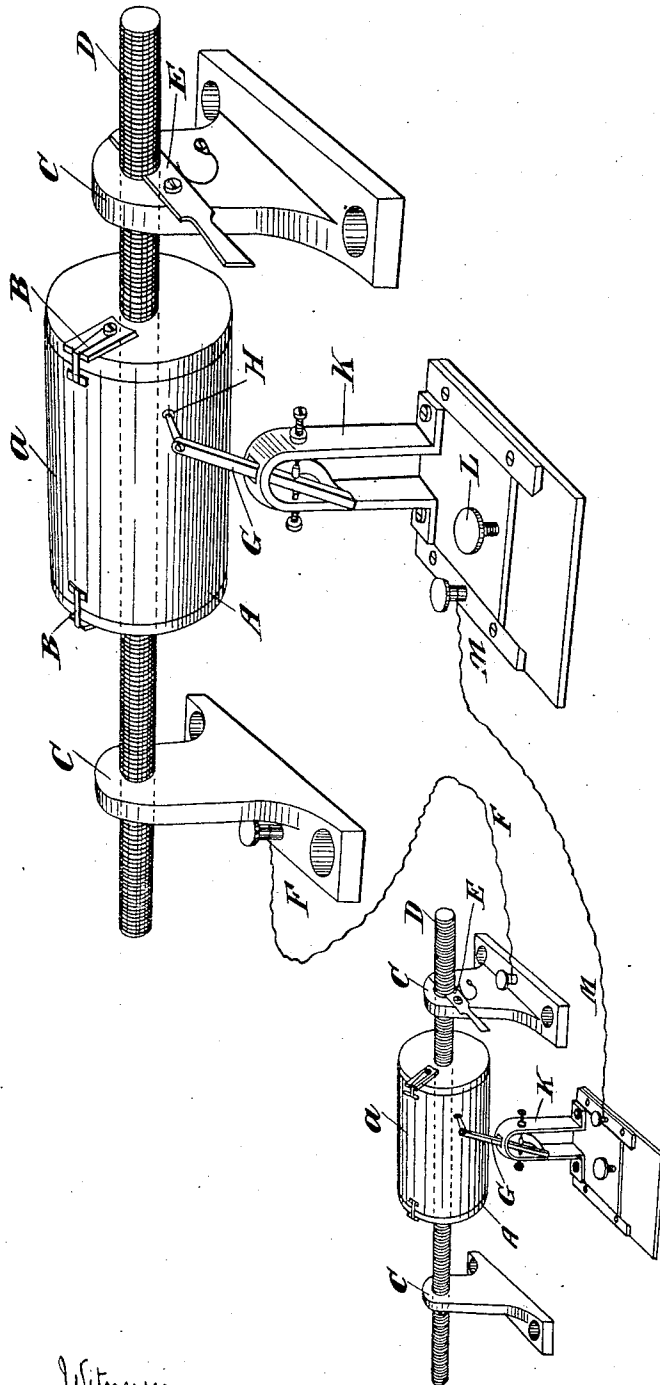


(No Model.)

H. W. C. COX & R. J. CROWLEY.
FACSIMILE TELEGRAPHY.

No. 566,298.

Patented Aug. 25, 1896.



Witnesses

H. van Oersmeel
A. S. Buisson

Inventors
Harry William Charles Cox
Richard Joseph Crowley
by *Richard Joseph Crowley*
Attorney

UNITED STATES PATENT OFFICE.

HARRY WILLIAM CHARLES COX AND RICHARD JOSEPH CROWLEY, OF LONDON, ENGLAND, ASSIGNORS TO JOHN CORRY FELL AND REGINALD WILLIAM JAMES, OF SAME PLACE.

FACSIMILE TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 566,298, dated August 25, 1896.

Application filed June 19, 1895. Serial No. 553,327. (No model.)

To all whom it may concern:

Be it known that we, HARRY WILLIAM CHARLES COX and RICHARD JOSEPH CROWLEY, residing at London, England, have invented Improvements in and Relating to Facsimile Telegraphy, of which the following is a specification.

This invention relates to improvements in facsimile telegraphy to transmit facsimiles of writing, drawings, stenography, signatures, maps, plans, cipher, foreign characters, or other written or printed matter.

We are aware that many attempts have been made to transmit writing or designs by telegraphy in facsimile and that many apparently practical instruments and arrangements exist for the purpose, but, so far as our knowledge extends, they are dependent upon, first, the drawn or written message being impressed upon the paper or carrying medium by lines or characters, raised or depressed by pressure, above or below the general surface of the paper or transmitting medium, for the making and breaking of the electrical circuit, as a stylus travels over the respective projections or depressions, or, secondly, upon a conducting-paper being prepared with a surface-insulating film or varnish, which is removed from the transmitting material by the action of the writing or drawing stylus, or, thirdly, by the use of a fluid for writing or drawing the lines to be transmitted, which shall be a conducting medium upon the surface of a non-conducting paper or transmitting medium. There are serious disadvantages against all these methods of preparing messages or drawings for facsimile transmission so as to be used popularly by the world at large. The preparation of a message or drawing in projecting relief or depression is not convenient or suitable for general use.

The employment of a special paper or medium covered with a non-conducting film or varnish, which may be removed by a stylus, is not practicable for general use, as the varnish to be removed must be in a plastic or moist condition when the message is written, and when transmitted by instruments the varnish is smeared by the action of the transmitting-stylus, and the drawing or message is effaced during transmission.

When a fluid or ink is employed to act as a surface-conductor on the face of the transmitting non-conducting paper or material, the words, characters, or lines are usually connected together by the fluid or ink used, which is contrary to the usual practice in writing, and will confuse the distinction in the words or signs, and, further, the current will be transmitted through long films of the said conducting fluid or ink, which opposes an impracticable electrical resistance into the circuit.

This invention therefore consists, essentially, in the employment of a fluid or ink which may be used in any pen or stylus, and which will absolutely permeate paper or similar material on which a message or drawing may be inscribed for facsimile transmission by any unskilled person in their usual mode of writing or drawing, and which fluid or ink will by its permeation render the paper, which is an electric non-conductor, a conducting medium to the current of electricity through the lines that have been traced on the paper, from front to back, and through which the operative current for the transmission of the facsimile message may be completed from a metallic stylus on one side of the paper to a supporting metal surface underneath the paper.

Messages or drawings can thus be written or drawn on suitable paper forms, as heretofore, with any pen in any place, provided the sender has a supply of suitable fluid or ink, and can be handed in at any office for facsimile transmission, as is at present done with ordinary telegrams, but with the avoidance of any error in transmission and with the power to transmit accurately any signs, ciphers, or stenographic writing which may be quite unintelligible to the instrument-operators.

In order that our invention may be the better understood, we now proceed to describe the same in relation to the drawing annexed hereto and to the letters marked thereon.

The figure is a perspective view of our transmitting and receiving apparatus for facsimile telegraphy.

To effect our facsimile telegraphy, we employ a movable transmitting-surface, which carries the writing or drawing effected on an

insulating material, such as paper, for facsimile transmission to a similar movable receiving-surface carrying a suitable material for the reception of the facsimile message or drawing. Preferably we make such movable transmitting and receiving apparatus in the form of a cylinder A, which is a known form of transmitting apparatus, on which is secured in any suitable manner, such as by the spring-clips B, the material *a*, such as paper, upon one of which the drawing or writing to be transmitted in facsimile has been made by any ordinary or convenient pen with an ink (hereinafter more fully described) which is capable of penetrating or permeating the insulating material or paper without materially spreading and which renders such permeated ink-line electrically conducting through the substance of the insulating material, such as paper, on which the message or design has been written or drawn. The said transmitting and receiving cylinder A is mounted in a frame C, so that it is capable of revolution about its axis D in the said frame, and it is uniformly rotated by any known clockwork, electrical motor, weight, or other means, the movements of the transmitting and receiving cylinders being accurately synchronized by any known means, of which many are well known, such as that in which the pendulums of the motive clockwork or the electrical motors are electrically controlled from the transmitting to the receiving cylinders. The axis D of the cylinder has also a worm or screw cut upon it, into which engages a clip E, fixed to the frame, which thus acts as a fixed nut and causes the cylinder to move laterally in its frame when it rotates. The metallic periphery and axis of the cylinder is connected at F to the main electrical circuit.

A spring-stylus G, having a small wheel H or a brush or pointer at its point, is mounted upon a slide-bar K, and may be adjusted so that the wheel H presses upon the surface of the paper upon the cylinder A, and may be fixed in that position by a set-screw L, and the said stylus G is connected also to the main circuit at M.

Now the paper on which the message or drawing is inscribed being an insulator, except where the electrically-conducting ink has permeated it, the circuit between the stylus and the transmitting-cylinder remains broken as the cylinder revolves and simultaneously moves in a lateral direction until the wheel H of the stylus G passes over a portion of the inked lines. At this point the circuit is closed and is again broken as the wheel H leaves the ink-line. As the wheel H of the stylus describes a continual spiral of very minute pitch over the whole of the surface of the paper carrying the inscribed message or drawing, the main circuit is closed in succession over each minute portion of the inscribed drawing or message.

The receiving-cylinder and wheel-stylus may be an exact duplicate of the transmit-

ing cylinder and stylus, with the result that the main circuit is completed through the receiving stylus and cylinder at the exact moment when the transmitting-stylus completes the electrical circuit through the ink-lines of the message or drawing. In this case we apply a chemically-prepared paper to the receiving-cylinder, which is an electrically-conducting medium and will discolor or become decomposed by the passage therethrough of the electric current from the receiving-stylus. Thus an exact facsimile of the original inscribed message or drawing is reproduced upon the chemically-prepared paper at the receiving-station.

We may pass a distinctive number of various electrical impulses to the various receiving instruments through one main circuit on the well-known principle of "duplexing" or "quadruplexing" messages through an electric wire or cable, but in such case the receiving-stylus, instead of making constant electrical contact through the receiving-paper with the main circuit, will not make contact at all with the receiving-paper until brought into contact therewith by an electromagnet, one of which controls the movement of each receiving-stylus, and thus only makes contact with the receiving-paper when the circuit is closed through the corresponding transmitting-stylus and conducting-ink. In this case the stylus may itself be a fountain-pen, so arranged that the ink will not run except when actuated by the electromagnet. Any number of copies can thus also be produced by intermediate layers of carbonized paper, and the receiving-cylinder need not be in the circuit, the circuit being closed through the coils of the electromagnets of the receiving-stylus.

The ink to be used in the facsimile telegraphy must have a free acid present to enable it to penetrate or permeate the insulating material, such as paper, and must be at the same time itself an electrically-conducting body.

The following ingredients make a good conducting and permeating ink for the purpose: nitric acid, one hundred parts by weight; a precipitate of tin or lead, and sulfuric acid, ten parts by weight. The precipitate is obtained by first melting the metal, and when melted by pouring sulfuric acid upon it until a compound is formed. This compound gradually becomes a liquid when exposed to the atmosphere, but it can be mixed at once with the nitric acid, a further chemical change then taking place. Any suitable coloring-matter may be added to the ink, such as Prussian blue, anilin dyes, or any suitable vegetable fiber or preparation, or any other suitable metallic base may be used in place of the above metals.

Having now described this invention, what we claim, and desire to secure by Letters Patent, is—

1. In facsimile telegraphy the composition

of an electrically-conducting ink, capable of permeating an insulating substance and rendering said paper electrically conducting through such ink-trace, consisting of an excess of free acid with an electrically-conducting metallic salt, with a coloring-matter such as anilin dye, substantially as described.

2. In facsimile telegraphy the composition of an electrically conducting and permeating ink consisting of one hundred parts by weight of nitric acid and ten parts by weight of a precipitate of lead or tin and sulfuric acid prepared substantially as herein described.

3. In facsimile telegraphy in combination, a transmitting metallic cylinder, a threaded metallic axle supporting same on metallic standards, a non-conducting paper with permeated conducting-traces marked thereon

mounted on cylinder by attachment-clips, all adapted to complete electrical continuity; a spring-pressed stylus and adjustable slide supporting same, adapted to complete electrical continuity of circuit between terminals; a duplicate receiving instrument, chemically-prepared conducting and discoloring paper thereon, and known means for the synchronized rotation of the said transmitting and receiving cylinders, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

HARRY WILLIAM CHARLES COX.

RICHARD JOSEPH CROWLEY.

Witnesses:

JOHN C. FELL,

RICHARD A. HOFFMANN.