

(No Model.)

3 Sheets—Sheet 1.

C. E. ALLEN.  
ESCAPEMENT MECHANISM.

No. 562,561.

Patented June 23, 1896.

Fig. 1.

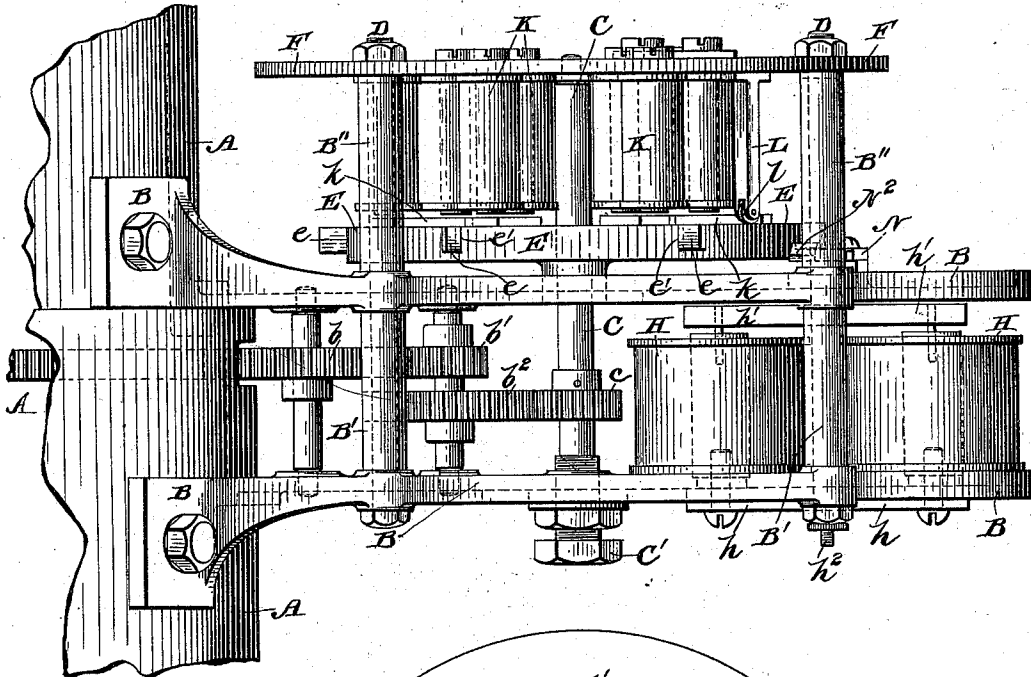
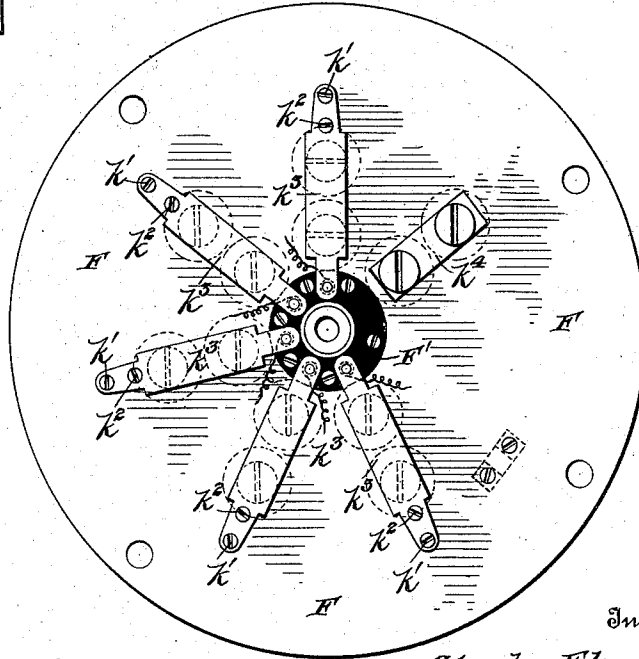


Fig. 2.



Witnesses

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3 Sheets—Sheet 2.

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Fig. 3.

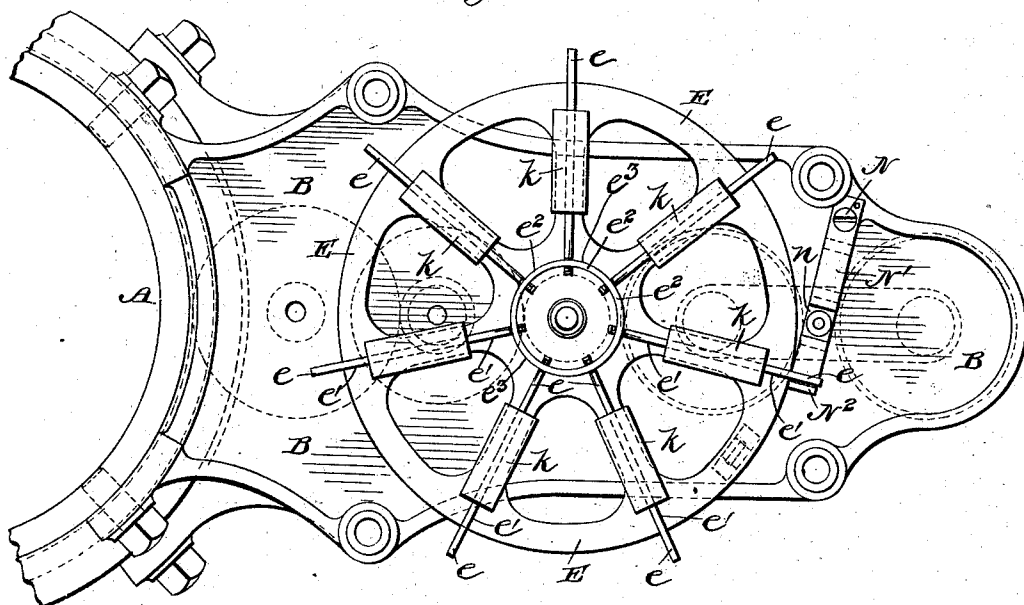


Fig. 4.

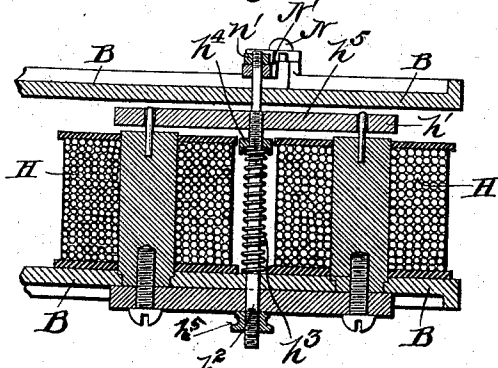


Fig. 5.

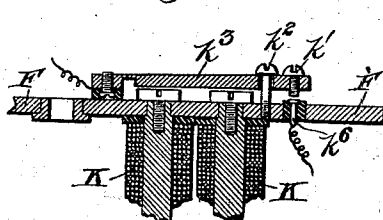


Fig.

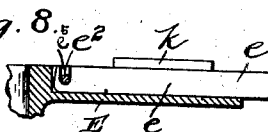


Fig. 7.



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(No Model.)

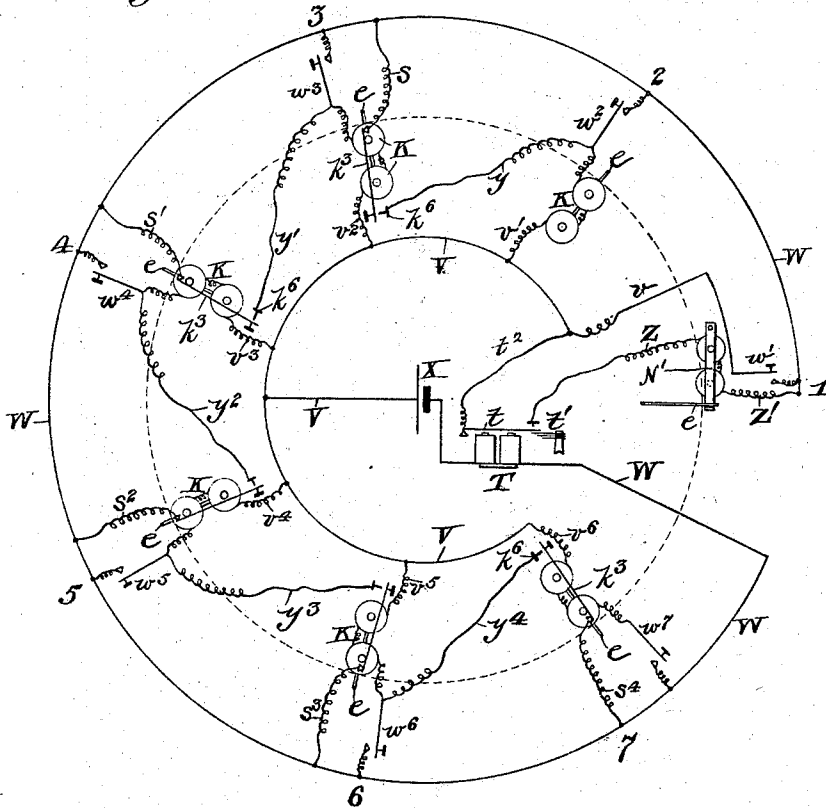
3 Sheets—Sheet 3.

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Fig. 6.



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# UNITED STATES PATENT OFFICE.

CHARLES ELMER ALLEN, OF WASHINGTON, DISTRICT OF COLUMBIA, AS-  
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## ESCAPEMENT MECHANISM.

SPECIFICATION forming part of Letters Patent No. 562,561, dated June 23, 1896.

Application filed May 28, 1894. Serial No. 512,656. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES ELMER ALLEN, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Escapement Mechanism; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in escapements or spacing devices, being an improved spacing device for use in machines in which it is desired to produce variable spaces or intervals in a positive manner and for a definite purpose at the will of an operator.

The particular construction herein after described has been designed for use in connection with type-writing, type-setting and type-printing machines, and all kindred machines in which it is desirable to produce varying spaces or intervals. The invention herein shown and described is an improved mechanical escapement or spacing device controlled by means and through the instrumentality of the electric current.

If it should be so desired, the device can be controlled by suitable mechanical means, as it is not absolutely necessary to use the electric current in connection therewith.

The invention consists, essentially, in an escapement wheel or disk carrying arms, stops or latches, and a number of magnets, the magnets being so arranged as to control the movement of the escapement wheel or disk to permit a variable space or interval to be made thereby.

The invention further consists in the novel construction and arrangement of the device and the parts thereof, and in its connection and combination with electrical means for controlling its operation.

Referring to the drawings, Figure 1 is an elevation of the escapement or spacing device secured to a suitable support and connected with any desired mechanism and shows a train of gears, the escapement wheel or disk

connected therewith, magnets for controlling the movement of said wheel or disk, and magnet for releasing the wheel and permitting it to revolve. Fig. 2 is a top view of the magnet-supporting plate F, Fig. 1, showing spring-armatures for the upper ends of the magnets secured to the under side thereof. Fig. 3 is a top view of the escapement wheel or disk, the arms thereon, the armatures for the lower ends of the magnets secured to the under side of the plate F and directly over said arms, the said armatures being secured to the upper sides of said arms, and the retaining spring or catch for holding said escapement wheel or disk in position and at rest and through which when properly actuated the wheel or disk is permitted to escape. Fig. 4 is a vertical section taken through the magnet H that controls the spring-catch for the escapement wheel or disk, and shows the construction and arrangement of its parts and also the manner of mounting it in the escapement-frame. Fig. 5 is a vertical sectional view of one of the magnets mounted in the upper part of the escapement-frame, showing the spring-armatures for the upper ends thereof and the manner in which they are mounted. Fig. 6 is a diagrammatical representation of the circuits and connections with conventional signs or symbols from which the operation of the electrical functions may be more clearly seen, the circuits through the mechanism in the drawings being purposely omitted to avoid confusion. Fig. 7 is a top view of a portion of the escapement wheel or disk, showing a radial groove therein, the hinged arm resting in said groove and showing the hinged end of said arm split or sprung. Fig. 8 is a sectional view of a portion of the wheel, showing the groove, arm hinged therein, and an armature secured on the upper side thereof.

Similar letters indicate corresponding parts in all the figures where they occur.

Referring to the drawings by letters, A is a suitable support upon which are securely fastened, at a predetermined distance apart and parallel with each other, thin supporting-plates B B, which form part of the framing for the escapement or spacing mechanism. These plates B B are provided, preferably, with four eyes or bolt-holes, as shown in Fig.

3, although a greater or less number may be used if found desirable. Between these plates B B and in line with the bolt-holes are placed sleeves B', which serve to hold the plates rigid at a fixed distance apart. Through the plates B B and the sleeves B' B' are passed bolts D D, and upon the upper ends of these bolts are slipped similar sleeves B'' B'', and upon the upper ends of the sleeves B'' B'' is placed a plate F, as shown. The upper ends of the bolts D D pass through suitable openings in the plate F, which plate is securely held thereon by taps or nuts upon the ends of said bolts. This construction forms a frame and support in which is mounted and securely held the mechanism and electrical apparatus of the escapement and the train of gears or other mechanism connected therewith.

b is a gear mounted in the frame and meshes with a suitable spring-wheel, the extent of the movement of which it is designed to control, and also meshes with a smaller gear b', rigidly secured upon a shaft upon which is mounted a gear b'', which in turn meshes with a small gear rigidly secured upon a shaft C. This shaft C is mounted at one end in a cup-bearing secured in one of the plates B, passes through a suitable opening in the upper plate B, and has its other end resting in an opening in the plate F, as shown in Fig. 1.

E is an escapement wheel or disk mounted upon the shaft C, rigid therewith. Around the hub of this wheel or disk is a circular groove or depression e<sup>3</sup>, and extending radially therefrom to the outer circumference of the said wheel are grooves e'.

e e are arms having one end split or sprung and having slots e<sup>3</sup> in one end and are of such width to fit snugly into the grooves in the wheel E and of such length as to project a short distance beyond the circumference of the wheel. These arms, by reason of the split or sprung end, will be self-supporting in the grooves at any height to which they may be raised. These arms are hinged to the wheel radially by the ring e<sup>2</sup>, that fits into the slots in the ends of the said arms and also into the circular groove around the hub of the wheel or disk, and lie snugly in the grooves, as shown in Fig. 3.

K K are magnets secured to the inner side of the plate F radially to the shaft C, which passes therethrough, by means of screws, as shown in Figs. 1, 2, and 5.

k k are bars or armatures for the lower ends of these magnets K K, and are secured upon the upper sides of the hinged arms e, by means of which the said arms e are raised in the grooves e', through the instrumentality of the magnets K K, for a purpose hereinafter stated.

k<sup>3</sup> k<sup>3</sup> are spring-armatures for the upper ends of the magnets K K, and are secured upon the upper side of the plate F.

k<sup>2</sup> is a limiting-screw and k' a contact-screw for the spring-armatures for making contact with the point k<sup>6</sup>, as is apparent. This spring-

armature is preferably secured and held upon an insulating-strip F', surrounding the journal-bearing in the center of the plate F, as shown in Figs. 2 and 5. On one of these magnets I have shown a yoke k<sup>4</sup>, but this is not necessary, as a spring-armature, such as shown on the other magnets, could be used if desired.

L is a suitable support secured to the underside of the plate F directly over the outer edge of the escapement-wheel E and has secured in its lower end a slicker wheel or roller l, which travels over the outer circumference of the escapement-wheel and returns the stops or hinged arms to their normal positions in the slots or grooves in the wheel or disk E as they pass under it, as is evident.

H is a magnet properly placed in the outer portion of the frame, or in any other convenient position, and is securely held to one of the plates thereof by means of screws and a proper yoke. h' is an armature therefor and is provided with guides which fit into proper ways in the cores of the magnets.

N' is a spring-catch secured to one side of the upper plate B of the frame and lies tangentially to the circumference of the escapement wheel or disk E, as shown in Fig. 2. This spring N' has a recess or seat therein, and an opening in said seat or recess for a purpose hereinafter stated. The free end of this spring is provided with a catch or raised calk N<sup>2</sup>. This spring lies directly over the armature H in such position that the opening in the recessed portion thereof will register with an opening in the plate B, an opening in the center of the armature h' in the lower plate B, and in the yoke of said magnet, so that a rod h<sup>2</sup> may be passed through them all, the upper end thereof being held in the recess in the spring by a nut n' and the lower end thereof being guarded or secured by means of adjusting-nut h<sup>3</sup>, as shown. It will be observed that the rod not only passes through the armature h', but is secured therein, so that it will have a vertical motion with said armature. H<sup>3</sup> is a spring surrounding said rod, and h<sup>4</sup> a cup-nut for securing said spring in place, the said spring being for the purpose of throwing the armature from the magnet when the current is cut off, as is evident. It will be further seen that by reason of the rod being secured rigid with the armature h' and the spring N', when the armature is pulled down upon the end of the core of the magnet the spring N' will be pulled down also, whereupon the escapement-wheel will be released and permitted to revolve, as is apparent from the drawings.

The slicker L is so placed that it will return the arms e to their proper position in the grooves of the wheel or disk E after they have passed over the end N<sup>2</sup> of the spring-catch N', as is evident.

The operation of this device is fully stated in connection with a diagrammatic illustration of the circuits.

In Fig. 6 I have shown a diagrammatic illustration of the paths of the currents through the machine when actuated. The diagram is arranged in circular form to bring it in as near exact form and arrangement of the escapement device as possible, the dotted line serving to represent the position of the escapement-wheel below the six magnets, (shown in Fig. 2,) and above the other magnet, as shown in Fig. 1, H. The diagram consists of two trunk-wires V and W, connected in multiple arc, as shown, and having a number of interposed magnets, a battery X, and a relay-circuit Z Z'. This construction also affords other and independent circuits, (indicated by s and y and s' and y', &c.)

The operation of the device will be as follows: When it is desired to make one space or interval, the key at "1" is depressed or closed, and the circuit thereby set up will be from battery X through V v w' W, relay-magnet T to battery. When the current passes through the relay-magnet T, it will become energized and the armature t will be drawn by said magnet T down upon the plate-springs t', and will remain in that position so long as the key at "1" is held closed. When the key is open, the circuit is broken, and the armature t is thrown by the spring t' and makes the circuit through V, t', t, Z, Z', W, and T to battery, whereupon the magnet H in this circuit will pull its armature and the spring-catch N', secured thereto, and release the arm e and return to position through action of the spring h<sup>3</sup> to receive and catch the next arm e when it shall come over the end of the spring, thus making one space or interval. If instead of one space it should be desired to make four spaces or intervals, the key at "4" would be closed, making the circuit V, v<sup>3</sup>, K, w<sup>4</sup>, W, and T to battery. Magnet T would act as stated in connection with key "1," and when the key "4" is opened the circuit would be broken and the relay-circuit V t' t Z Z' W T to battery would be made and the magnet H act, as before stated, to release the escapement-wheel. This alone, however, would effect the making of but one space or interval, as the catch would receive and hold the next arm e from key "2" as it came over the end of the spring. To prevent this, I provide an auxiliary circuit whereby the arms lying between the spring N' and the key to be struck are lifted above the level of the spring and will pass over it. When the key "4" is closed, the magnet K is energized and will pull down the spring-armature k<sup>3</sup> against the contact-point k<sup>6</sup>, when a circuit V, v<sup>3</sup>, K, y', k<sup>6</sup>, k<sup>3</sup>, s', W, and T will be made, and will cause the armature of the magnet of the key "3" to become energized and lift the arm e beneath it and also pull down its spring-armature k<sup>3</sup> against the contact-point k<sup>6</sup>, making the circuit V, v', K, y, k<sup>6</sup>, k<sup>3</sup>, s, W, and T, energizing the magnet of key "2" and lifting the arm e under it, so that all the arms on the

escapement-wheel between the spring N' and the key ("4") to be closed will be raised so that they will pass over the spring-catch without interference therewith. In this instance the arms under the magnets of keys "2," "3," and "4" would be raised, so that when the spring N' is released they will all pass over it, and the arm that would be caught and retained by the catch would be the one that was under the magnet of key "5." The same operation would take place should key "7" be closed, every magnet before the "7" being energized and lifting the arm beneath it. In this escapement I have shown seven keys, but it is evident that any number may be applied, and I therefore do not limit myself to the number herein shown. It will also be evident that the keys "1," "2," and "6," or "2" and "5," or one or all of the keys in the escapement, may be closed, and the same operation will take place, the key that governs the escapement being always the last one struck. For instance, in the combination "1," "2," and "6," the "6" key would control the escapement.

This escapement mechanism may be used in connection with any device requiring a step-by-step movement, whether such movements are to be variable or not, and may be operated by either mechanical or electrical means, without departing from the spirit of my invention, but the mechanism as particularly herein shown and described is designed for use in machines which require a variable step-by-step movement, such, for instance, as is shown in my application for improvements in linotype-machines, filed on or about July 24, 1895, Serial No. 556,980, although it is evident that it may be used in machines of different characters with little or no modification of its construction.

Having thus described my invention, what I claim is—

1. In an escapement mechanism for variable spacing an escapement wheel or disk provided with hinged arms mounted thereon, in combination with means for engaging said arms, and for releasing the same when desired, as set forth.
2. An escapement for variable spacing having an escapement-wheel provided with movable arms mounted thereon, and controlled by means of the electric current.
3. An escapement for variable spacing having an escapement-wheel provided with hinged arms mounted thereon, and magnets for controlling said arms, the said escapement being controlled by means of the electric current.
4. A number of magnets arranged in multiple arc, each magnet being provided with a relay and conductors, whereby the magnet next preceding is caused to become energized, as set forth.
5. An escapement consisting of a wheel or disk having arms hinged radially thereon,

magnets for raising said arms and a magnet and spring for releasing said wheel or disk to make the proper interval, as set forth.

6. An escapement mechanism consisting of  
5 a wheel or disk having hinged arms thereon, magnets arranged over said arms, spring catch or stop for engaging said arms, and a magnet for withdrawing said catch for releasing the arms, as set forth.
- 10 7. An escapement mechanism consisting of an escapement wheel or disk, having arms hinged radially thereon, magnets set radially to said disk or wheel and above said hinged arms and adapted to raise them, a magnet  
15 for releasing said escapement-wheel and a spring-catch controlled thereby, as set forth.
8. An escapement mechanism consisting of an escapement wheel or disk having arms hinged radially thereon, magnets set radially  
20 above said arms and adapted to raise them, a magnet for releasing said escapement-wheel, a spring-catch controlled thereby, and a slicker adapted to return the arms to their normal position, as set forth.
- 25 9. An escapement mechanism consisting of a train of gears, an escapement wheel or disk having arms hinged radially thereon, magnets set radially above said arms and adapted to raise them, a magnet for releasing said escapement-wheel, a spring-catch controlled by  
30 said magnet, and a slicker, as set forth.
10. In a device for variable spacing the combination of an escapement-wheel having suitable arms hinged thereon, with a catch or stop  
35 adapted to catch and hold the wheel at rest, and means for disengaging said catch or stop to permit the movement of the said wheel, as set forth.
11. In an escapement mechanism the combination of a magnet having a spring-controlled armature and a spring-catch rigidly connected with said armature, with an escapement wheel or disk having hinged arms  
40 mounted thereon and adapted to engage said spring-catch, as set forth.
12. In an escapement mechanism the combination of an escapement wheel or disk having arms hinged thereon, armatures on said arms, magnets arranged above said arms and  
45 armature and conductors, spring-armatures on the opposite end of each magnet adapted to connect with and relay the preceding magnet, with a magnet and a spring controlled thereby whereby the wheel is held or permitted to escape, as set forth.
13. In a device for variable spacing a wheel or disk having movable arms thereon, a number of magnets arranged to control the movement of the said arms, each magnet having a  
50 relay for causing the preceding magnet to become energized, whereby every arm under every magnet preceding the magnet first energized will be raised, as set forth.
14. In an escapement mechanism an escapement wheel or disk having radial grooves  
60 therein, and arms or latches hinged to said disk and adapted to rest in said grooves, in

combination with releasing-magnet and catch or stop controlled thereby as set forth.

15. In an escapement mechanism an escapement wheel or disk having a circular groove or depression around the hub thereof, radial slots or grooves extending from said groove to the outer circumference of the wheel or disk, arms resting in said grooves, and a ring  
75 surrounding said hub and hinging said arms to the wheel or disk, in combination with releasing-magnet and catch controlled thereby as set forth.

16. In a device for variable spacing a number of magnets arranged in multiple arc, each magnet having a relay and conductors connected therewith for causing the preceding magnet to become energized, whereby every magnet in multiple arc from the first to the  
85 one first acted upon, both inclusive, will be energized.

17. In an escapement mechanism a number of magnets arranged in a circular or other convenient form adapted to control hinged  
90 arms, latches or other movable devices mounted on an escapement-wheel, each one of said magnets being located above one of the hinged arms, and provided with an electric circuit, said circuit having opening and  
95 closing mechanism, controlled either by the operator, or other suitable means, as set forth.

18. A number of magnets arranged in multiple arc provided with electric circuits and connected with a suitable source of power,  
100 each of said magnets being provided with an auxiliary armature or relay and conductors whereby an auxiliary circuit may be set up automatically through each preceding magnet in the multiple arc, and a relay-circuit  
105 having therein a single magnet adapted to be operated when the main circuit is broken, as set forth.

19. An electromagnet having a main armature at one end, and provided with an auxiliary armature on the opposite end, the said auxiliary armature being magnetized by the same current that energizes the magnet and magnetizes the main armature, whereby an auxiliary current can be automatically set up,  
115 as set forth.

20. Two or more magnets arranged in multiple arc with a battery or other source of electricity, an auxiliary circuit passing through and automatically made by the said magnets  
120 in multiple arc whereby each magnet causes the one immediately preceding it to become energized, and the said battery or other source being in connection with a relay that acts in common response to each of the individual  
125 circuits.

21. In an escapement mechanism a number of magnets arranged in circular form and multiple arc for controlling an escapement wheel or disk, the said magnets having a circuit therethrough from a battery or other source, an auxiliary circuit made by the said magnets when energized, each magnet so energized being adapted to energize the magnet

preceding it, and a relay-circuit having therein a magnet adapted to release the escapement-wheel, the said relay-circuit being made by breaking the main circuit through the magnets of the multiple arc, as set forth.

22. In a device for variable spacing a wheel or disk having movable arms thereon, a number of magnets arranged in multiple arc and so placed as to control the movement of the said arms, each magnet having a relay for causing the preceding magnet to become energized, whereby every arm or stop under every magnet preceding the magnet first energized will be raised, as set forth.

23. In an escapement mechanism of the character described an escapement wheel or disk, arms or latches hinged or pivoted thereon, and means substantially as described for holding said arms or latches in an elevated position, in combination with means for holding said wheel or disk stationary, or releasing it to permit its rotation to effect the desired spacing, as set forth.

24. In an escapement mechanism of the character described an escapement wheel or

disk, arms or latches hinged or pivoted thereon, means substantially as described for holding said arms or latches in an elevated position, and suitable means for depressing said arms or latches, in combination with means for holding said wheel or disk stationary, or releasing it to permit its rotation to effect the desired spacing.

25. In an escapement mechanism of the character described an escapement wheel or disk, hinged arms or latches mounted thereon, means for revolving said wheel, means for raising said hinged arms and means for holding said arms in a raised position, in combination with a stop or other suitable means adapted to engage with and be disengaged from the said arms when depressed, and means for depressing the raised arms after they have passed the stop, as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

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