

(No Model.)

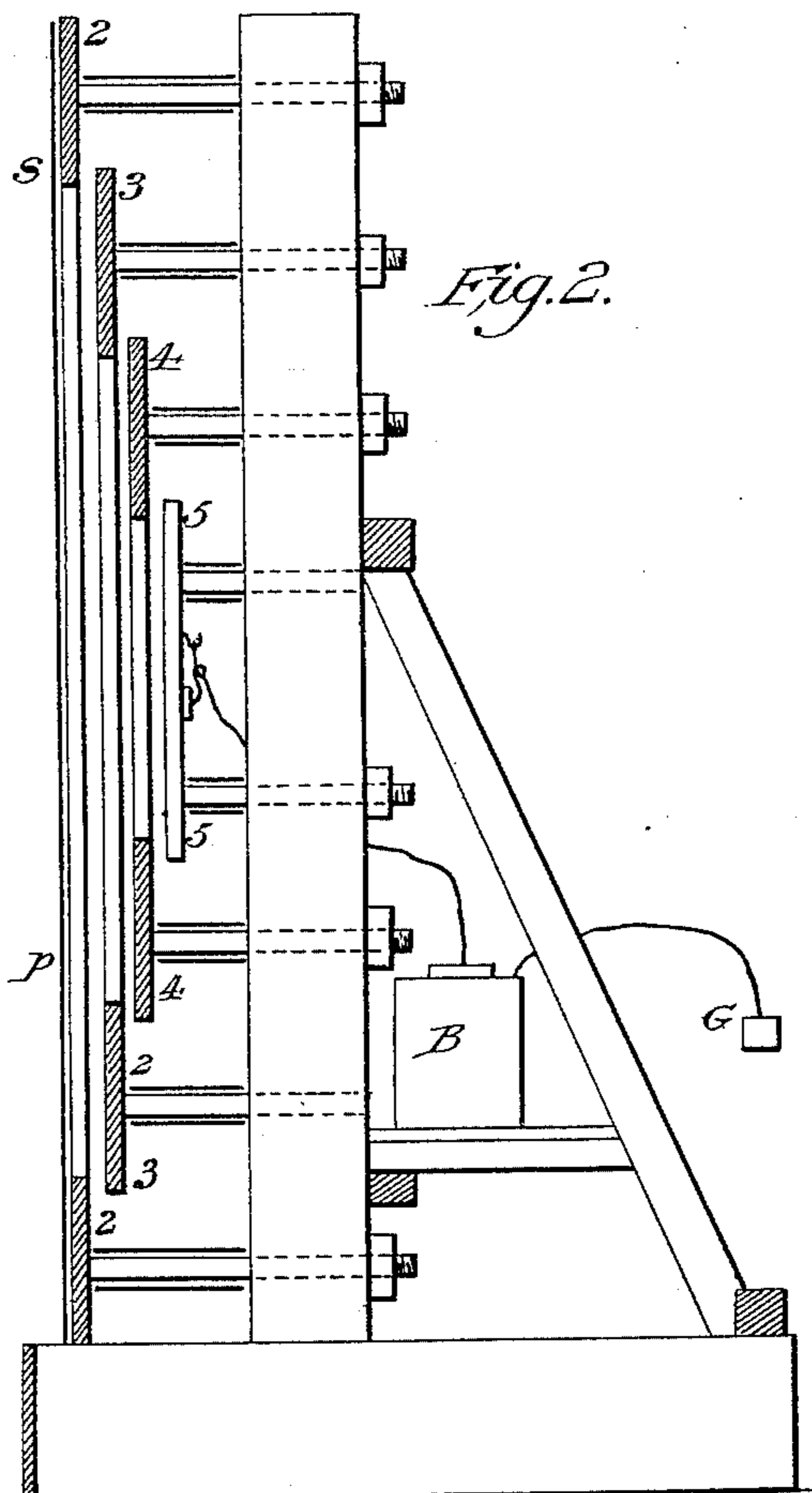
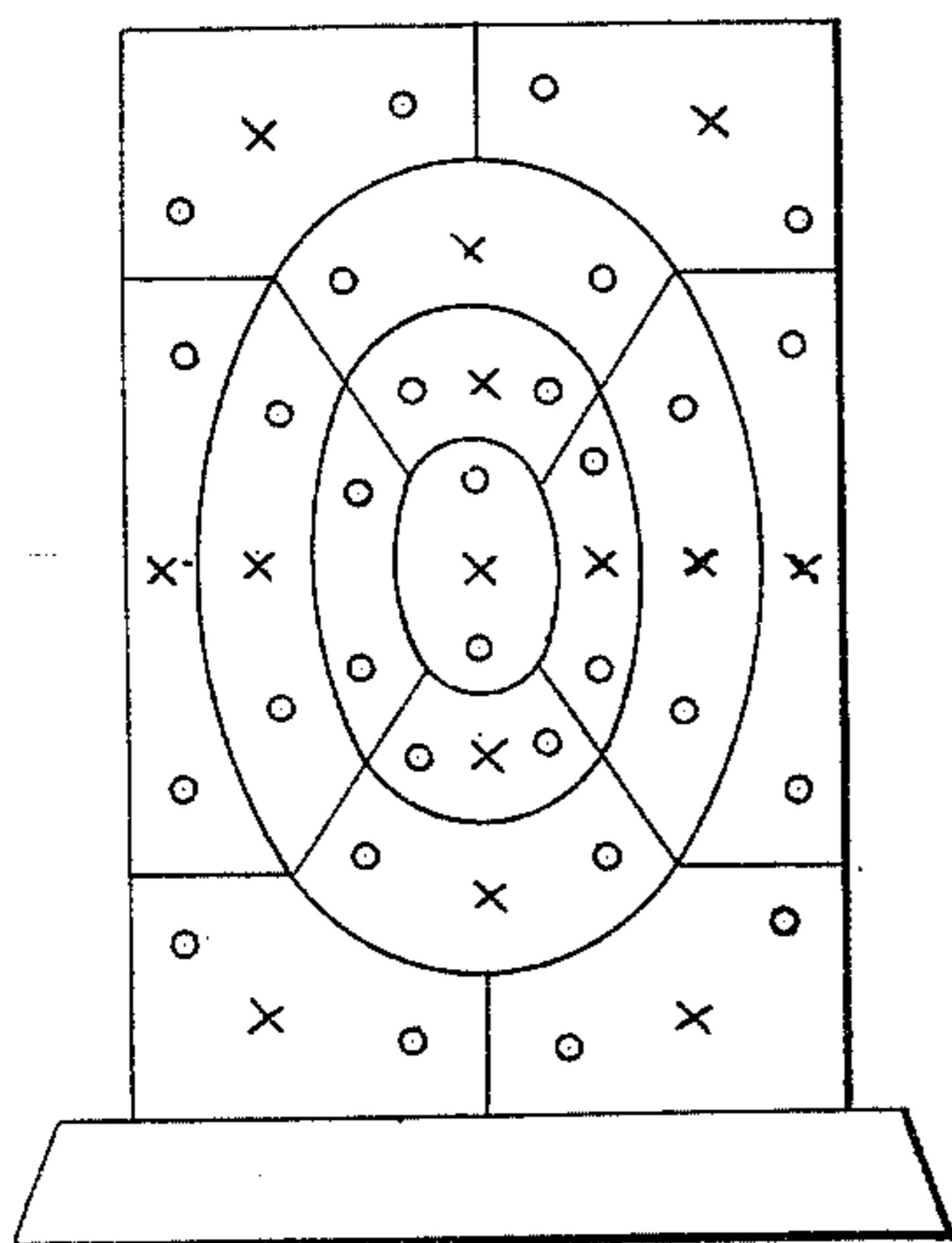
2 Sheets—Sheet 1.

F. J. PATTEN & T. A. BINGHAM.  
ELECTRIC ANNUNCIATOR TARGET.

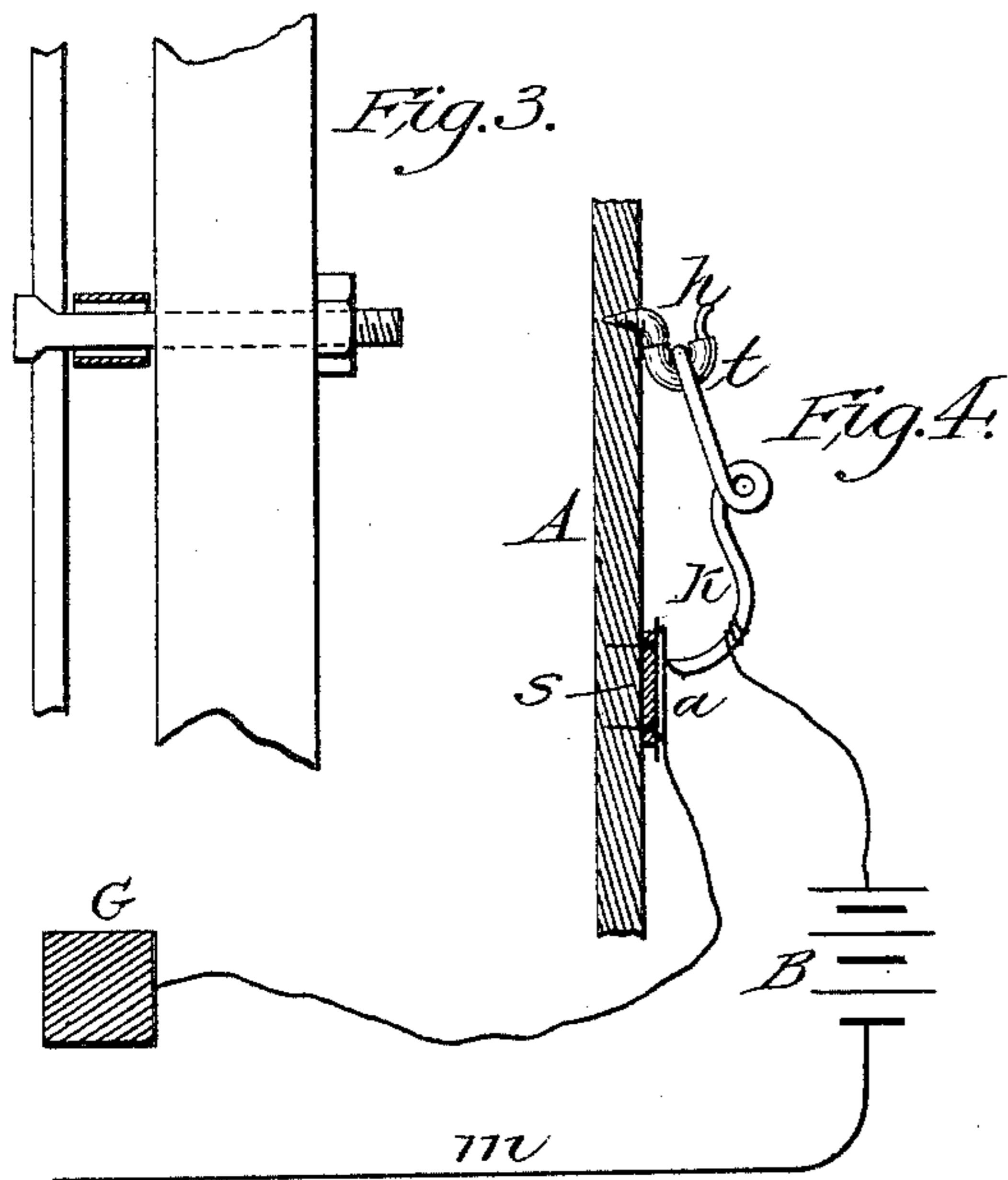
No. 394,081.

Patented Dec. 4, 1888.

*Fig. 1.*



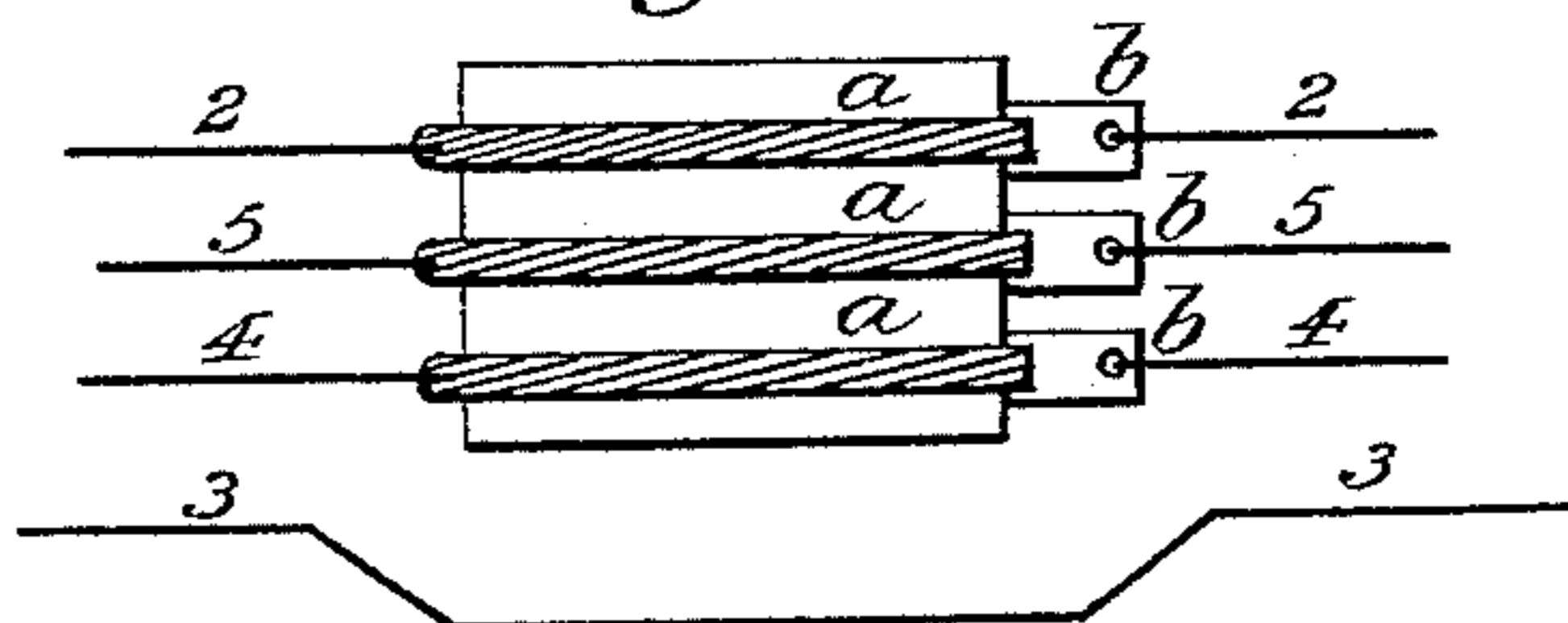
*Fig. 2.*



*Fig. 3.*

*Fig. 4.*

*Fig. 5.*



Witnesses:

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(No Model.)

2 Sheets—Sheet 2.

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Fig. 6.

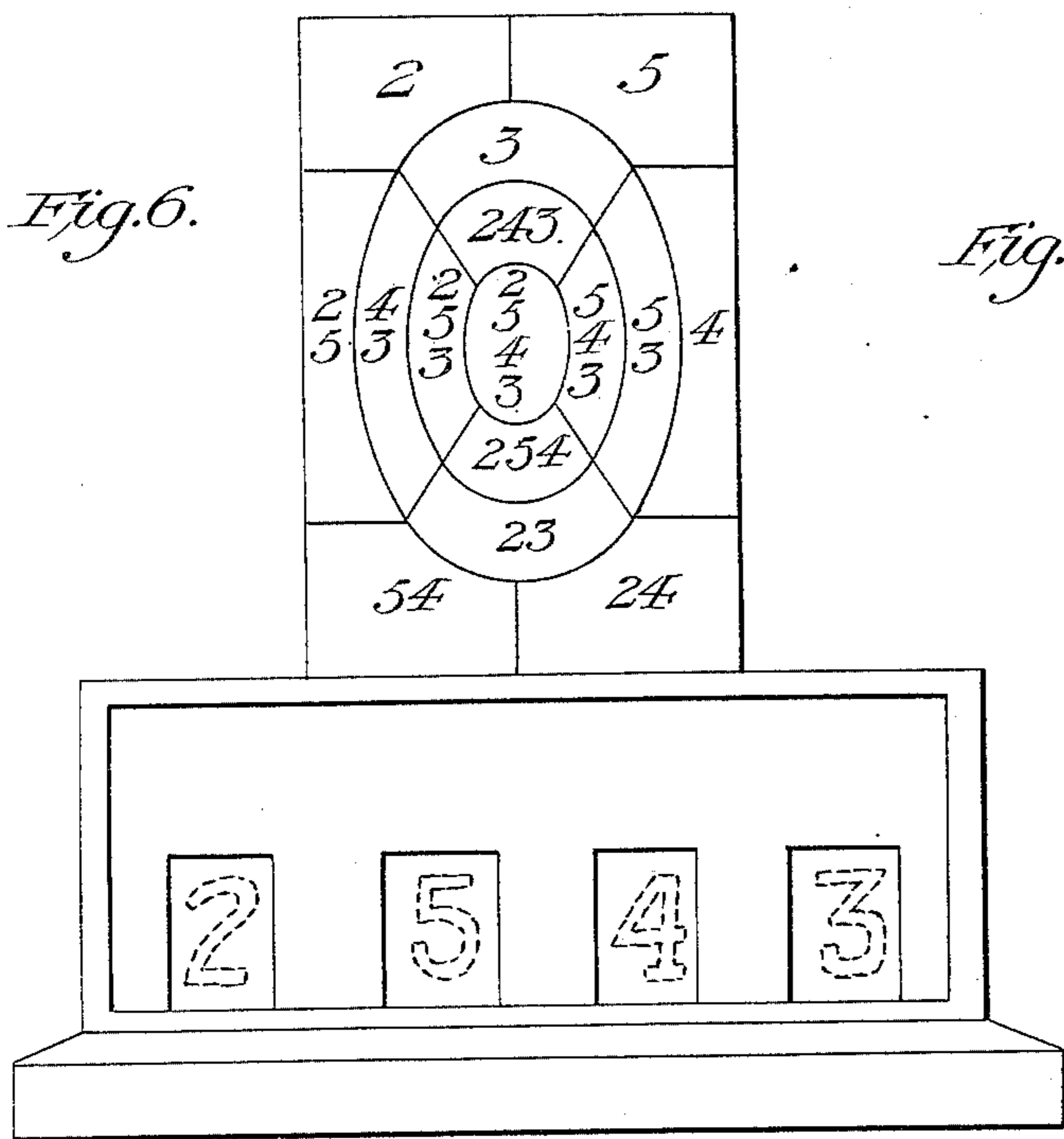


Fig. 5.

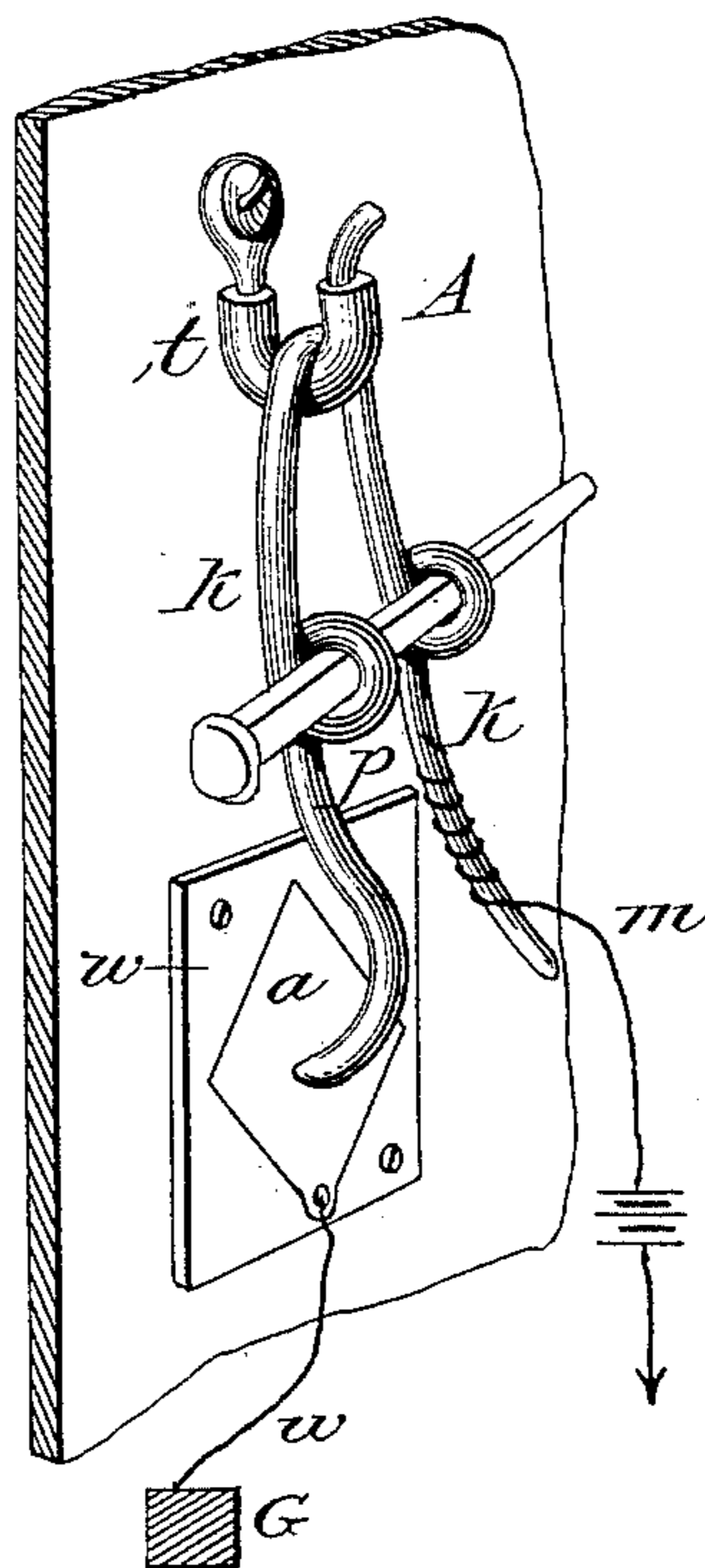


Fig. 8.

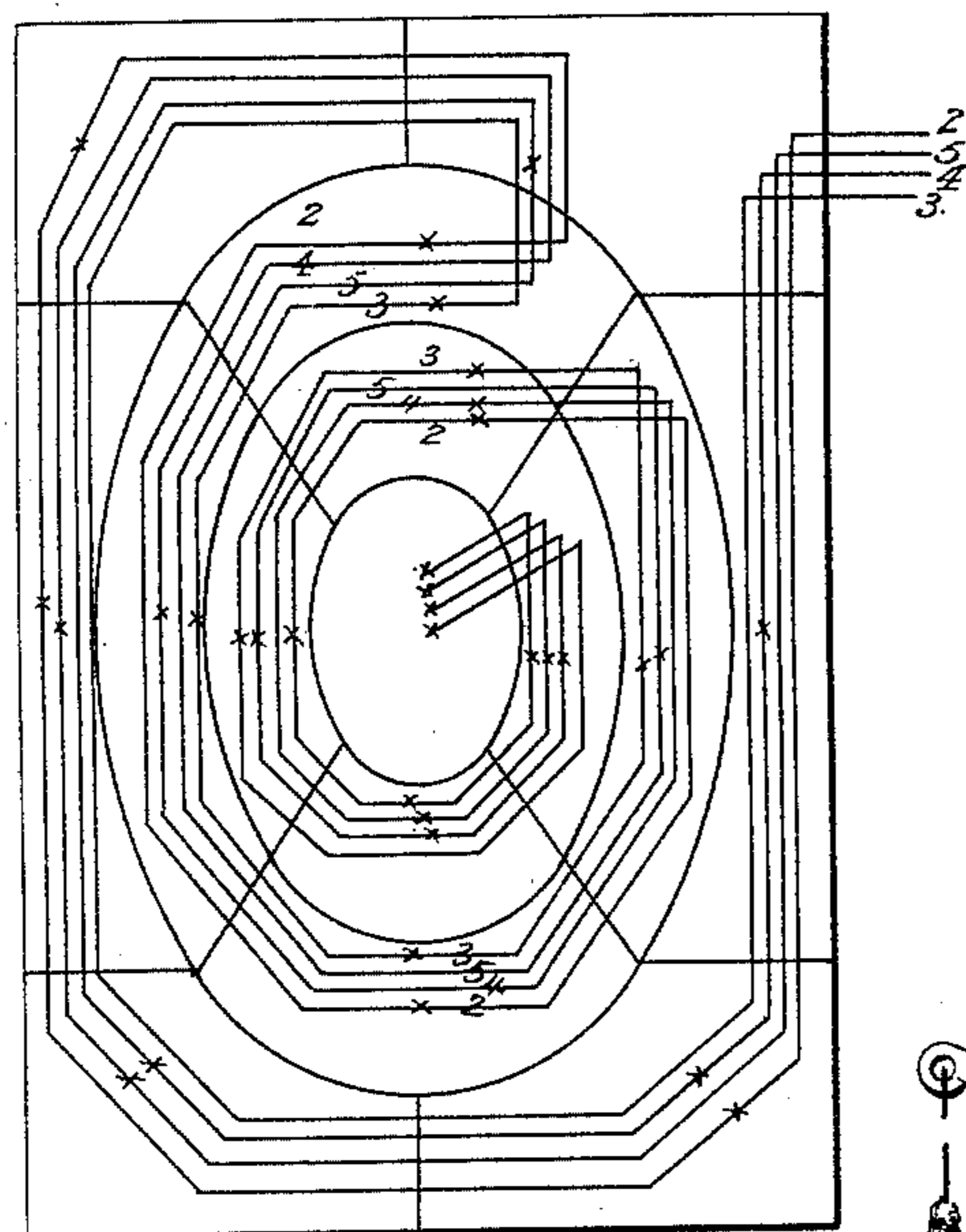
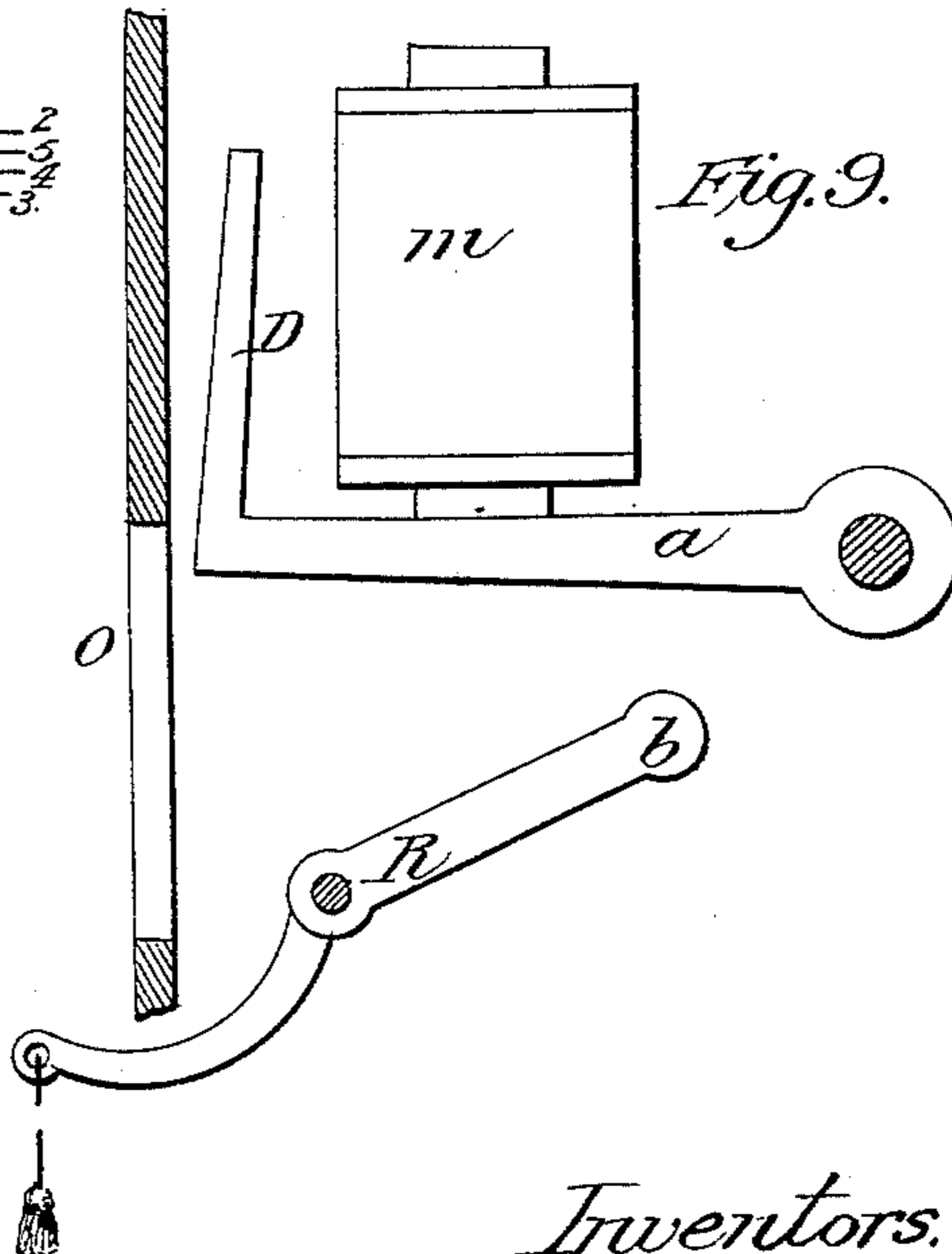


Fig. 9.



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# UNITED STATES PATENT OFFICE.

FRANCIS JARVIS PATTEN AND THEODORE A. BINGHAM, OF THE UNITED STATES ARMY.

## ELECTRIC ANNUNCIATOR-TARGET.

SPECIFICATION forming part of Letters Patent No. 394,081, dated December 4, 1888.

Application filed October 20, 1886. Serial No. 216,781. (No model.)

*To all whom it may concern:*

Be it known that we, First Lieutenant FRANCIS JARVIS PATTEN, United States Army, and First Lieutenant THEODORE A. BINGHAM, Corps of Engineers, United States Army, both citizens of the United States, and stationed at Fort Sidney, county of Cheyenne, State of Nebraska, and St. Louis, in the State of Missouri, have invented an Improved Electric Annunciator-Target, of which the following is a specification.

Our invention consists of an electric self-registering target designed especially to meet the requirements of army-rifle firing, &c., where long ranges and high velocities necessitate the use of heavy structures, and at the same time require a limited number of wires and apparatus.

Our target is designed on the plans of the "army service-target," and for rifle-firing will be made of the ordinary size and in three (3) forms or plans adapted to the different ranges called "A," "B," and "C" targets, so named in War Department orders.

As the mid-range or B target and long range or C target are constructed on the same plan, simply varying the shapes and sizes of the plates used, a description of the short range, three hundred (300) yards or A target, will suffice.

There are four essential parts: the target-face, of iron; the target-support in the rear, of wood; the circuit-breaker, and the annunciator system.

Figure 1 is a front view of the target as it appears to the marksman. Fig. 2 is a side view of the structure. Fig. 3 shows arrangements for support. Fig. 4 shows details of the indicating-key. Fig. 5 shows the detail construction of the key. Fig. 6 shows front view of the annunciator-instrument. Fig. 7 shows the arrangement of the circuits in the keys. Fig. 8 shows the arrangement of the circuits on the back of the target. Fig. 9 shows parts of the annunciator.

Fig. 1 shows a front view of the A-target for use up to three hundred (300) yards, and a peculiarity of this target is that nothing is to be seen from the front except the surface at which the shots are aimed. The army service-target is subdivided by three concentric

ellipses into four subdivisions or areas, having each a different "shot value." They are as follows: A central surface or area, called the "bull's-eye," is an ellipse in form, having its longer axis vertical within this area. A hit counts five. Outside this an elliptical ring, commonly known in the Creedmoor system as the "center," is the next area outward, and upon this surface a hit counts four. Outside of this ring another elliptical ring, which in the Creedmoor system has been commonly known as the "inner," is in the service-target called the "three-ring," and on its surface a hit counts three. The remaining rectangular surface outside the three-ring, known in the Creedmoor system as the "outer," is the two-space of the service-target, and within its lines a hit counts two. The ellipses that determine the boundaries of these different areas of the target-face are all concentric with their longer axes all in the same vertical line. This is the peculiarity of the "service" target as distinguished from the Creedmoor target, in which the corresponding subdivisions are determined by a similarly-arranged series of concentric circles, therefore the shot-values are 5 4 3 2. A detailed explanation of this Fig. 1 is necessary in order to understand the working of the annunciator. It is, however, not sufficient to know in which of these rings a shot has struck; but it is also necessary to know whether the shot is high or low, to the right or left, in any particular ring. For this purpose the rings are subdivided, as shown in Fig. 1, by diagonals suitably inclined for the three and four rings, by two horizontals and a vertical for the two-space. We thus have the face of the target divided into fifteen (15) sections with relation to the different shots it receives. The two (2) space has six (6) divisions; the three (3) space has four (4) divisions; the four (4) space has four (4) divisions; the bull's-eye intact has one (1) division. Total, fifteen divisions. It is required to know which of these subdivisions a bullet strikes, if any, when a shot is fired. To effect this, each of these fifteen areas of the target is composed of a separate iron plate, each plate being in electrical connection with the annunciator at the firing-point.

Fig. 2 is a side elevation. The target

stands on a bed-plate or stand of wood or iron laid flush with the ground; or, if above the ground, the stand is provided with a shield of iron to protect it from low shots.

5 The plates of each elliptical ring are held in the same vertical plane by the supports in rear; but the plates composing the different rings are placed a trifle in the rear of each other, as shown in Fig. 2, in which the vertical plates 2 3 4 5 are each in rear of the other. The inner rings, receding from those in front, overlap the outer ones, thus doing away with the elliptical edges of meeting, and the only joints are the diagonal ones. This makes  
10 a re-entering target instead of a projecting one, (as in Patent No. 346,876,) and this arrangement serves a definite purpose. A target thus arranged with plates overlapping, whether re-entering or projecting, will inevitably have its surface covered with shadows cast by the plates nearest the light on the other plates, thus confusing the face of the target and rendering it unfit to shoot at. Thus in this system by arranging the plates  
25 in a series receding toward the center, as described, an ordinary paper target is then pasted over the outer or front surface, thus making the entire face of the target a smooth and vertical plane, and, as usual, without shadows, which could not be done if the plates projected successively beyond each other to the front.

As shown in Fig. 3, each plate is held separately by two or more rigid bolts passing through it and the wooden support behind. A washer or thimble three or four inches long for the rear plate (shown in Fig. 3) around each bolt holds the plate off the wooden backing. The nut on the rear extremity of the  
40 bolt admits of screwing the plates tightly. The dots on the different plates, Fig. 1, show the points at which the bolts are attached to each plate. To enable the target to give its report through the electrical circuit, each plate  
45 has in its rear, at the points marked *x*, Fig. 1, a circuit-breaker or compound circuit-key of peculiar construction. This key is shown in its general features with connections in Fig. 4, in which the shaded sectional part A represents the edge of a target-plate. To its rear, above the point *x*, Fig. 1, or to the backing, as convenience may suggest, is fastened an ordinary hook. A piece of telegraph-wire, *k*, bent as shown, forms the key. It is hung on  
55 the hook, resting by its weight on a piece of rubber tubing, *t*, Fig. 5, slipped over the hook and designed to insulate the key. Its lower extremity rests against a block of wood, *w*, carrying a conducting-strip of zinc, *a*, Fig. 5, or brass. A spike, Fig. 5, is twisted into a turn of the wire key to weight it down and hold one of its prongs *p* against the conducting-strip *a*, Fig. 5.

In Fig. 4, B is the battery. From it a wire  
65 passes to one fork, *p*, of the key *k*, Fig. 5. From the conducting-strip *a* in the wooden rest, Fig. 4, another wire goes to the ground

G. From the other pole of the battery the main-circuit wire *m* passes down the range to the annunciator at the firing-point, through  
70 the annunciator-magnet, and then to the other ground, thus completing the circuit. It is evident that so long as the key is down with the prong *p* pressing against the conducting-strip  
75 *a*, Fig. 5, the circuit is completely closed throughout. If now a bullet strikes the plate A, the jar of impact will cause the key *k* to fly away from its connection with the conducting-strip, and the circuit is immediately  
80 broken. This breaking of the circuit is a peculiar feature of this system, the breaking of a circuit by this action being much more certain than causing a key under like action to close or make a circuit, the latter requiring a definite pressure and certain contact. Each  
85 plate has a key arranged on this same plan in its rear at the point *x*. When a plate is struck, its corresponding circuit breaks. The annunciator, hereinafter described, is normal when the circuit is closed and arranged to  
90 give indications only when circuits are broken. The annunciator system best adapted to this purpose is described in detail in application for patent, No. 214,574, (electric annunciator-call system, F. J. Patten, filed September 25,  
95 1886.) Its application to this particular use may be briefly described, as follows:

There are fifteen plates of the target from which reports are required. This would ordinarily require fifteen wires running down  
100 the range and fifteen indications on the dial of the annunciator with the plates numbered from 1 to 15, inclusive. By our system the fifteen separate indications are made with but four wires, and there are only four indicators  
105 to the annunciator. This is accomplished by application of the following principle: There are four distinct shot-values—viz., 2 3 4 5—which values may be regarded as four elements. These four elements are susceptible,  
110 taking them singly and in groups of two, three, and four, of just fifteen distinct combinations, no two of which will be similar. These fifteen combinations are as follows:

	2	5	4	3	115
First group.	{ 25	54	-	-	
	{ 24	-	-	-	
Second group.	23	53	43	-	
Third group.	254	253	543	243	120
Fourth group.	2543				

The figure 3 is placed last for a purpose to be hereinafter explained.

Now, we want fifteen indications from the target, and there happen to be just fifteen possible combinations of the four elementary  
125 shot-values; or, in other words, we can give to each plate of the fifteen a different number composed of one or more of the four figures 2, 5, 4, 3. The bull's-eye, being hit least, will be  
130 designated 2543. The four numbers having each three figures—viz., (third group, 254, 253, 543, 243)—are assigned to the four quadrants of the four-ring. The four num-

bers ending in three—(viz., 23, 43, 53, 3,)—to the four quadrants of the three-ring and the six odd numbers remaining (viz., 2, 5, 4, 25, 54, 24) are assigned to the six sections of the two-space. Thus all the fifteen plates of the target are assigned each a different number composed of the four figures 2, 5, 4, 3, and it will be observed that no two are alike.

A front elevation of the annunciator is shown in Fig. 6, having an ordinary box and dial with four magnets and four indicators numbered from left to right in order 2, 5, 4, 3. Above the annunciator is a miniature target divided by lines, as described, having the number of each section of the target stamped upon it, so that when, for instance, the indication is 2, 4, 3 on the dial, a glance at the miniature target tells where the shot hit. The magnets are connected up so as to act by breaking circuits. The armatures carry disks at their ends with the figures thereon, which show through apertures in the dial, when the armatures fall, allowing the figured disks to show through the apertures. The armatures act by gravity when released. As soon as a circuit through any magnet is broken, the magnet becomes instantly demagnetized and its armature falls exposing the corresponding figure to view through the hole in the dial. The armatures are reset, in the usual way, by a rocking bail worked by a pull-cord, thus preparing the annunciator and target system for the indication of another shot, inasmuch as the key first opened at the target on swinging automatically back to place closes the circuit or circuits that were opened by the last shot.

*The compound circuit system.*—Four wires leaving the battery go to the target. The bull's-eye plate has four keys like the one described, Fig. 5, one for each of the four wires. When the bull's-eye is hit, all four circuit-keys are jarred, all four circuits broken, and the annunciator displays all four figures at once and together. Its reading then is 2543, this being the number placed in the bull's-eye of the miniature target above the annunciator. The four wires then pass around the four-ring, each quadrant-plate of which has three keys, and at each quadrant-plate in turn a different wire of the four skips the keys, passing on to the next plate. Thus at each quadrant of the four-ring a different set of three wires and circuits is cut by the impact of a bullet, so when any part of the four-ring is struck an indication of three figures is received. The four wires next pass around the three-ring, but the several quadrants of this ring have but two keys each, and the wires skip the keys in sets of two—different ones each time—giving thus for any quadrant in this ring one of four different indications ending in figure 3. Passing, lastly, around the two-space at the six different plates, the circuits skip so that those going through the keys, and consequently broken when a plate is hit, transmit one of

the six odd indications assigned to the plates of the two-space.

Fig. 8 shows the method of tracing the circuits around the target, the circuits crossed at any quadrant or plate being the ones that pass through the keys, and are consequently cut, in order to give the required indication of that particular plate. The circuits may be broken by a single key, as shown in Fig. 7, made of some insulating substance, as wood, and having as many conducting-strips *a a a* on it as there are circuits to go through it. The circuits which it is desired to keep unbroken passing around the key, the strips *a a a* rest on connections *b b b*, also conductors. When the plate is struck, all circuits of the key are broken at once together. This last device is more applicable to small targets for gallery use, and is a part of this invention. Leaving the target, the four wires pass down the range along its side, thus keeping clear of stray balls. At the different firing-points—two hundred, three hundred, four hundred, five hundred, six hundred, seven hundred, eight hundred, and one thousand yards—the four wires come down the pole form a loop, then up the pole and on to the next firing-point, and so on from one firing-point to the next beyond, the last ground wire being placed beyond the extreme firing-point.

The annunciator is made small and portable. Its four connecting-wires project to the rear, where they can be easily attached to the branches of the loops coming down the pole at any firing-point. Thus the single four figures on the annunciator will not only show which one of the fifteen plates of the target was hit by a bullet, but by shooting at the targets in turn it will give the indications for every target on the range.

When through with the firing at any point, the annunciator is taken from the loop, the loop is connected up, as before, and the portable annunciator taken to the next range, or to whatever point it is desired to fire from.

Fig. 9 is a side elevation of interior arrangement of the annunciator, showing a magnet, *m*, and its armature, carrying the disk *D* with the figure on its front face. When the circuit is broken, the armature falls down against the rocking bail *R b*, showing the figure of the disk through the opening *o* in the dial of the annunciator.

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

1. An electric annunciator-target composed of fifteen metallic plates arranged in successive vertical planes, said plates receding from the front of the target to the rear and from the periphery toward the center, the lines of subdivision being determined by three concentric ellipses having their longer axes in the same vertical line and by straight lines further subdividing the four areas so formed, as follows: a middle line vertical and two

horizontal lines dividing the front plane (or two-space) into six plates, said horizontal lines passing through the extremities of four inclined radial lines, subdividing the second and third planes (or the "three" and "four" spaces) into four equiangular divisions each.

2. A sectional metallic target arranged in the manner described and having in addition an ordinary paper, cloth, or pasteboard target pasted over or fixed upon its front face to prevent shadows, as described.

3. An electric annunciator-target having a system of suspended keys or circuit-breakers arranged to break the circuit or circuits of which they are parts by motion communicated to them through the impact of a bullet against the plate with which they are in contact.

4. A key or circuit-breaker hinged at its upper extremity to a support attached to the

rear surface of the target-plates, from which it is insulated, said key being provided with one or more connectors, which rest against other insulated connectors, also fixed to the rear surface of the target-plates, through which last connectors and the metallic parts of the key the signaling-circuits are continuous, while the key is at rest against said connectors, as described.

5. An electric annunciator-target composed, as described, of sectional metallic plates and having attached to each plate a key or circuit-breaker connected each to a different combination of wires or electric circuits from that of any other section or plate.

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