(No Model.) 4 Sheets—Sheet 1.

J. ABSTERDAM.

AUTOMATIC AND FAC SIMILE TELEGRAPH.

No. 295,219. Patented Mar. 18, 1884.

Fig. 1.

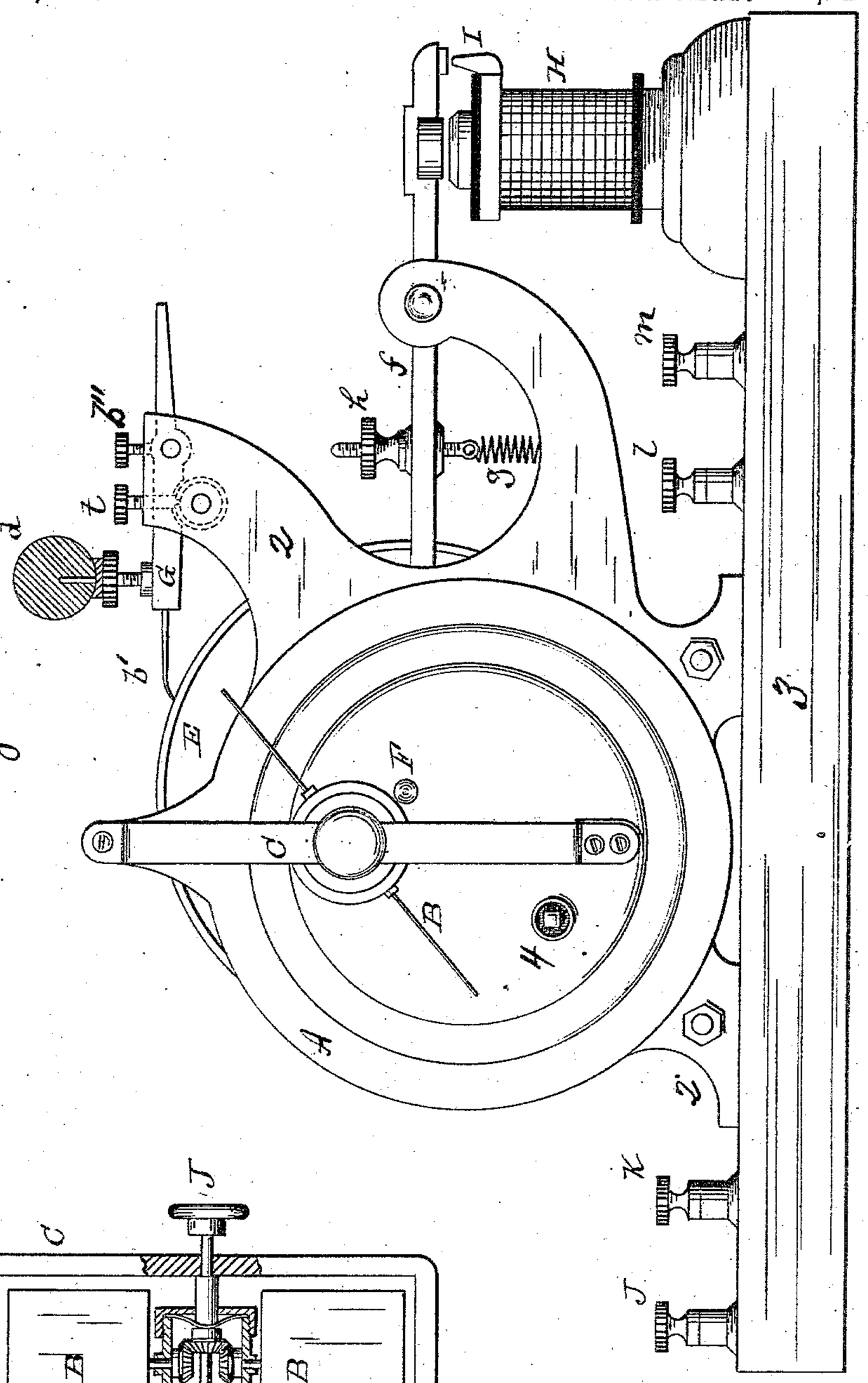
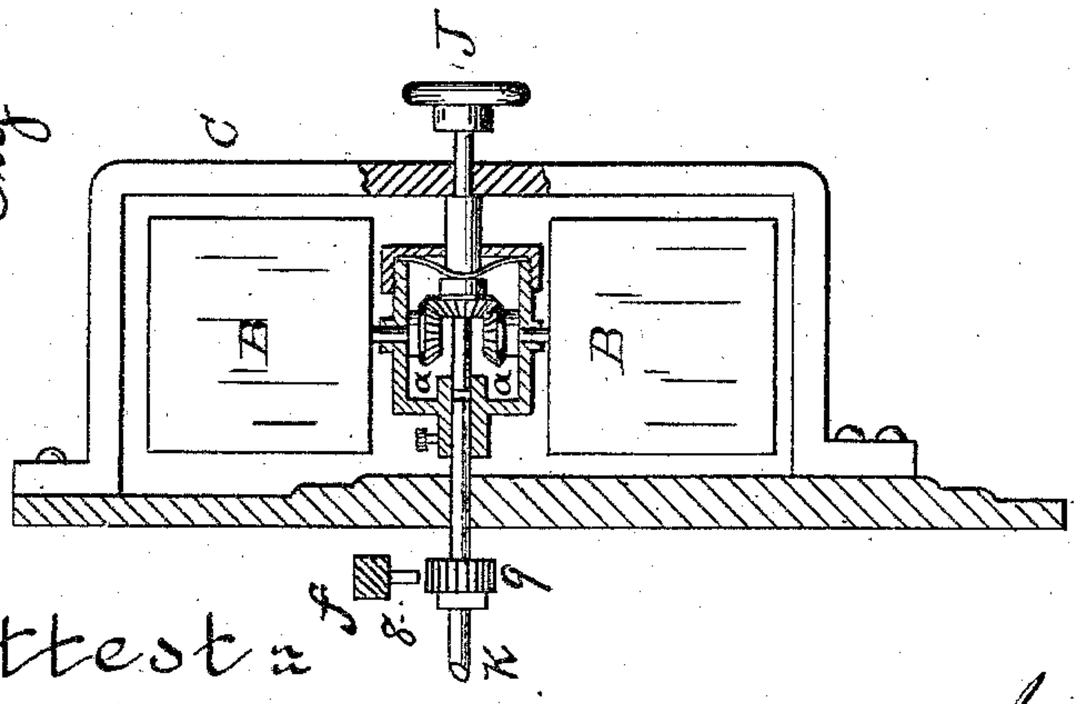


Fig. 3.



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(No Model.) 4 Sheets—Sheet 2.

J. ABSTERDAM.

AUTOMATIC AND FAC SIMILE TELEGRAPH.

No. 295,219. Patented Mar. 18, 1884.

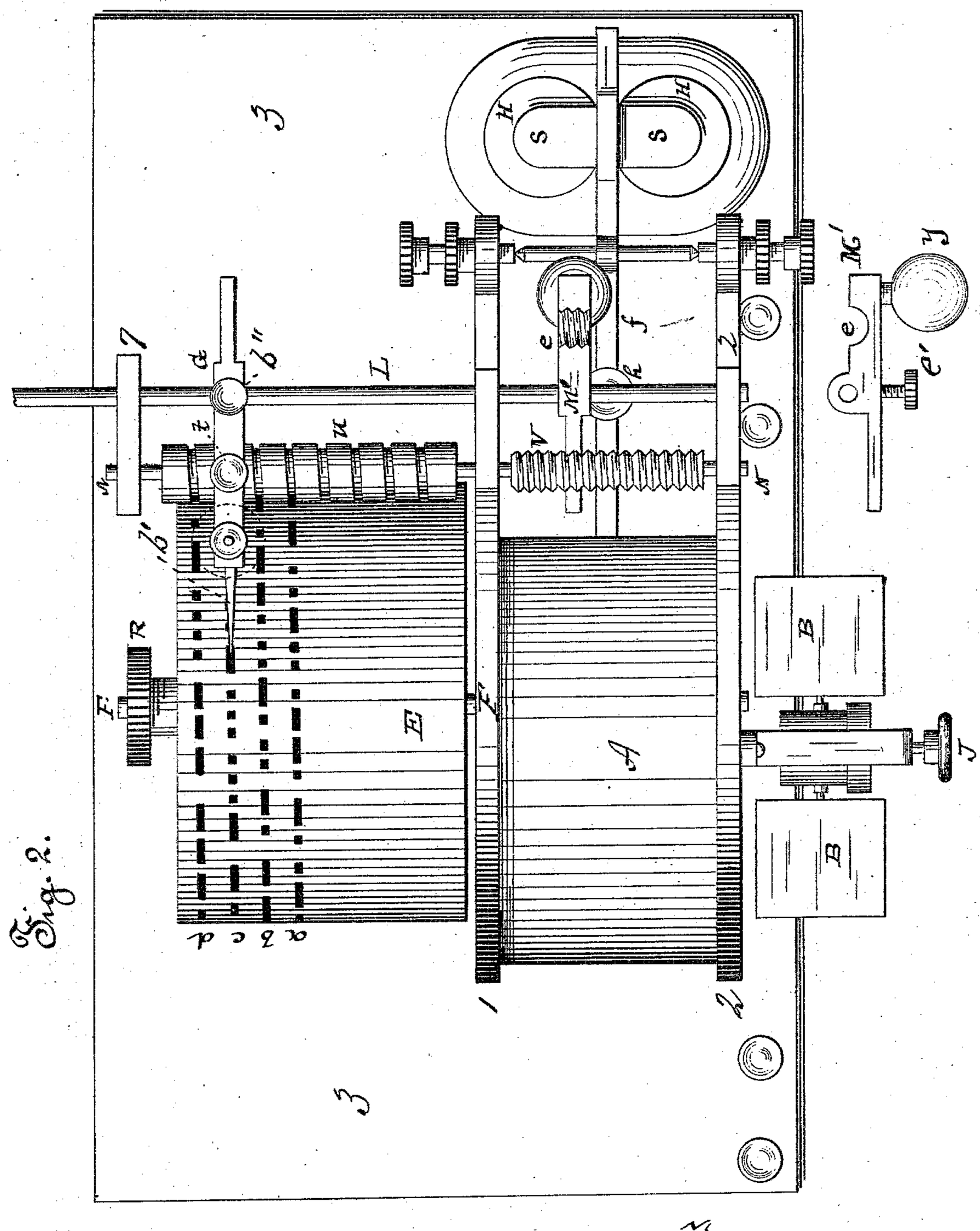

Fig. 2.

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(No Model.) 4 Sheets—Sheet 3.

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AUTOMATIC AND FAC SIMILE TELEGRAPH.

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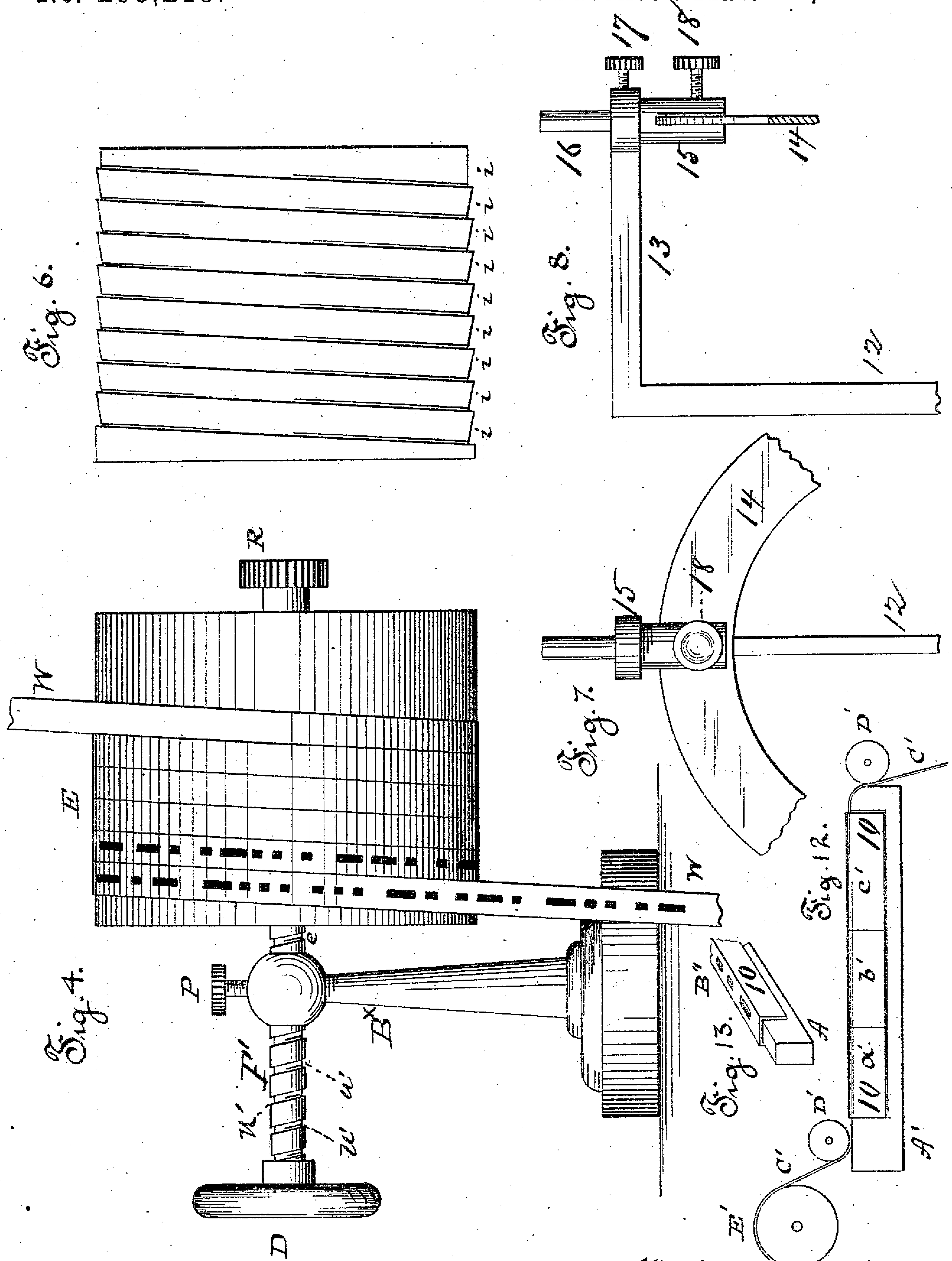

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(No Model.) 4 Sheets—Sheet 4.

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AUTOMATIC AND FAC SIMILE TELEGRAPH.

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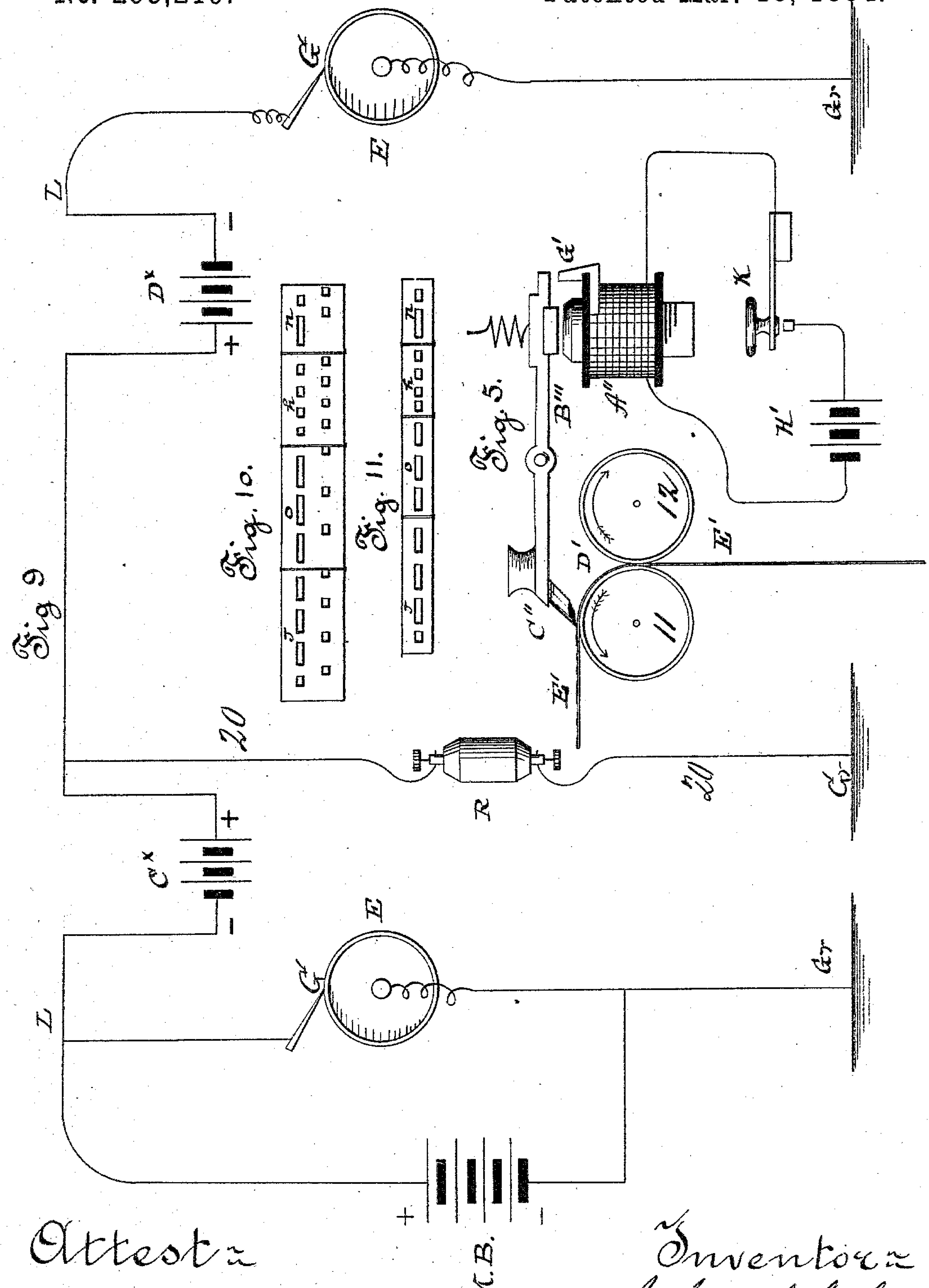

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UNITED STATES PATENT OFFICE.

JOHN ABSTERDAM, OF NEW YORK, N. Y.

AUTOMATIC AND FAC-SIMILE TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 295,219, dated March 18, 1884.

Application filed April 18, 1883. (No model.)

To all whom it may concern:

Be it known that I, JOHN ABSTERDAM, of New York, in the county of New York and State of New York, have invented a new and useful Improvement in Automatic and Fac-Simile Telegraphy; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention relates, generally, to improvements in that branch of telegraphy known as "automatic"—that is, wherein the mere transmission of the impulses necessary to indicate the message is not sent by hand, but the message is "composed" in or on some material or base, and the composed message is used to automatically control the apparatus transmitting the necessary impulses.

It more especially relates to improved, simple, and reliable means and methods for "composing" the message, means for transmitting the composed message, and to arrangements of circuits and batteries specially adapted to this class of telegraphy; and it consists in the features more particularly hereinafter described and claimed.

In carrying my invention into effect, I use as the base upon which the message is composed a perfectly smooth metallic cylinder or drum adapted to be placed upon or removed from a shaft, upon or with which it receives a rotary motion from any suitable prime motor, an adjustable fan-regulator being connected to the train, so that the speed of rotation of the cylinder or drum can be regulated and controlled.

For regular telegraphic transmission by any arbitrary code, the message-symbols are to be placed or composed upon the cylinder or drum in a regular spiral or winding line thereabout, with insulating material, either the insulated or the uninsulated portions representing the symbols, as may be desired. The spiral line of symbols may be placed upon the cylinder or drum in either of several ways. A paper fillet may be perforated in any well-known way, and the perforated band wound spirally around the cylinder or drum, and the surface then brushed over with the insulating ink or paint, the fillet serving as a stencil, so that when removed from the cylinder or drum the symbols appear thereon by the ink or paint reaching its surface through the perforations. If this system of stenciling be used, it is advantageous to use a blade which is an annulus whose interior diameter is that of the cylinder or drum adjustably mounted in a standard, the interior edge being then used to hold the perforated paper firmly on the drum or cylinder while the stenciling is in progress; or, upon a fillet of paper, the symbols may be marked in an ink or pigment which is both insulating and transferable, which strip of paper is then wound tightly upon the drum or cylinder, and the ink or pigment therefore transferred to its surface by the use of the proper dampness and pressure, or such other process as may be best adapted therefor. This strip of paper may be prepared for transfer by the use of stencils—that is, a set of stencils, each representing an arbitrary telegraph-symbol, is provided, each stencil being bent or hooked at each end, so that a number of them may be joined together to form a word or message. So joined together, they are laid upon the fillet and held thereon by suitable means, whereupon they are used as stencils to suitably mark the paper; or upon the free end of what would ordinarily form the pen or stylus of a Morse register may be mounted a broad-nibbed fountain or magazine or stylographic pen filled with the proper ink, the action of which would be to mark the symbols in broad dots and dashes of the insulating and transferable ink, instead of embossing the paper, as usual. Fillets or bands or sheets of paper prepared in either of these ways may be used as the agent for transferring the message to the face of the drum or cylinder. Instead, however, of transferring the symbols or matter to be transmitted to the surface of the drum, the strip itself may be wound thereon, it first having been prepared by any of the means noted—that is, with the matter stenciled thereon, or imposed by the register noted, or in any other suitable way. When the strip itself is used and wound around the drum or cylinder,

the ink to be used is preferably one not affected by water, either a fatty ink or a varnish not soluble in water, and properly colored, if desired, in order that it may show on the surface of the paper. A strip or fillet prepared with such an ink or varnish is saturated with water, the surplus water squeezed out in any suitable way—say by passing it through an ordinary wringer—and the strip or fillet then wound spirally around the drum or cylinder, with the symbols thereon uppermost. The web portion of the fillet or band becomes, through the agency of the moisture, conducting, while the fatty ink or the varnish forms insulating spaces, and the current through the transmitting device is thereby controlled.

If desired, in order to render it of greater conductivity, the water used to moisten the strip may be acidulated or impregnated with metallic salts in a manner well known in the art; or the symbols may be placed in a merely insulating ink on a metallized paper strip—that is, on paper having one side coated with a conducting metal—or even upon a metal foil. Such a strip is then wound on the drum or cylinder, its ends being fastened thereto by metal clips or by pasting, or in any other way which will securely hold it thereto. In this latter case any non-conducting ink will answer.

In order to facilitate the placing of the symbols in a regular spiral around and upon its face, the drum or cylinder may be provided with a fine spiral mark, engraved or cut therearound; or its face may be formed into a beveled spiral showing in cross-section a series of beveled grooves, the bottom of each being at a shoulder or wall rising to the top of the next; or the drum or cylinder may be placed upon a shaft capable of rotation in a suitable standard. This shaft is twice or more as long as is needed for the support of the drum or cylinder, and the part upon which the drum or cylinder does not rest is cut into a screw-thread of pitch corresponding to the pitch of the spiral upon the drum or cylinder. Into this screw-thread, through the box in which the shaft revolves, takes a pin or point. It follows, then, that if the drum or cylinder be rotated, and the fillet or other device used for placing the symbols thereon be fed thereto or used therewith at one point, a true spiral will be formed on the face of the drum or cylinder as it is moved forward during rotation by the action of the pin or point and screw-threaded shaft. I prefer a device of this kind for preparing the drums or cylinders for the work of transmission, instead of using one machine for both preparation and transmission, as thereby the more complicated and expensive transmitting machinery is left free to be employed at any time for its own uses.

The transmitting device consists of any suitable prime motor, suitably inclosed, gearing with and giving motion to a projecting shaft, upon and with which the drum or cylinder, prepared as hereinbefore specified, may be mounted and rotated. To this motor or some part of its train is connected a regulating-fan, the blades of which are adjustably connected to their shaft, so that their angle, and hence their resistance to rotation, may be varied or adjusted at will, whereby at will the speed of rotation of the shaft and the drum or cylinder placed thereon is regulated and controlled.

In the framing of the machine is mounted a rod capable of longitudinal movement in its bearings in the framing in a direction at right angles to the axis of rotation. Upon this rod is secured, so as to take upon the drum or cylinder, when desired, a stylus or pen. In the framing there has also its bearings a shaft, which receives a rotary motion by gearing connecting it with the prime motor of the transmitter. This shaft should be of twice the length of the cylinder or drum, and in that portion immediately adjacent thereto is screw-threaded, and with a pitch corresponding to the pitch of the spiral line of symbols upon the drum or cylinder. A pin, preferably a screw-point, passes through the body of the pen or stylus referred to and takes into such screw-thread. The result is that as both drum or cylinder and this shaft are rotated the pen or stylus passes across the face of the drum or cylinder, passing over the line of symbols thereon, and, if the proper line and battery connections be made, breaking and making or controlling the circuit in accordance therewith.

Thus far what may be termed a "purely automatic system of preparation and transmission" has been described. I have united therewith, however, means for using at will such a system, or a system of pure fac-simile telegraphy.

The screw-threaded shaft referred to is, in the portion thereof not adjacent to the drum or cylinder, screw-threaded with a much finer pitch—indeed, a very fine pitch. Upon the longitudinally-moving shaft referred to there is mounted what may be called a "guide," capable of movement thereon, but also of being fastened thereto. It has formed upon its under side a half-nut, adapted, when thrown in proper position, to take into and be guided by the fine screw-thread noted. If, now, that be placed upon the drum or cylinder which it is desired to transmit in fac-simile, this guide is moved to its initial point, thrown into contact with the screw-threaded shaft, and fastened to the longitudinally-moving rod. The pen or stylus is fastened to the rod, but its pin or screw-point released from taking in the coarser screw-thread. Thereupon the pen or stylus is caused to traverse the drum or cylinder in a spiral of exceedingly-fine pitch, corresponding to the pitch of the finer screw-thread, making and breaking the circuit so often as to cause at the receiving end the re-

ception in fine parallel lines of a fac-simile of the message upon the transmitting drum or cylinder.

As this mechanism may be used for either transmitting or receiving, it is well to add to it a magnetic stop in the well-known manner of the Morse register—simply a magnet, the free end of whose armature takes into some part of the motor-train, and thereby stops it when the magnet is unchanged. The first make of the circuit or charging of the magnet, however, causes the attraction of the armature, releasing the train, while the resilience of the retractor of the armature and the magnetic force of the magnet are so adjusted relatively to each other that the magnet does not become sufficiently demagnetized to let go of the armature and cause a stoppage during the rapid pulsations used in automatic or fac-simile telegraphy.

The instrument thus far described has been described as a transmitter only. It may be used, however, as a receiver as well, and, in fact, in practice it is desirable to so use it. When used as a receiver, a strip of paper chemically prepared with any of the well-known solutions for that purpose is wound spirally around the drum; or a sheet of paper prepared in the same way may be fastened thereto. So prepared, the drum or cylinder may be rotated at a high rate of speed, avoiding the danger of breaking or tearing the fillet or band, which danger is always present when the fillet or band is merely passed between rollers or between a drum or roller and a stylus or pen. The stylus, in such case, is made merely as a fine metal point, in most cases of iron or steel, but varying as to material as the chemical composition of the material used with the receiving-paper varies.

In the exceedingly rapid work expected of these branches of telegraphy, if the circuit were absolutely made and broken as rapidly as the stylus can pass over the conducting and non-conducting portions of the drum or cylinder, a blurring of the received record would occur, due to prolongation of effect, caused by the extra or induced or earth currents in the wire itself. To obviate this, it is best to use an arrangement of circuits and batteries somewhat as follows: At each end of the line is placed a small battery, the two being connected to line, so as to neutralize, and the circuit being normally closed. At the transmitting end a third or main battery, more powerful than either of the other two, is connected to line around the transmitter, and in such manner that the transmitter forms a shunt-circuit away from the line for this battery, one end of this battery being connected both to the stylus and the line, and the other end of such battery having a connection to the ground and the drum, so that the connection between the battery and drum, when the stylus is on a conducting-space of the drum, forms the shunt-circuit, short-circuiting this battery from the line. When, then, the stylus is in contact with the metal surface of the drum or cylinder, a short-circuit for the main battery is established, so that it does not flow to line, while the two batteries directly in line neutralize each other. If, however, the electrical contact of the stylus and drum or cylinder is broken, the short-circuit of the main battery is broken and it is thrown to line. The two lesser batteries, though neutralizing each other, keep the line in a state of electrification, so to speak, and ready to be affected by any variation of potential at either end, while the circuit of the main battery never being broken, the current thereof being simply transferred from the shunt to the main circuit, or vice versa, sparks and extra currents are largely avoided.

In order to more completely avoid any effects of any extra induced or earth currents, one or more connections may be made from the line to the ground through large resistance—that is, through a resistance which the ordinary working-current would not overcome, but which the high-tension currents—such as are the extra or induced currents—would overcome.

By the means thus generally described I am able to furnish an exceedingly simple and reliable system of automatic telegraphy, uniting in one instrument capacity for code or fac-simile transmission, and requiring the least possible amount of skilled labor in its operation. In fact, by the use of the stencils noted, messages may be prepared at business houses or offices and sent to the telegraph-office ready to be transferred to the drum; or, as the drums are preferably prepared separately from the transmitting apparatus and then placed thereon, the drum itself may be fully prepared for transmitting by the customer and then sent to the operating-office.

It should have been noted that in preparing the messages a series or number of drums may be used, it being preferable that the drums or cylinders be prepared first and then placed in the transmitting apparatus. The preferable drum or cylinder is one made of zinc, and upon it the spiral guide-line before alluded to may be made with muriate of platina, which, in conjunction with zinc, gives a readily visible black mark. This process keeps smooth the surface of the drum and gives the needed indication without any indentation thereof.

It is preferable to coat the drums or cylinders used for receiving with a tinned surface, deposited thereon in any of the known methods of tinning, as tin withstands the corroding influences of the chemicals used and the current better than most, if not all, the commercially-practicable metals. These lines may be placed in a spiral for automatic transmission of code-signals or in straight lines for fac-simile or autographic transmission.

It may be noted, also, that the sources of current for the operation of the line may be dynamic or mechanical generators of current, instead of the batteries shown, the relations between the various generators or sources of

current used being preserved, as before noted. In fact, the various chemical, mechanical, and electrical conditions noted may be varied without departing from the spirit of the invention as hereinafter claimed. Several matters are herein shown or described not claimed herein, and no claim thereto is herein made because proper claim thereto has been made in a prior application or will be made in proper subsequent applications.

Convenient devices and arrangements for carrying my invention into practice are illustrated in the drawings, in which—

Figure 1 is a side and Fig. 2 a top view of the transmitter. Fig. 3 is a side view, partly in section, showing the arrangement for adjusting the blades of the fan-regulator. Fig. 4 is a side elevation of the device for supporting the drum while the latter is being prepared to control transmission. Fig. 5 is a side view, partly diagrammatic, of a device for preparing the transfer-paper by means of a pen. Fig. 6 is a view of a form of drum or cylinder which may be used in lieu of the drum shown in Fig. 4. Fig. 7 is a front and Fig. 8 a side view of a device for retaining the paper-fillet in position for stenciling on the cylinder or drum during stenciling. Fig. 9 is a diagram of the circuit and battery connection referred to. Fig. 10 and 11 are top views of the stencil-plates referred to, while Figs. 12 and 13 show convenient ways of using them.

In Figs. 1 and 2 of these drawings, which show the transmitter itself proper, 3 is any suitable base, on which are supported the framings 1 2, rising therefrom, between which is placed the casing A, containing the gearing or gearing and motive power for giving motion to the drum or cylinder E. While the motive power may be of any desired kind, it is here represented as a spring-power inclosed within A and having winding-place 4. Beyond the framing 1 extends a shaft, F, connected to and rotated by the gearing within A, upon which is to be placed the drum or cylinder E, which may be secured thereon so as to rotate therewith by the jam-nut R.

Upon a shaft, K, connected to the gearing within A so as to rotate therewith, and within a supporting-frame, C, attached to A, are secured fan-blades B B, rotated through the medium of bevel-gears *a a*, meshing with a bevel-gear and controlled by the thumb-piece J. By this arrangement the inclination or angle of the fan-blades B B to the plane of rotation may be varied, and hence the speed of rotation of them, the connected gearing, and the cylinder or drum E controlled and regulated.

Upon the cylinder E a representation of the matter to be transmitted is placed in alternate conducting and non-conducting spaces. These representations may be in the ordinary signs of any written language, or they may be, as shown in Fig. 2, the arbitrary or conventional signs of a telegraph-code. In the latter case they are to be laid around the drum or cylinder in a spiral line, as shown at *a b c d*, and by method and means to be hereinafter explained.

Supported by the framings 1 2 and a standard, 7, and capable of longitudinal movement in its bearings therein, is a rod, L, upon which is carried a stylus-holder, G, having a binding-screw, *b″*, adapted to fasten it to L. In the same framings, and between L and E, is supported a shaft, N, having gearings (not here shown) connecting it to the motor actuating E, so as to rotate proportionately therewith. Upon it is cut a screw-thread, *u*, of a pitch corresponding to the pitch of the spiral *a b c d* on E. Through G passes a screw or point taking into *u*. It follows, then, if the motor be allowed to act, that E and N will be rotated, and that the stylus-point *b′*, attached to G, will be carried across the face of the drum or cylinder, passing over the lines *a b c d*, and making and breaking circuit accordingly, if E and G be properly connected in circuit. The other extreme, however, of the shaft N is provided with a screw-thread, V, of much finer pitch than *u*—in fact, it should be of exceedingly fine pitch. Opposite it upon the rod L is what may be termed a "guide," M′, having a screw, *e′*, to secure it, when desired, to L, but loose thereon when not secured by *e′*.

M′ has formed in it a half-nut, *e*, adapted to take on the thread V. When the telegraphic symbols shown are to be transmitted, the screw *e′* is turned to loosen M′ from L, and M′ is thrown over from contact with V, as shown. If, however, a message in figure or language signs be placed upon E for fac-simile transmission, *t* is turned so that it does not take in *u*, and G is turned to secure G to L, at the same time M′ is thrown over so that *e* takes on V and M′ is fastened by *e′* to L, which, as before stated, is capable of longitudinal movement in its bearings. The parts being thus arranged, if the motor be started by the action of V *e* L G, the stylus *b′* is caused to traverse the face of E in a spiral of fine pitch corresponding to V, controlling the circuit accordingly. Thus I am enabled to furnish one instrument adapted to transmit at will either arbitrary telegraphic symbols or fac-simile or autographic messages.

In the circuit controlled by E and G is placed a magnet, H, having an armature-lever, *f*, and a back-stop, I, limiting its play. The lever *f* is provided with the usual retractor, *h g*, and its outer or free end is adapted and arranged, by a hook or stop, 8, when the lever is controlled by *g*, to take into a wheel, 9, of the motor-train, so as to stop or block the motor. The strength of H and *g* are so adjusted, however, relatively to each other that if H be overcharged, releasing, through *f* and 8, the motor-train, its residual magnetism will hold *f* during the rapid makes and breaks incident to automatic or fac-simile telegraphy.

It should have been noted before that by the adjustment of the regulator-fan blades B B the speed of the transmitter may be changed. In fac-simile telegraphy they may be so set as to allow the drum or cylinder to rotate much

faster than when it is used in ordinary automatic telegraphy. At the same time, if it be desired to prepare the drum while in the transmitter, they may be set so that its speed of rotation shall correspond with the speed of operation.

In order to give both G and M′ firm contacts with E and A, respectively, preventing any jumping or skipping, weights *d y* are provided. These weights may be applied as clearly shown in Fig. 1, where *d* is the weight applied to a projection, either screw-threaded or plain, from the body of the stylus-carrier G. This weight is so adjusted that it holds the pen or stylus firmly to the face of the drum or cylinder and obviates any liability to jump from the face or surface on which the end may rest.

The drum or cylinder for automatic transmission shown in Fig. 2 may be prepared in either of several ways. A strip or fillet of paper may be perforated to represent, either by the perforations or by the spaces between the perforations, any telegraphic code, and this by any of the well-known forms of perforators, as shown in Fig. 4. The strip so perforated is wound spirally around the drum or cylinder and used as a stencil for imprinting thereon marks or symbols corresponding to the perforations; or the strip or fillet of paper may be marked with an insulating and transferable ink or pigment in symbols representing a code, which strip or fillet may then be wound around the drum or cylinder and so treated that the ink or pigment is transferred from the fillet or band of paper to the surface of the drum or cylinder. A convenient means for accomplishing this is shown in Fig. 5, wherein 11 and 12 are rolls actuated to feed between them the strip, band, or fillet E′, while A″, B‴, H′, and K represent the ordinary construction of a Morse register. Upon the armature-lever B‴ is mounted a broad-nibbed fountain or reservoir pen, C″, which is lifted from or allowed to contact with E′, according as the circuit of H′ is made or broken by the key K. Instead of this, a set of stencils, each being the arbitrary symbol representing a word or letter in a telegraphic code, may be prepared, the ends of each stencil being bent over, so that a series may be hooked together, as shown in Figs. 10 and 11, wherein stencils representing J O H N are fastened together to form a word or message or part thereof. These stencils may be kept in stock, selected and joined to form the message by either the customer of the telegraph-line or by the employés thereof. They may, if desired, be formed with the shoulders 10. (Shown in Figs. 12 and 13.) Joined together, they are then used as shown in Figs. 12 and 13—that is, the paper band or fillet C′ is drawn over a support, A′, and held in position by rollers or clamps D′ D′, the stencils *a′ b′ c′* laid thereon, and the message stenciled on C′ in transferable insulating ink or pigment, and the strip C′ then used, as before stated, as the means by which the message is transferred to the drum E. By any of these means the drum E may be covered with a series of arbitrary telegraphic symbols in a spiral line. In order, however, to insure the correctness of the spiral line, and in order to at all times leave the transmitting apparatus free for its own particular work, I prefer to prepare the drum apart therefrom and place it in the transmitting apparatus only when fully prepared to control the sequence of makes and breaks necessary for complete and perfect transmission.

This can be accomplished by the use of the devices shown in Fig. 4, in which B× is a standard, having its upper end formed into a bearing or box for the shaft F′, which, for about half its distance, is screw-threaded, as shown at *u′*, the pitch of such thread corresponding to that of *u* on N in Fig. 2. A screw or point, P, takes through the journal or box into such screw-thread. Upon the shaft F′ the drum or cylinder is placed, and is secured thereon by the jam-nut R′. The shaft F′ is provided with a pulley or hand-wheel, D×, by which it may be rotated. If, now, an end of the perforated fillet or band W be secured to E, and E be rotated by D×, and the fillet or band fed thereto from one point, it is evident that it will be wound thereon in a spiral corresponding to *u* and *u′*. If desired to assist in this, the face of the drum or cylinder may be turned in a beveled spiral, as shown at *i i* in Fig. 6. The latter form affords a sure and simple guide for the spiral line, especially when the stencil-plates shown in Figs. 10 and 11 are used.

In order to retain firmly in place the stencils when in use, whether they be the perforated fillet or the plates, the device shown in Figs. 7 and 8 may be used, wherein 12 is a standard having a projecting right-angled arm, 13, in the end of which is supported, by means of its shank 16, a slotted piece, 15. In the slot of 15 is secured, by means of the set-screw 18, the blade 14, which is an annulus, its interior diameter being equal to the diameter of the drum or cylinder. The blade is adjusted by the set-screw 17, so as to bear upon the stencil, when placed on the drum or cylinder, and so hold it firmly while it is being brushed over.

By the means described, the drum or cylinder may be readily and reliably prepared to control automatically the transmission of the desired matter, and that with a minimum of skilled labor.

For transmission, the arrangement of circuits, batteries, and instruments shown in Fig. 9 is a desirable one, in which at the receiving and transmitting stations the drums or cylinders E E and pens G G are conventionally represented, the drums or cylinders being connected to the ground G*r*, while the styluses or pens are connected to the line. At each end of the line is a weak battery, these batteries being indicated at C×× and D××, of equal strength, and connected oppositely in the circuit, so as normally to neutralize. At the

transmitting-station a stronger and main battery, M B, is connected to line, so as to re-enforce $C^{\times}$, and to ground around the transmitting apparatus E G. In the line between the stations is made a ground-connection, 20, having in it a rheostat, R, of such resistance as to prevent the ordinary working battery-currents from going to earth. Normally the batteries $C^{\times}$ $D^{\times}$ neutralize each other, keeping the line in a neutral state so far as electrical tension is concerned. When the transmitter is used, as the pen G rests on a metallic portion of the drum or cylinder E, the main battery M B is short-circuited. When, however, electrical contact between E and G is broken by an insulating-space, the short-circuit of M B is broken and its current is forced to line and distant station, to complete its circuit. As its circuit is never broken, but merely changed, the danger of false marks from prolongation of discharge is largely obviated, while the resistance-leak 20 and R (of which there may be any desired number in the circuit) affords a short path to ground for any extra or induced currents, so that they are not compelled to pass through and affect the receiving-instrument.

I do not herein claim, broadly, a method of automatic transmission consisting in causing the ordinary symbols of a telegraph-code to be recorded in insulating and conducting spaces upon a suitable surface, and then using the record so made to automatically control the transmitting-circuit; nor the combination, with one transmitting-surface, of a motive power and a regulator adapted to vary and control the speed of movement of such transmitting-surface, and means for controlling the regulator at will, as such subjects-matter of invention form the subject of a prior application, bearing serial number 88,352; but,

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an automatic-telegraph transmitter, the combination of a drum or cylinder having symbols thereon in non-conducting matter in a spiral line, and representing a telegraphic code or signals, a stylus, and means, substantially as described, for causing the stylus to contact with the drum or cylinder when in operation and take upon the drum and the lines of non-conducting symbols, substantially as set forth.

2. In an automatic-telegraph transmitter, the combination of a pen or stylus, a drum or cylinder having thereon symbols of non-conducting material in a spiral line therearound, and means for rotating such drum or cylinder, and means for causing the pen or stylus to traverse the drum or cylinder in a spiral line, substantially as set forth.

3. In an automatic-telegraph transmitter, a drum or cylinder having a series or number of symbols representing a telegraphic code or alphabet imprinted thereon in non-conducting matter, and in a spiral line therearound, to automatically control the transmission of the electrical impulses necessary for a message, substantially as set forth.

4. In an automatic-telegraph transmitter, the combination of a drum or cylinder, a stylus or pen, and a shaft provided with two different screw-threads and a guide, so that the path of travel of the stylus over the face of the drum or cylinder may be changed, substantially as set forth.

5. In an automatic-telegraphic transmitter having a drum or cylinder prepared in spiral lines of conducting and non-conducting material, to control the transmitting-circuit, the combination, with the drum or cylinder, of a motor giving motion thereto, a vibrating or governing fan for controlling the speed thereof, and means for simultaneously adjusting the position or angles of the vanes of the fan relatively to each other, and locking them positively in such position or relation, so as to readily control and regulate the speed of the motor and of rotation of the drum or cylinder, substantially as set forth.

6. A stencil-plate or series of stencil-plates, each representing an arbitrary telgraph-symbol, and provided with hooked ends adapting them to be joined together to form a message, substantially as set forth.

7. The means for holding the stencil in position upon the face of the drum or cylinder while in use, consisting of an upright and its right-angled arm and an adjustable annulus supported thereby, substantially as set forth.

8. The method of automatic transmission herein described, consisting in causing telegraphic symbols to be recorded upon a drum or cylinder in conducting and non-conducting spaces in a spiral line by transferring or stenciling thereon a suitable ink, paint, or pigment, and then using the record so made to automatically control the transmitting or line circuit, substantially as set forth.

This specification signed and witnessed this 16th day of April, 1883.

JOHN ABSTERDAM.

Witnesses:
P. B. WILBER,
F. H. HALL.