrel 7 and a conical member or point 8 are shown cut away to expose the internal parts of the pencil. The barrel and point may be of hard rubber, Bakelite or other insulating material. The conical member 8 is designed to screw into the barrel 7 which is provided with slots 9' to accommodate projections of the spider 9. This spider supports a wire 10 which is carried close to the orifice 11 in the end of the member 8. The projections 12 of the spider 9 serves as a means for making electrical connections to the wire 10.

A plunger 13 adapted to be moved longitudinally by screw 14 threaded through the sleeve 15 is included in the barrel 7.

The cap 16 and the plunger 13 may be removed to permit filling the barrel with the desired marking material. When the cap is replaced the position of plunger 13 may be adjusted to obtain the necessary pressure to insure the flow of the marking material into the conical member 8.

In Fig. 3 are shown two drums 21 and 22 which are assumed to be synchronously driven by the motors 23 and 24. Drum 21 is part of the sending instrument of a facsimile system in which the message or picture to be transmitted is scanned and the successive signals over a line depend upon the nature of the picture or message being scanned. Such a system is described in the co-pending application of R. J. Wise, Serial 23,926, filed May 28, 1935.

Motor 24 is a part of the facsimile receiver and moves the electrostatic pencil 25 longitudinally as it rotates the drum 22, so that the

pencil traces a helical path on the recording medium 26 placed upon the drum 22. The pencil 25 is of the construction shown in Fig. 2 and is filled with finely divided carbon or other marking particles. The drum 22 is of metal or other conductive material.

An electric circuit for scanning the picture 27 comprises a source of current 28, drum 21, the picture 27, the sending stylus 29 and an amplifier 30. As explained in the aforesaid co-pending application of R. J. Wise a current will flow through this electric circuit when the sending stylus 29 contacts a printed portion of the picture 27. These current impulses are amplified by the amplifier 24 and are transmitted over the lines 31 to the receiving amplifier 32. The output of amplifier 32 is connected across the pencil 25 and the drum 22. Thus a potential is applied between the drum 22 and the wire in the orifice of the pencil 25 whenever the sending stylus 29 contacts a printed portion of the copy 27. This potential causes some of the carbon or other marking particles with which the pencil is filled to be propelled from the pencil and to the surface of the recording medium 26. The marks thus made under the control of the sending equipment form a reproduction of the transmitting copy upon the recording medium.

It is not intended that the invention be limited to the particular forms shown as these are for illustration only. In Fig. 2 the connecting wire is shown extended to the orifice of the pencil. This is desirable when using marking materials of poor electrical conductivity but the connection need merely be made to any portion of the marking material when the latter is electrically conductive. Many variations will be evident to those skilled in the art.

What is claimed is:

1. In a facsimile system, a recording medium, a recording pencil comprising a container provided with an orifice, a dry marking material disposed in said container, and means to apply a

signal controlled electrical potential between said marking material and the recording medium to transfer said marking material through said orifice from said container to said recording medium.

2. A facsimile receiving instrument comprising a container provided with an orifice, a marking material disposed in said container, an electrically conductive member disposed within said container adjacent said orifice, an electrically conductive member external to said container for supporting a recording medium, and means for applying a signal controlled electric potential across said conductive member within said container and said conductive member external to said container, to transfer said marking material to said recording medium.

3. A recorder comprising a container provided with an orifice, a dry marking material within said container, said material being adapted to be moved by an electric field, a recording medium and means for applying an electric field between said marking material and said recording medium to transfer said marking material from said container through said orifice to said recording medium.

4. A receiving instrument comprising a platen having an electrically conducting surface, said platen being adapted to carry a message blank, an elongated container having a bore tapered to end in an orifice, an electrically conductive member within said bore and having one end thereof positioned adjacent said orifice, said container being positioned with respect to said platen so that said orifice is closely adjacent said conducting surface, and means to apply a signal controlled electric potential between said conductive member and said platen whereby a recording medium in said container is transferred to a message blank on said platen to produce a substantially permanent record.

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