Feb. 4, 1936. E. M. RICKARD 2,029,636

SELECTIVE SIGNALING DEVICE

Filed Oct. 13, 1932 2 Sheets-Sheet 1

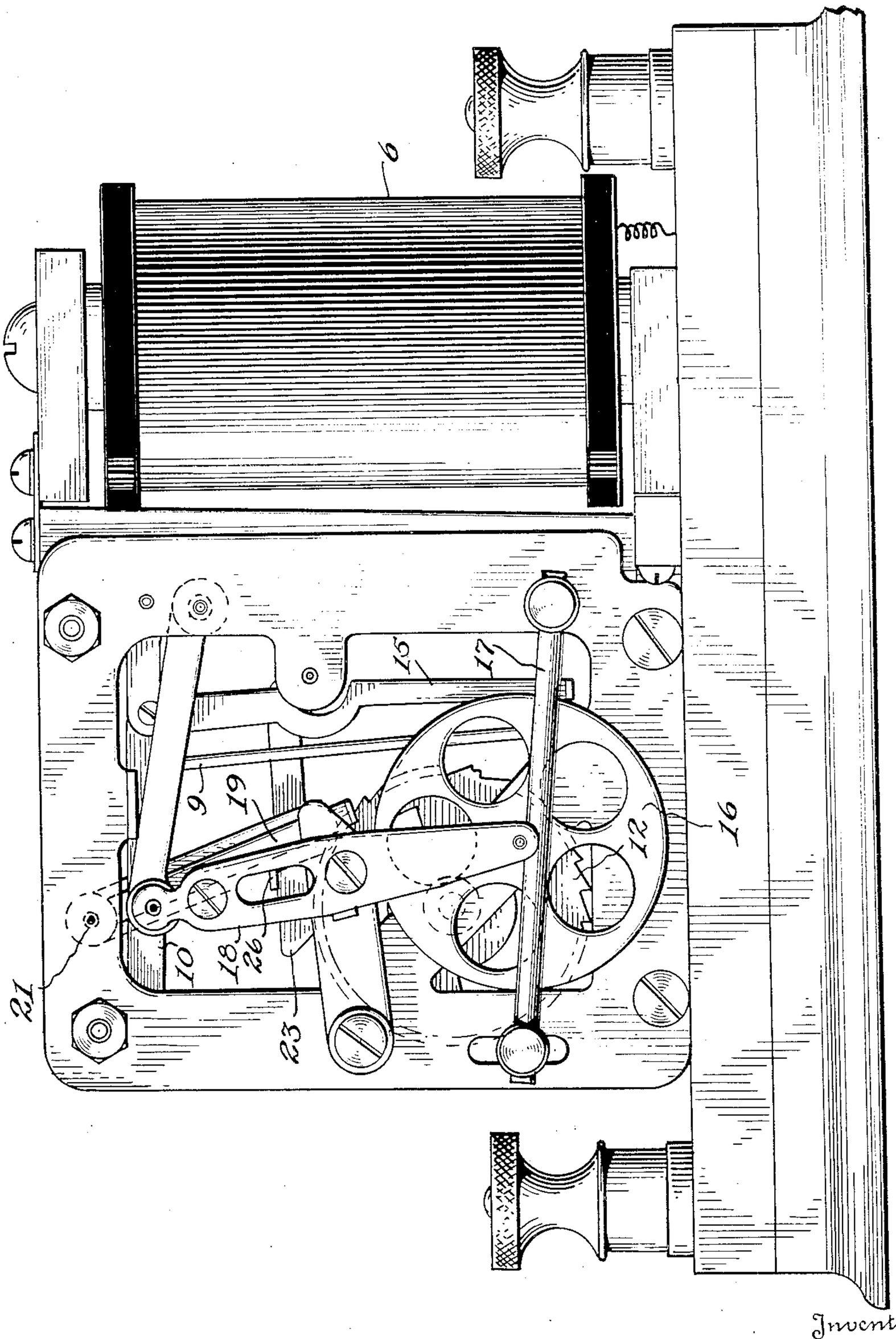

Fig. 1.

Inventor
Eric M. Rickard

Eugene C. Brown
Attorney

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Filed Oct. 13, 1932 2 Sheets-Sheet 2

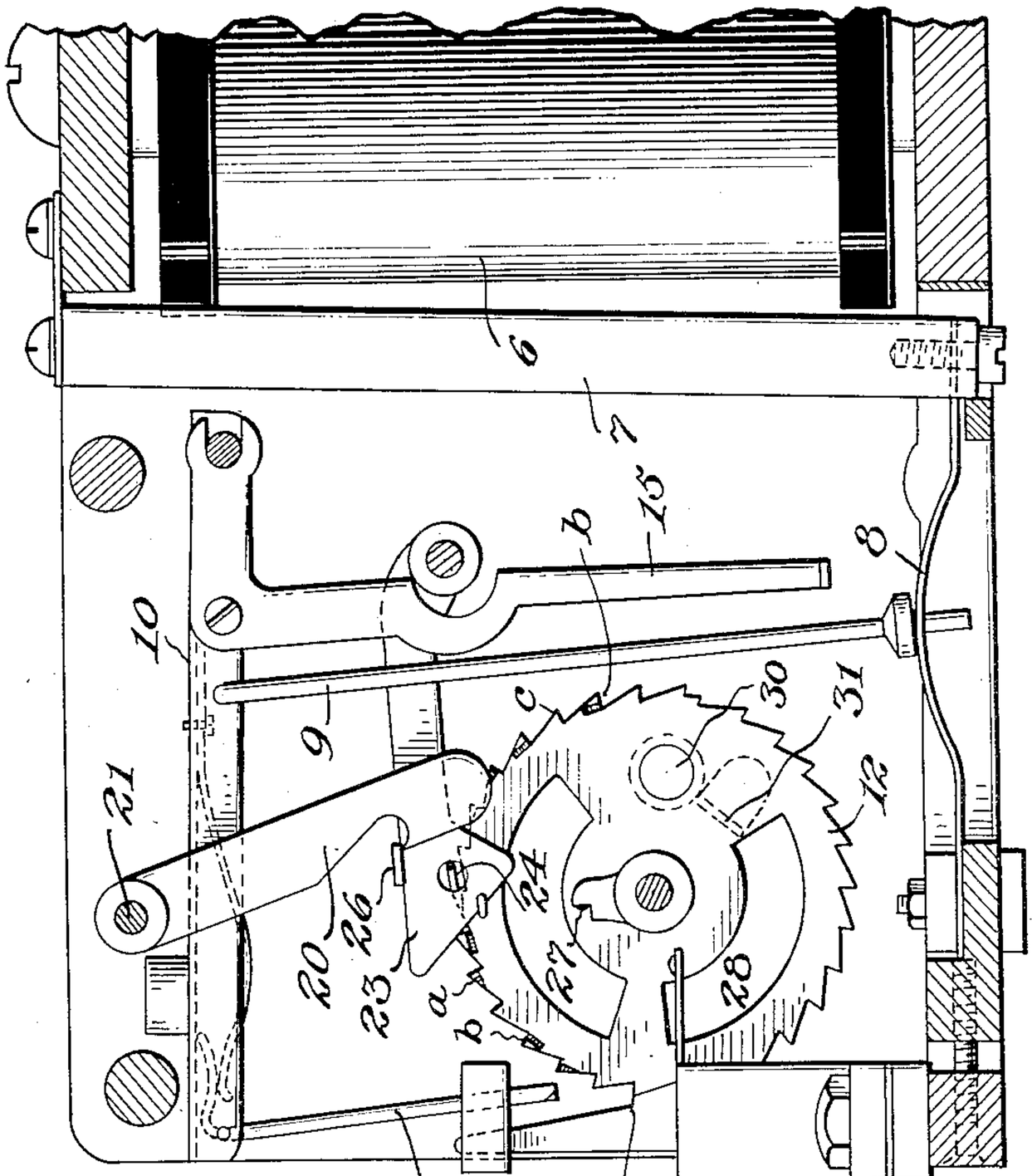

Fig. 2.

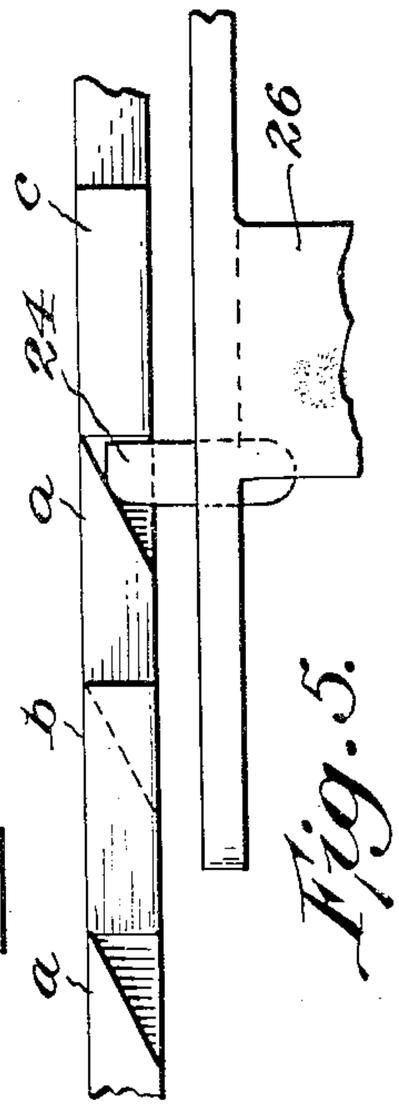

Fig. 5.

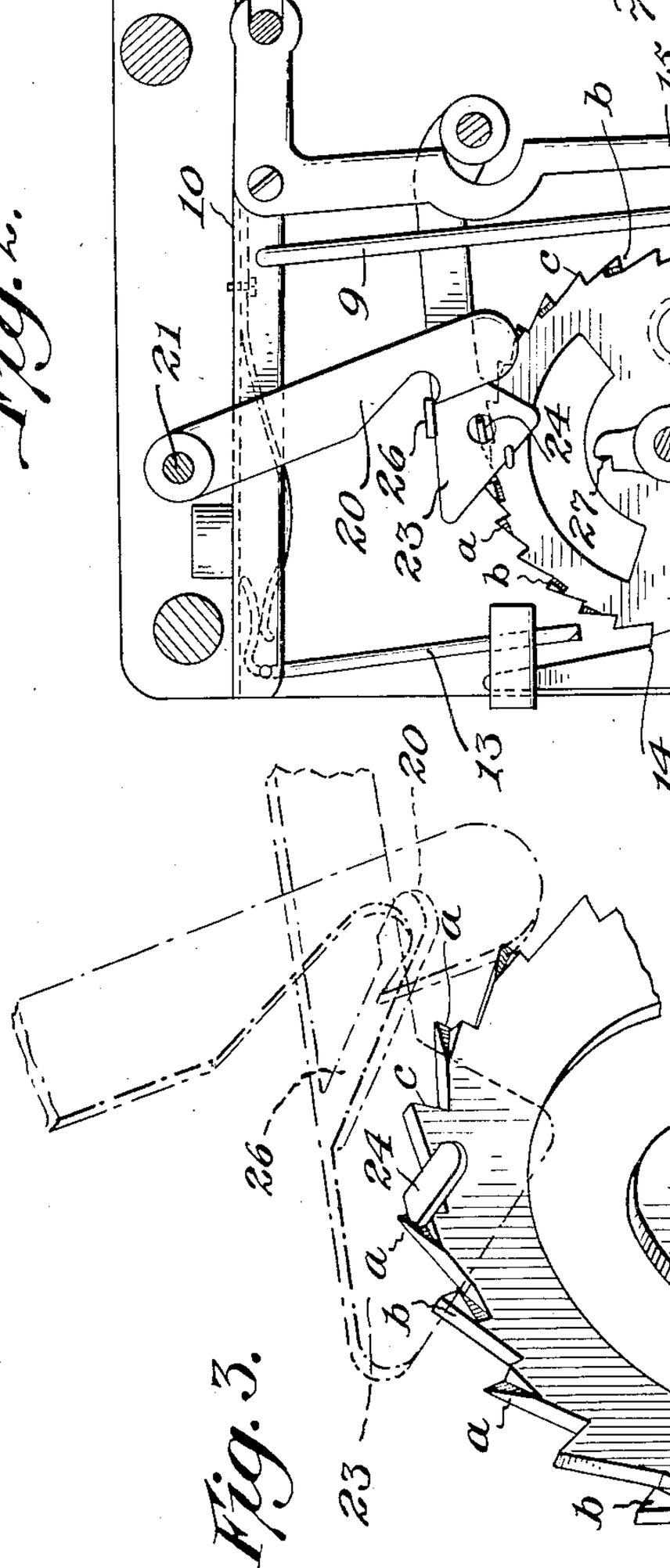

Fig. 3.

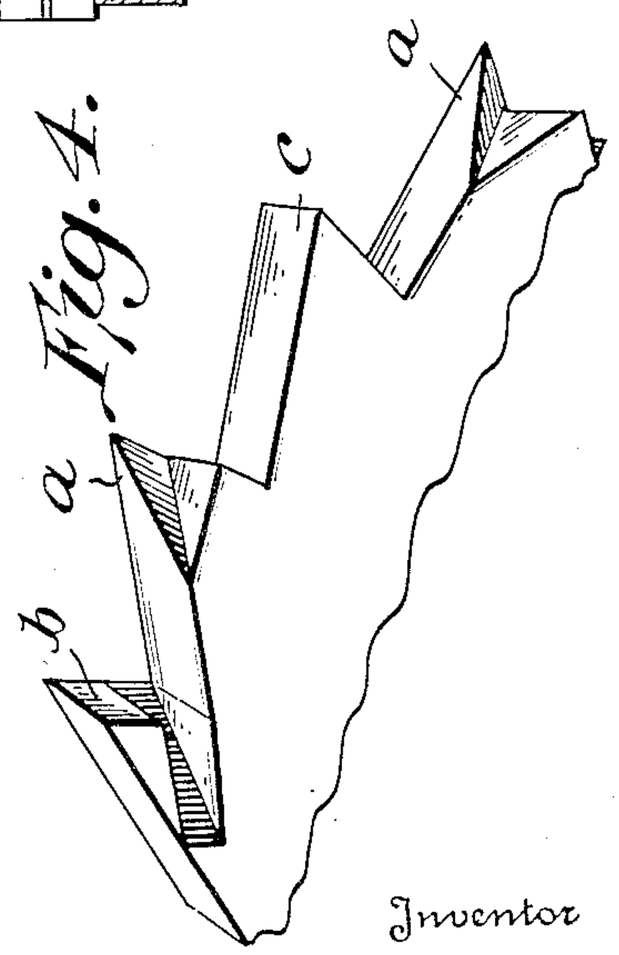

Fig. 4.

Inventor

Eric M. Rickard

Eugene C. Brown
Attorney

Patented Feb. 4, 1936

2,029,636

UNITED STATES PATENT OFFICE

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SELECTIVE SIGNALING DEVICE

Eric M. Rickard, New York, N. Y., assignor to The Western Union Telegraph Company, New York, N. Y., a corporation of New York

Application October 13, 1932, Serial No. 637,653

2 Claims. (Cl. 177—332)

This invention relates to selectively operated circuit-controlling devices wherein the signal responsive devices or "selectors" at a number of stations along a line may be selectively operated from a transmitting station.

One of the objects of my invention is to provide a selective signal system wherein the apparatus of each individual signaling station may be responsive individually to its own number signal and whereby the devices at all or any desired number of stations may be responsive also to another call signal.

In the following description I shall refer to the accompanying drawings, in which—

Figure 1 is a side elevation of a Gill selector to which my invention is applied;

Figure 2 is a longitudinal vertical sectional view of the same;

Figures 3 and 4 are perspective views and Fig. 5 a top plan view illustrating the teeth of the code wheel in accordance with my invention.

I have applied my improvement in code selecting apparatus to the well-known Gill selector disclosed in patents to E. R. Gill Nos. 906,523 and 1,004,566. It will be unnecessary, therefore, to describe in detail the construction and operation of said selecting mechanism. The code selecting element in these devices consists of a toothed wheel which is coded by cutting grooves at either the top or bottom of the teeth. These grooves consist of slots sawed in the teeth at an angle of 45° to the side of the wheel. Those teeth which are grooved or bevelled at the top are termed "top cut" while those grooved at the bottom are called "bottom cut", the former being indicated in Figs. 2 to 5 at *a* and the latter at *b*. The arrangement or order of these two types of teeth on the code wheel of the selector determines the code number or "call" number which will operate that particular selector.

A selector code is composed of short dashes (the length of a Morse letter **T**) and long dashes, about six times as long as the short dashes. The functioning of a selector of the Gill type when actuated by a long dash and a short dash is as follows:

When a long dash is sent through the windings of the electromagnets **6**, the armature **7** is attracted toward the pole pieces thereby straightening out the driving spring **8**. This allows the connecting rod **9** and propelling arm **10** to fall, which produces the following results.

First, the code wheel **12** is advanced one notch by means of the downward movement of the propelling pawl **13**. The propelling pawl stop **14** limits the downward movement of the propelling pawl thus preventing the code wheel **12** from being advanced more than one notch, or tooth.

Second, the time wheel restoring lever **15** swings away from the time wheel **16**, thus allowing the time wheel to roll completely down its track **17**. As the time wheel rolls to the bottom of its track, the time wheel frame **18** strikes the retaining hook throw-out lever **19** and moves it a slight distance.

The movement of the retaining hook throw-out lever **19** is transmitted directly to the retaining hook **20** as they are both attached rigidly to the same shaft **21**. This causes the release of the retaining pawl lever **23** allowing it to fall downward so that the retaining pawl **24** will engage the bottom of the code wheel tooth that was advanced to the position directly beneath it.

If this tooth is top cut, the retaining pawl **24** will hold the code wheel **12** in this advanced position even after the rest of the mechanism has been restored to its normal position in readiness for the next signal of the selector code. If it is a bottom cut tooth, the groove in the bottom of the tooth will cause the retaining pawl **24** to slide to one side thus allowing the code wheel **12** to return to initial position.

When the selector is actuated by a short dash, the code wheel **12** is advanced one notch and the time wheel restoring lever **15** swings away from the time wheel **16** in the same manner as described above for a long dash. With a short dash, however, the time wheel **16** rolls only a part of the way down its track **17** before it is restored to its upper position by the time wheel restoring lever **15**.

The time wheel frame **18** does not move the retaining hook throw-out lever **19** a sufficient distance to cause the retaining hook **20** to release the retaining pawl lever **23**. Hence, the retaining hook **20** continues to engage the retaining lever lip **26** as shown in Figure 2, and thus holds the retaining pawl lever **23** in such a position that the retaining pawl **24** will engage the top of the code wheel tooth that was advanced to the position directly beneath it.

The action that now takes place is the opposite of that which resulted when the selector was actuated by a long dash. If the tooth is bottom cut, the retaining pawl **24** will hold the combination wheel in the advanced position. If, however, it is top cut, the groove in the top of the tooth will cause the retaining pawl to slide to one side, thus allowing the code wheel to be re-

turned to its initial position with the counterweight 30 engaging the stop 31.

The movable contact point 27 is connected to the same shaft as the code wheel, and advances therefore as the latter is stepped around. Thus the closure of the selector contacts 27, 28 depends upon the movement of the retaining pawl 24 to the top or the bottom of the cut teeth on the code wheel in a definite sequence depending entirely upon the arrangement of the two types of teeth on the selector, or in other words, the code number of the selector.

The bevel in each type of code wheel tooth is provided for the purpose of throwing the retaining pawl out of engagement with the code wheel and permitting its return to the starting point. Hence the short impulse which causes the retaining pawl to engage the upper portion of the tooth must rest against an unbevelled surface if it is to act as a retainer. The lower bevel in a short impulse tooth is provided to "clear out" or return the code wheel to the starting point should a dash be received, and similarly, a long impulse tooth is bevelled at the top to "clear out" should the signal be a dot.

It is evident from the foregoing description that the sequence of short and long impulses must follow exactly the arrangement determined by the order of the "top cut" and "bottom cut" teeth of the code wheel. No variation is permitted in this arrangement or sequence of long and short impulses for any particular selector. In other words, a Gill selector, as disclosed in said patents, will only respond to one code combination.

It has been found that it is desirable to have the selectors respond to more than one code combination, so that the individual selectors will respond to their own call number, while all of the selectors on the line will respond to a common or master call number. For this purpose I have devised a code wheel which permits a selector to respond to more than one code combination. At one or more points in the code wheel I introduce an uncut or non-bevelled tooth in place of the top-cut or bottom-cut tooth. From the previous description it will be evident that the retaining pawl engaging an uncut tooth will hold the wheel whether the impulse is short or long, since in either case it engages a flat or unbevelled face. It is evident that at this point in any code combination we may introduce either a short impulse or a long impulse in the code combination. Thus, two codes will operate the instrument, both codes being the same except at one point where one code contains a short impulse and the other a long impulse. By introducing more than one uncut tooth in the code wheel, the two codes, to which the selector will respond, can be made to differ at more points than one.

The operation will be evident from the above description. Assume two selectors equipped with combination wheels exhibiting a tooth of each type, i. e. upper bevelled, lower bevelled and uncut, whose sequence is arranged so that selector A responds to the code dot dash dash with the uncut tooth in the first position and selector B responds to the code dash dot dash with the uncut tooth in the second position.

It being understood that an uncut tooth will respond to either a dot or dash signal, it will be seen that selector A will respond to the master code dash dash dash by virtue of the first tooth being uncut, and likewise selector B will respond to this same master code for its uncut tooth is at the second position.

If the code signal for selector A is sent to selector B, it will not respond because the application of a dot signal to a code wheel tooth cut for a dash permits the code wheel to return to the starting point upon release of this first signal. If the code signal for selector B is sent to selector A, the code wheel will be advanced one position by virtue of the uncut code wheel tooth. However, the second signal, a dot applied to the tooth cut for a dash, permits the code wheel to return to the starting point upon release of this second signal. It is, therefore, seen that neither selector will respond to the code signal of the other, but both will respond to the master code.

It will be seen, therefore, that this invention makes it possible to provide a large number of individual codes working with a single common or master code.

I claim:

1. In a selectively operated circuit controlling device, a step-by-step toothed element, operating to control a signaling circuit when brought to a predetermined position, comprising an electromagnet, a pivoted armature responsive to short and long impulses through said electromagnet, a stepping pawl adapted to actuate said element in the operation of said armature, said element having some of its teeth provided with faces bevelled on their upper part and square on their lower part, some of the teeth being square on their upper part and bevelled or undercut on their lower part, and some of the teeth having uncut faces, being square on both upper and lower parts, said upper bevelled, lower bevelled and uncut teeth being disposed in a predetermined arrangement, and a retaining pawl operated by said armature and mounted so as to engage the upper part of said teeth upon the occurrence of a short impulse and to engage the lower part upon the occurrence of a long impulse, whereby said lower bevelled teeth are held by said retaining pawl only upon the occurrence of a short impulse, said upper bevelled teeth are held only upon the occurrence of a long impulse, and said uncut teeth are held upon the occurrence of either a short or a long impulse.

2. In a code device of the character described, the combination with the toothed wheel constructed as defined in claim 1, of contacts controlled thereby, an electromagnet, an armature responsive to long or short current impulses through said electromagnet, stepping means operated by the armature for advancing said wheel step-by-step in response to succeeding impulses, and a retaining pawl adapted to engage the upper part of an adjacent tooth in response to a short impulse and adapted to engage the lower part of a tooth in response to a long impulse, said non-bevelled teeth being so disposed with relation to said teeth with bevelled upper or lower parts that the wheel will be brought to the position where said contacts are engaged in response to a plurality of code combinations of impulses.

ERIC M. RICKARD.