J. A. HULIT.

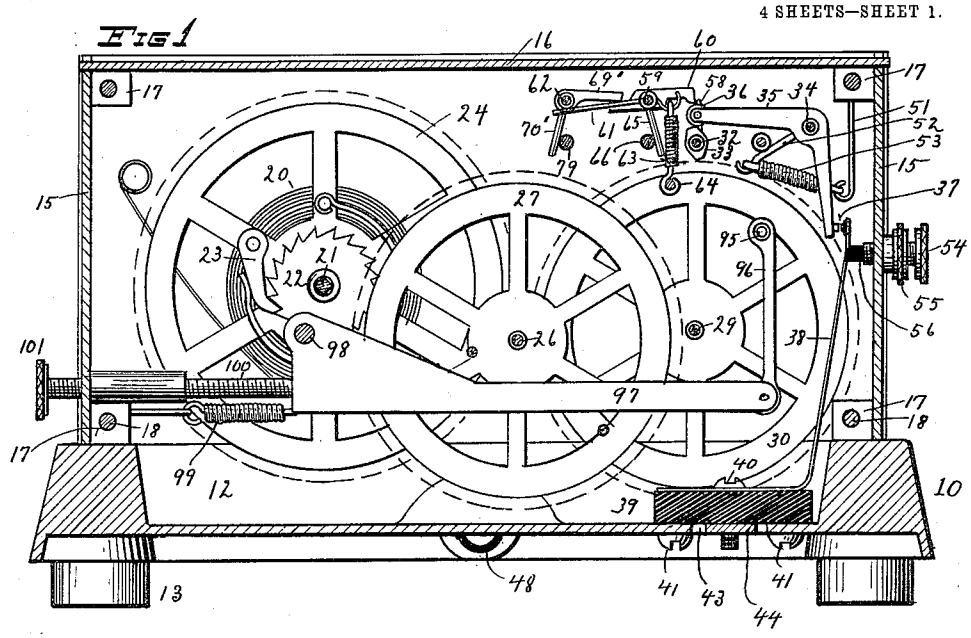
TELEGRAPH SENDING MACHINE.

APPLICATION FILED NOV. 6, 1909.

1,017,054. Patented Feb. 13, 1912.

4 SHEETS—SHEET 1.

Fig 1



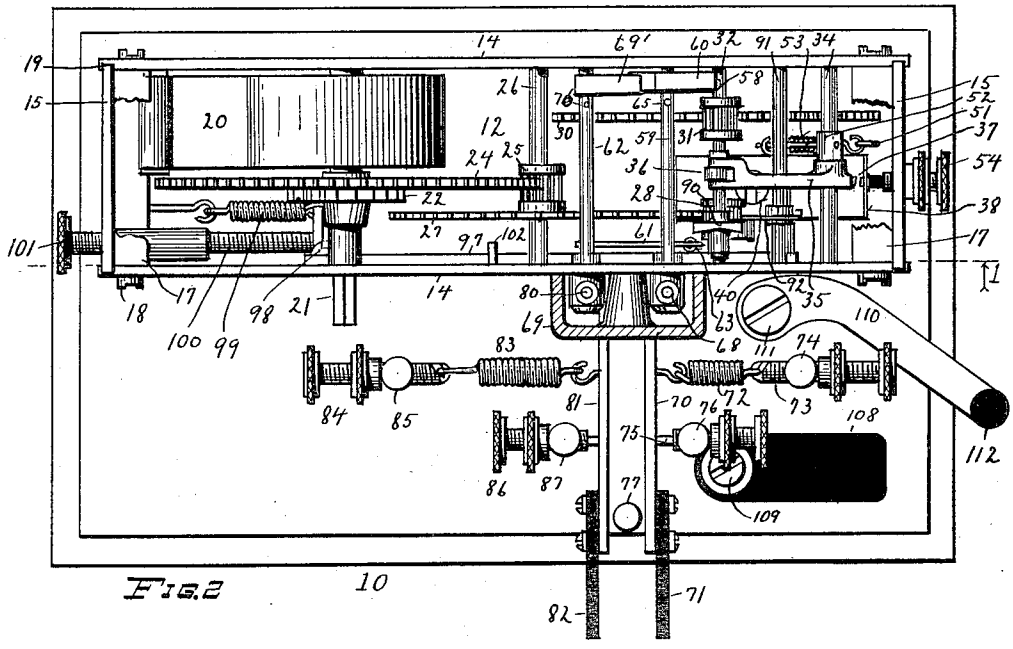


Fig 2

WITNESSES

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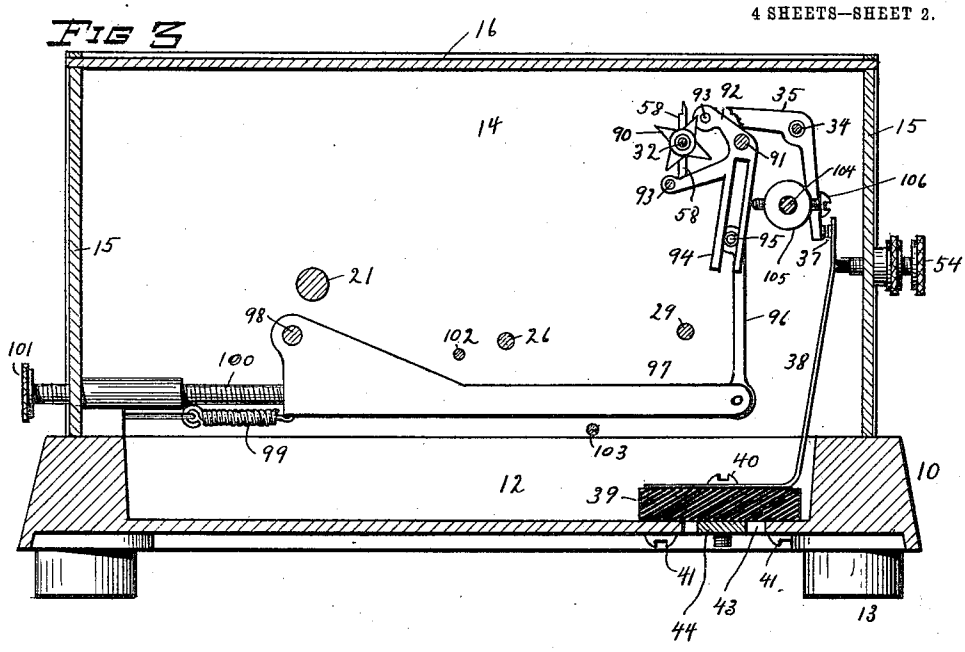
4 SHEETS—SHEET 2.

FIG 3



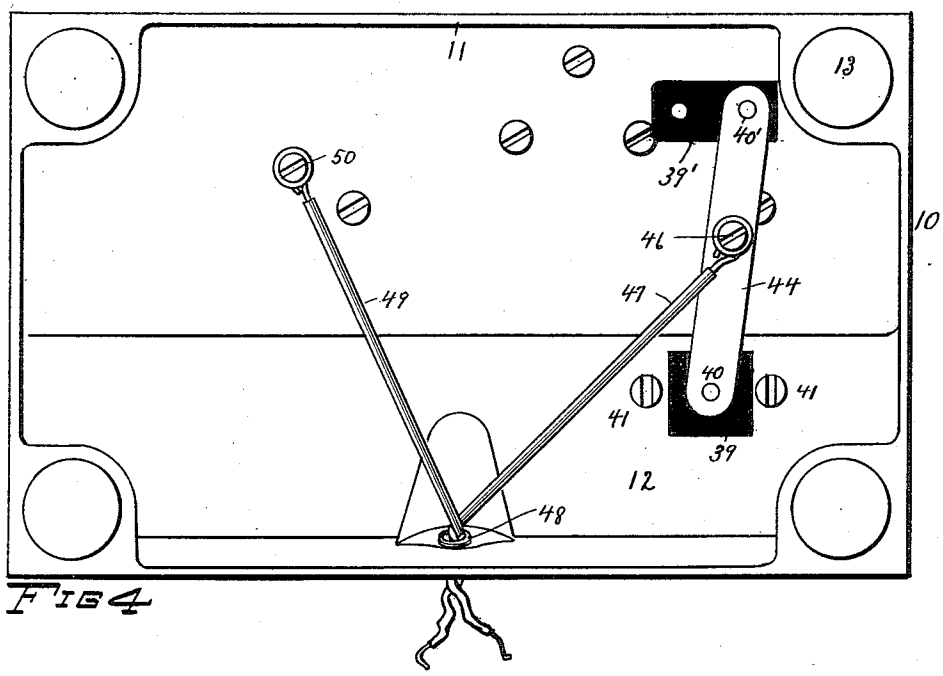


FIG 4

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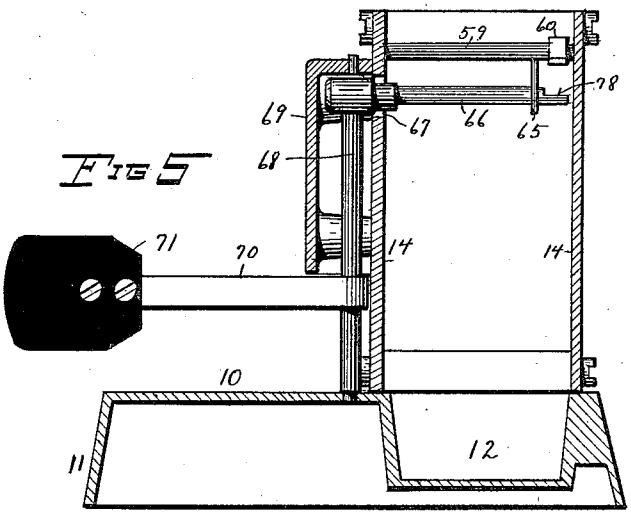
4 SHEETS—SHEET 3.

FIG 5



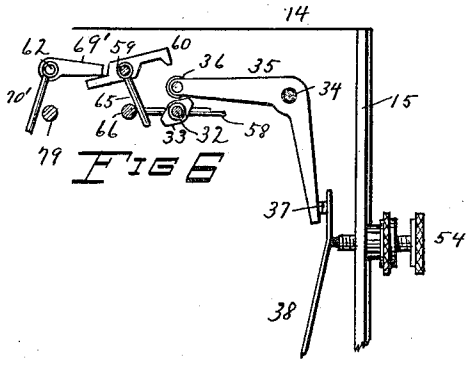
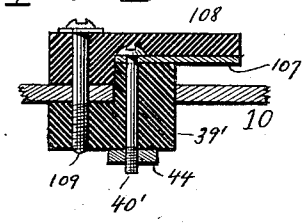


FIG 6

FIG 8



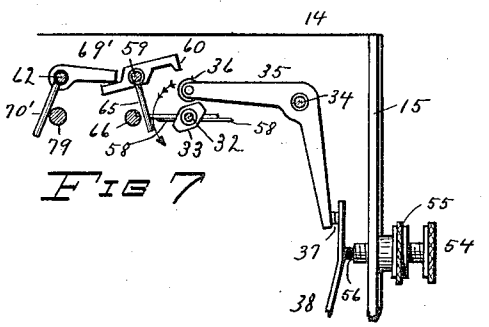


FIG 7

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4 SHEETS—SHEET 4.

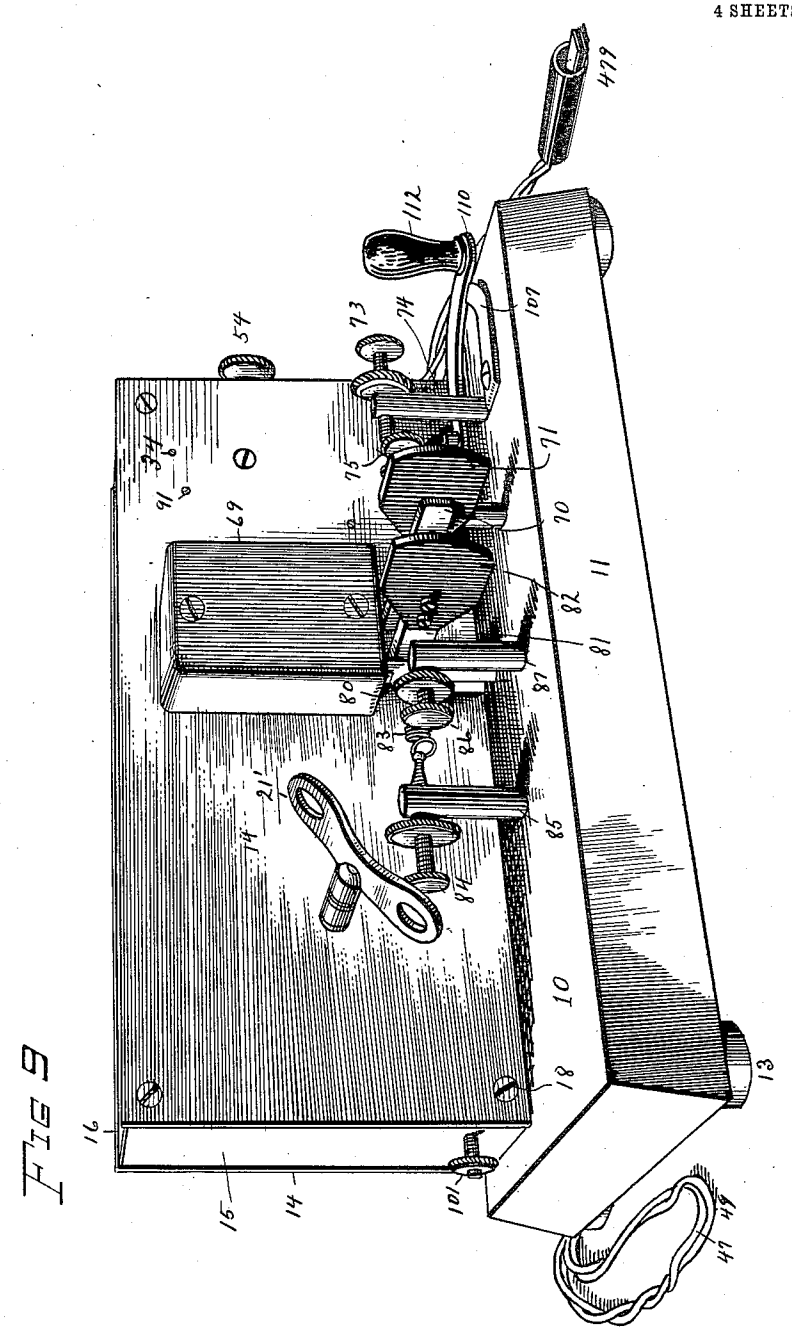

FIG 9

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UNITED STATES PATENT OFFICE.

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TELEGRAPH SENDING-MACHINE.

1,017,054. Specification of Letters Patent. Patented Feb. 13, 1912.

Application filed November 6, 1909. Serial No. 526,516.

To all whom it may concern:

Be it known that I, JOHN A. HULIT, a citizen of the United States, residing in Topeka, in the county of Shawnee and State of Kansas, have invented new and useful Improvements in Telegraph Sending-Machines, of which the following is a specification.

My invention relates to automatic and semi-automatic sending machines or telegraph keys.

The object of my invention is to improve generally upon machines of this kind; to provide a circuit-closer operated by an intermittent motor and so arranged as to make a succession of similar characters and controlled in such a way that the motor power is expended only while such characters are being transmitted; to provide a spring motor and a circuit closer with a means for controlling the motor and circuit closer in such a way that the motor runs only while the circuit-closer is being operated; and to provide the several parts, improvements, and combinations hereinafter set forth.

My invention consists principally of a circuit-closer, a spring motor for driving the circuit-closer, and a mechanism for controlling the spring motor and the circuit-closer in such a way that the motor runs and expends its energy only while the circuit is being opened and closed, so that there will be no loss of motor power, especially so as to avoid the use of the constantly running motor which has heretofore been used on key-board sending machines. And my invention further consists of the parts, improvements, and combinations hereinafter set forth and claimed.

In the drawings accompanying and forming part of this specification and in the description of the drawings, I have shown my invention in its preferred form and have shown what I deem to be the best mode of applying the principles thereof; but it is to be understood that the invention itself is not confined to the exact details of the drawings and the description of the drawings, that parts and combinations thereof specifically claimed may be used with or without other connecting parts, or devices of similar general nature; and that I contemplate changes in form, proportions, and materials, the transposition of parts, and the substitution of equivalent members, within the scope of the appended claims, without departing from the spirit of my invention.

Figure 1 is a vertical sectional elevation of a telegraph sending machine made in accordance with the principles of my invention, on a plane indicated substantially by the line 1 of Fig. 2. Fig. 2 is a plan view, certain parts of the frame being broken away to disclose the mechanism. Fig. 3 is a sectional elevation corresponding with Fig. 1, but with most of the parts not shown, and being intended to show especially the retarding device. Fig. 4 is a view of the bottom of the machine. Fig. 5 is a cross sectional elevation, most of the parts being removed, and being intended to show one of the controlling levers and finger-keys, and the manner of mounting same. Figs. 6 and 7 show the action of the controlling levers and the circuit-closer and intermediate connecting mechanism; Fig. 6 showing how the motor is stopped with the circuit closer in closed position, and Fig. 7 showing the action when the motor is driving the circuit-closer in the making of a succession of dots. Fig. 8 is a section of the base and part of the switch mounted thereon. Fig. 9 is a perspective view of the entire machine.

Similar reference numerals indicate like or corresponding parts throughout the several views.

10 is the base, made preferably of cast iron and enameled, and having the sides 11, and also a depression 12 into which may be let down the lower part of the spring motor, as seen clearly in Fig. 1. On the under side of the base are four rubber feet 13.

14, 14 are the side plates.

15, 15 are the end plates, and 16 is the top plate of the frame, secured together by means of suitable spacers 17, 17, and set upon the base 10 above the depression 12, as shown. The end and top plates are slides fitting in grooves 19 in the side plates, the top plate overlapping the end plates so as to lock them firmly in place. These parts are held together by means of the screws 18, 18.

Set between the side plates is a spring motor comprising the main-spring 20, shaft 21, ratchet 22, pawl 23, and the train of gears indicated by the numerals 24, 25, 26, 27, 28, 29, 30, 31, and 32; the numeral 32

indicating the last arbor in the train and hereinafter referred to as the "cam shaft"; the object of the spring motor being to rotate said cam-shaft in the direction indicated by the arrow in Fig. 7. The motor may be wound by hand by means of the winding key 21'.

Secured to the cam-shaft is a double-cam, the ends of which are blunt being arcs with a radius extending from the center of the cam-shaft.

34 is an arbor extending between the side plates, and 35 is the contact lever mounted on this arbor.

36 is an anti-friction roller mounted in one end of the contact lever so as to bear against the cam; in the other end of the contact lever, which is L-shaped, is one member of the contact points 37, the other of said points being mounted on the upper end of a stationary contact spring 38, which is secured to a block of insulation 39 by means of a screw 40. The block of insulation, preferably fiber or hard rubber is located in the bottom of the depression in the base and directly across an opening 43, and is secured to the base by means of two screws 41, 41. Secured to the under side of said fiber or hard rubber block 39, by means of said screw 40, which is obviously threaded through the strip 44, is said strip 44, mounted, as indicated, so as to be insulated from the base and frame and electrically connected with the stationary contact spring 38 through the screw 40. Secured to said bar 44, by means of a screw 46, is one part 47 of the double cord, the other part 49 of which is grounded to the frame by means of the screw 50. And these cords are extended a suitable length out through a hard rubber bushing 48 in the rear of the frame, and provided with a wedge or split plug 479, whereby the machine may easily be electrically connected with the telegraph circuit.

51 is a pin or rod secured to the spacer 17 adjacent to the contacts; 52 is a pin or rod secured to the hub of the contact lever; and 53 is a spring extended between the ends of said two rods or pins and tending naturally to close the contacts 37 and to compress the anti-friction roller 36 against the cam.

54 is a set-screw insulated at its inner end 56 and being adapted to move the stationary contact spring 38 toward the contact; that is, the stationary spring 38 tends naturally to force its contact member away from the other member, to the right in Fig. 1, while the screw 54 forces it in an opposite direction, so that by turning the screw 54 in or out the contact may be adjusted. 55 is a binding nut for the screw.

It will now be understood that, assuming the machine to be electrically connected with a telegraph circuit, the operation of the spring motor rotating the cam-shaft, will raise and lower the anti-friction roller end of the contact lever, the spring 53 pulling the lever down at the low places of the cam, and the rotation of the cam raising the lever against the tension of the spring at the high places. By adjusting the stationary contact so that the contacts engage when the anti-friction roller is at a low place, it will be understood that the circuit will be closed when the cam is in position with a low place under the roller, and open when the cam is in position with a high place under the roller. By screwing the adjusting screw in farther, the contact will be made before the roller strikes the lowest places of the cam, so that the contact will thus be made with the full force of the spring 53; also by turning the adjusting screw in or out, the relative lengths of the contacts and of the spaces therebetween may be regulated. This regulation is important in telegraphy in order to adjust the machine to any circuit and to make the characters light or heavy, as may be desired. Preferably the rods or pins 52 and 51 are made of material that can be bent, so that the tension of the spring 53 may be adjusted.

58, 58 are two stop-pins secured in the cam-shaft and oppositely disposed, one corresponding to each point of the cam and being approximately on a line with the rear end of the blunt cam point, as indicated in Figs. 1, 6, and 7.

59 is an arbor mounted in and extending between the side plates and having mounted thereon a dog 60 and a stop pin 61, said stop pin engaging against another shaft or arbor 62 mounted in and between the side plates. A spring 63 tends naturally to hold the arbor 59 with the pin 61 against the arbor 62, and the dog 60 in the path of the stop pins 58, so that in such position, the dog stops the motor with the anti-friction roller 36 resting on the end of one of the cams so that the circuit will be open. 65 is a pin secured to said shaft 59 and extending downward and in the path of a controlling lever comprising the arm 66, which extends through a hole 67 in the side plate, the pivot rod 68 which is set between the base and the inclosing box-like bearing 69, and the arm 70 with the finger-piece 71. The inner end of the arm 66 is flattened as shown at 78.

72 is a spring extending between the arm 70 and the hooked adjusting screw 73 which is threaded through a post 74 secured to the base.

75 is an adjustable back-stop screw threaded through a post 76 secured to the base.

The spring 72 tends naturally to hold the controlling lever against the back-stop, while the bumper-post 77 limits the movement of said lever forward.

The various parts just referred to are so

arranged that when the controlling lever is in normal position against the back stop, the dog is in engagement with one of the stop-pins 58, as shown in Figs. 1, 2; and when the controlling lever is moved against the bumper-post 77, the arm 66 strikes against the rod 65 and raises the dog 60 so as to free the stop-pin 58 therefrom and permit the motor to turn the cam-shaft, and at the same time the flattened end 78 of the arm 66 comes into the path of said stop-pin 58, and the motor is stopped with the stop-pin resting against the end of the arm 66. In this position of the cam-shaft, the anti-friction roller is over one of the low places of the cam with the circuit closed. This position is indicated in Fig. 6. If, now, the finger-key 71 be released so that the springs restore the several parts to their normal positions, the motor will drive the cam-shaft another quarter turn and restore the circuit-closer to its normal position with the circuit open, the cam-shaft having, in the operation of closing and opening the circuit, made a one-half rotation. The dog 60 and the dog comprising the flattened end 78 of the controlling lever are located about ninety degrees apart with relation to the stop-pins 58, so that the stop with the closed circuit is made at the quarter turn, and the stop with the open circuit is made at the half turn. If the finger-key 71 be given a short sharp stroke, the dogs will be restored to their normal positions without having detained the stop-pin at the quarter turn, thus permitting the motor to rotate the cam-shaft a half turn. Thus a dot may be made by such a short stroke, and a dash may be made by holding the key in pressed-in position for the proper length of time. It will be understood, too, that this mechanism may be used for transmitting Morse characters by the manipulation of the finger-piece 71 alone; every character being sent over the wire with mechanically uniform pressure at the contacts 37, without the possibility of a "split" or imperfect dot or space, and without the hard pressure usually required of the operator on the ordinary desk key. He may adjust the finger tension by the screw 73 to secure any desired touch, without changing the character on the wire. I prefer however to use the key 71 for making dashes only and to provide another key for making the dots, by simply lifting the dog 60 without operating the dog 78, so that by a quick stroke on the dot key a single dot will be made, and by holding the dot key in pressed-in position for the proper length of time any desired number of dots may be made in succession, as will be now explained.

69′ is an arm secured to the shaft 62 and engaging the tail of the dog 60.

70′ is a pin or rod secured to the shaft 62 and extending down and in the path of the dot-controlling lever comprising the arm 79, pivot rod 80, and arm 81 with finger-piece 82. The dot-controlling lever is mounted similarly to the dash-controlling lever, but adapted to just opposite action and normal position; that is, they are arranged adjacent to each other so as to be operable by the thumb and forefinger of the telegraph operator by pressing them toward each other, the dot lever being provided with the tension spring 83, adjusting screw 84 in post 85, and the back-stop screw 86 in post 87, and being adapted to be pressed against the bumper-post 77. In normal position, the dot lever does not affect the dog 60, and when the finger-key 82 is pressed in against the bumper post, the arm 79 strikes against the rod 70′, rocks the shaft 62 so as to move the arm 69′ down which lifts the dog 60 out of the path of the stop-pin 58. A quick stroke and release of the key 82 permits the machine to make a single dot; and a series of dots as for the letters *s*, *h*, and *p*, and for any letters or combinations having more than one dot in succession, may be made by holding the key 82 in pressed in position for the requisite length of time. By this means it will be seen that not only will the dots and the spaces therebetween be of uniform length, but that also the spaces between a dot and a following dash, or between a dash and a following dot, or between succeeding dashes, will be uniform; that is, an operator may make as long a dash or space as he may desire, but he cannot make a shorter dot or space than that automatically made by the machine; he cannot make a "split" character.

The dogs 60 and 78 may be so adjusted that a slight pressure on the key 71 will release dog 60 without bringing dog 78 into the path of the stop-pins, and a further pressure of the key 71 will bring dog 78 into such path; a releasing of the key stopping the machine in normal position; thus making it possible to make both dots and dashes with the same key. But I prefer the other adjustments above explained, in which the two dogs are adjusted to act simultaneously, so that whether the key 71 be pressed in or released, the cam shaft can make only the quarter turn for each movement.

The object of the special form of box-like bearing 69 is to provide for extending the operating levers from inside to the outside of the frame and to cover the holes 67, so that the frame may be practically dust-proof.

90 is a four-pointed star-wheel secured to the cam-shaft.

91 is a shaft or arbor mounted in and between the side plates.

92 is a yoke mounted on the shaft 91, and having a pin 93 in the end of each arm and

extending in the path of the star-wheel points so as to be engaged thereby alternately in the manner of a clock escapement. 94 is a slotted tail to said yoke, in which slot works an anti-friction roller 95 secured to a weight or arm 96 which is pivoted to a long lever 97, which is pivoted to the front side plate at 98.

99 is a spring tending naturally to hold the lever 97 down against the stop pin 103 in the front side plate.

100 is an adjusting screw threaded through a boss in the end plate and provided with a head 101 on the outside of the frame, by which the lever 97 may be raised until it comes to the stop-pin 102 in the front side plate. This mechanism comprises a retarder to slow down the motor to a practical speed. Obviously by raising or lowering the lever 97, weight or arm 96 with roller 95, the speed will be increased or diminished by reason of the less or greater travel of the roller 95 and weight 96 in coming nearer to or farther away from the shaft 91. Inasmuch as the pins 93 of the yoke may be so arranged as to have considerable free travel, I provide a means for adjusting this travel, in the adjusting screw 106 which is threaded through the block 105 secured to the front plate by means of screw 104. By screwing this screw 106 in, the range of movement of the yoke will be lessened; but by screwing it out, the range of travel will be increased so as to slow the machine down. This method of adjustment is desirable because, if it is found that the range of speed adjustment is such that with lever 97 against pin 102 the speed is not fast enough, the speed may be increased by screwing in screw 106; or a slower speed may be secured than with lever 97 against 103 by screwing out the screw 106.

Extending through an opening in the front part of the base is a block of insulation 39′ on top of which is mounted a metal strip 107 held in place by a screw 40′ which passes through said strip and said block and is threaded into the bar 44. 108 is a shield of insulating material, preferably hard rubber, to cover said strip 107; and the parts are held to the base by the screw 109, which is threaded in the block 39′.

110 is a switch tongue provided with a handle 112 and pivoted and grounded to the base by the screw 111. It will be noted that this switch is located so as to be easily operated by the operator, with slight movement of the hand, and yet is effectually insulated, so that the operator cannot be shocked. The shield is not shown in Fig. 9.

The relative positions of the stop-pins, the cam, and the star-wheel points on the cam shaft are of importance. Thus it will be noted that the star-wheel points and the stop-pins are so arranged that the cam-shaft will have considerable travel, after being released from either the hand or the quarter turn, before the points encounter the yoke; thus permitting the motor to travel initially without retardation on being released from either position; also the cam is so arranged that the circuit will be closed instantly and before the retarder is encountered; also on coming from the closed to the open circuit at the end of the dash, the circuit will be opened before the motor encounters the retarding element. This important arrangement prevents any lagging or hesitancy, and is important in the manual sending of Morse characters. It permits the full force of the machine to be exerted, without retardation, on the circuit-closer, the response being instantaneous on the touch on the key, and the retarding being effected after the circuit has been closed or opened, as the case may be.

In a co-pending application Serial No. 451,487, filed September 3, 1908, I have shown and claimed some features herein shown but not claimed.

What I claim is:

1. In a machine of the kind described, the combination of a base having a top and sides with a depression in the top, a frame erected on the base over the depression, a motor mounted in the base and extending down into the depression, a circuit-closer mounted in the frame and operated by the motor, finger-keys for controlling the motor and circuit closer, a switch mounted on the base and having a tongue and a leaf, said leaf being insulated from the base, and said base having an opening in said depression and an opening under said leaf, insulating mountings at said openings, one of the members of the circuit-closer being mounted at said opening in the depression, and a bar extending between said mountings and being electrically connected with said leaf and said member.

2. In a machine of the kind described, the combination of a base having a depression in the top thereof, a frame erected on the base over the depression, a motor mounted in the frame and extending down in said depression, a circuit closer driven by the motor and mounted in the frame, a switch mounted on the base outside said frame, the base having an opening through said depression and an opening at the switch, insulating blocks mounted on the base at said openings, one member of the circuit-closer being mounted on the insulating block over the opening in the depression and one member of the switch being mounted on the other insulating block, a bar extending across said blocks under said base, and electrical conductors extending through said blocks and connecting the bar with said respective members.

3. In a machine of the kind described,

the combination of a frame, a motor mounted therein, a circuit-closer operated by the motor, a reciprocating pivoted weight for retarding the motor, a lever for shifting the weight nearer to and farther away from the pivot from which it is operated, and an adjusting screw having its head outside the frame for shifting the lever.

4. In a machine of the kind described, the combination of a frame, a motor mounted therein, a circuit-closer operated by the motor, an escapement device having a reciprocating tail, a weight having a pin-and-slot connection with said tail said slot extending radially from the pivot of said escapement device, a pivoted lever to which said weight is pivoted and being capable of shifting said weight nearer to and farther away from said pivot, a spring tending naturally to force said lever in one direction, and a screw capable of forcing said lever in the opposite direction.

5. In a machine of the kind described, the combination of a frame, a motor mounted in the frame, a circuit-closer operated by the motor, an escapement device for retarding the motor and comprising a star-wheel and a yoke engaging the star-wheel and oscillated thereby said yoke being pivoted in the frame, a bumper-screw arranged so that the yoke strikes against the end thereof, and said screw being capable of adjustment to limit the range of movement of the yoke so as to increase and diminish the speed of the motor.

6. In combination, a frame, an intermittent spring motor, a circuit-closer actuated by the motor, manually controlled devices for releasing and stopping the motor, and so arranged as to stop the motor with the circuit closed and to stop the motor with the circuit open; and a retarding device for the motor having an oscillating member operated thereby, and an adjusting screw against which said oscillating member strikes at one end of its oscillations; the oscillating member resting normally against said adjusting screw when the motor is stopped with the circuit-closer in each of its positions, and the circuit being closed and opened by the motor on release from each position before the motor operates the retarding device.

In testimony whereof I have signed my name to this specification in the presence of witnesses.

JOHN A. HULIT.

Witnesses:
J. M. STARK,
C. J. ROSEN.