

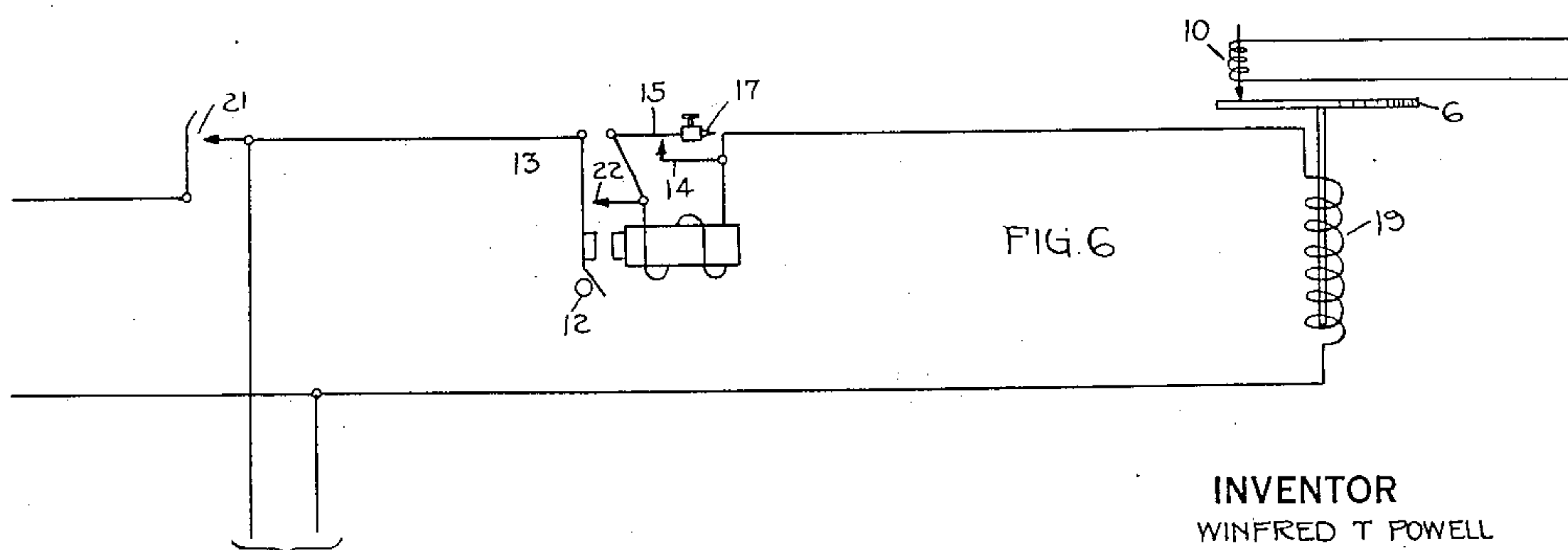
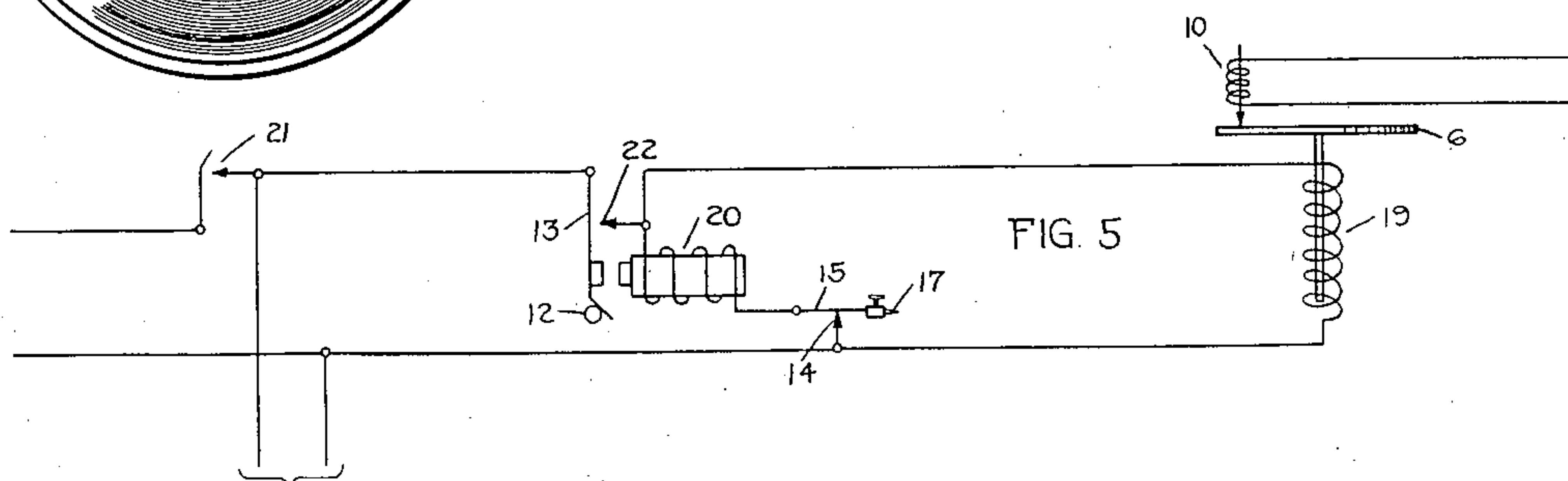
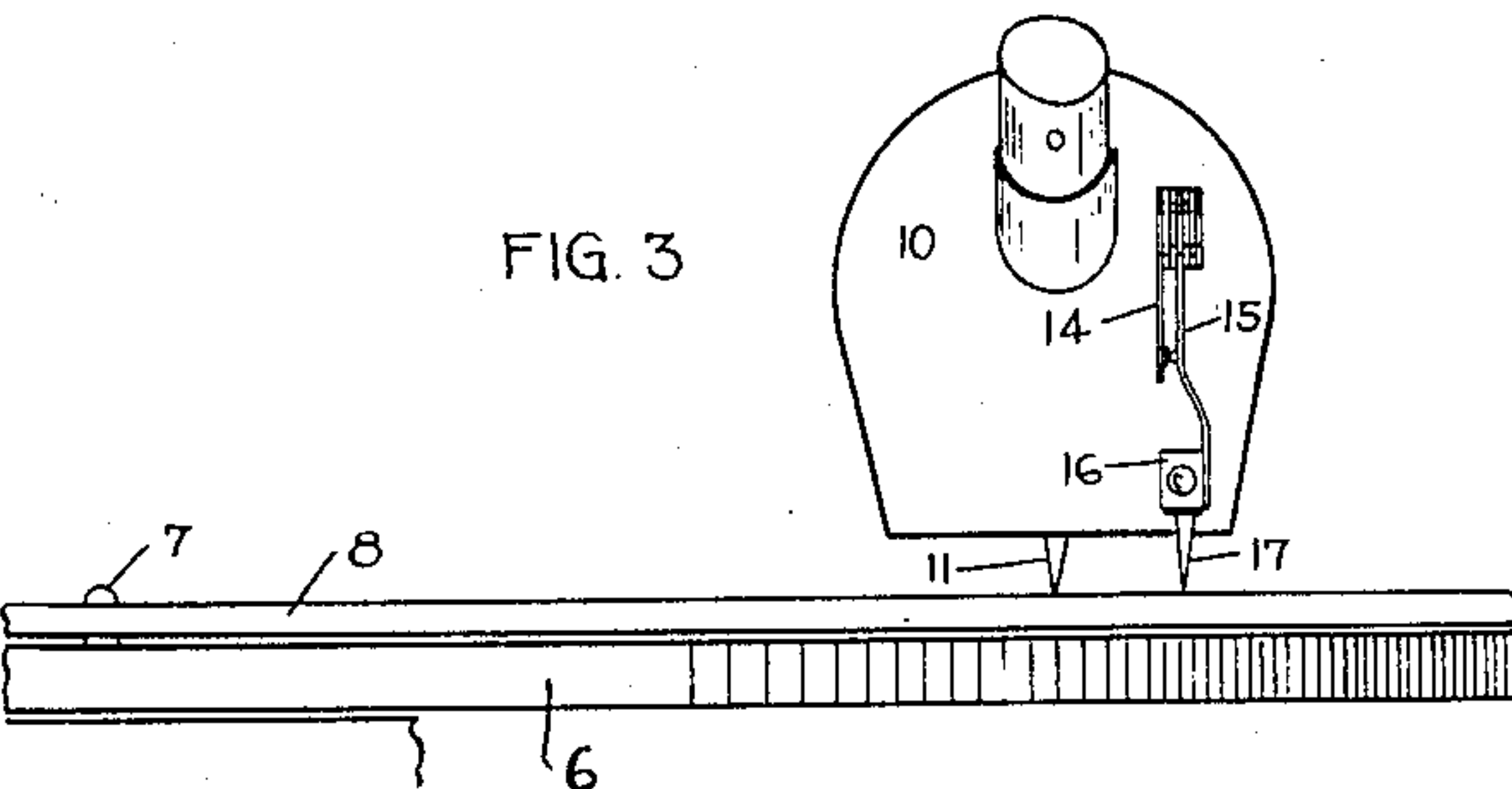
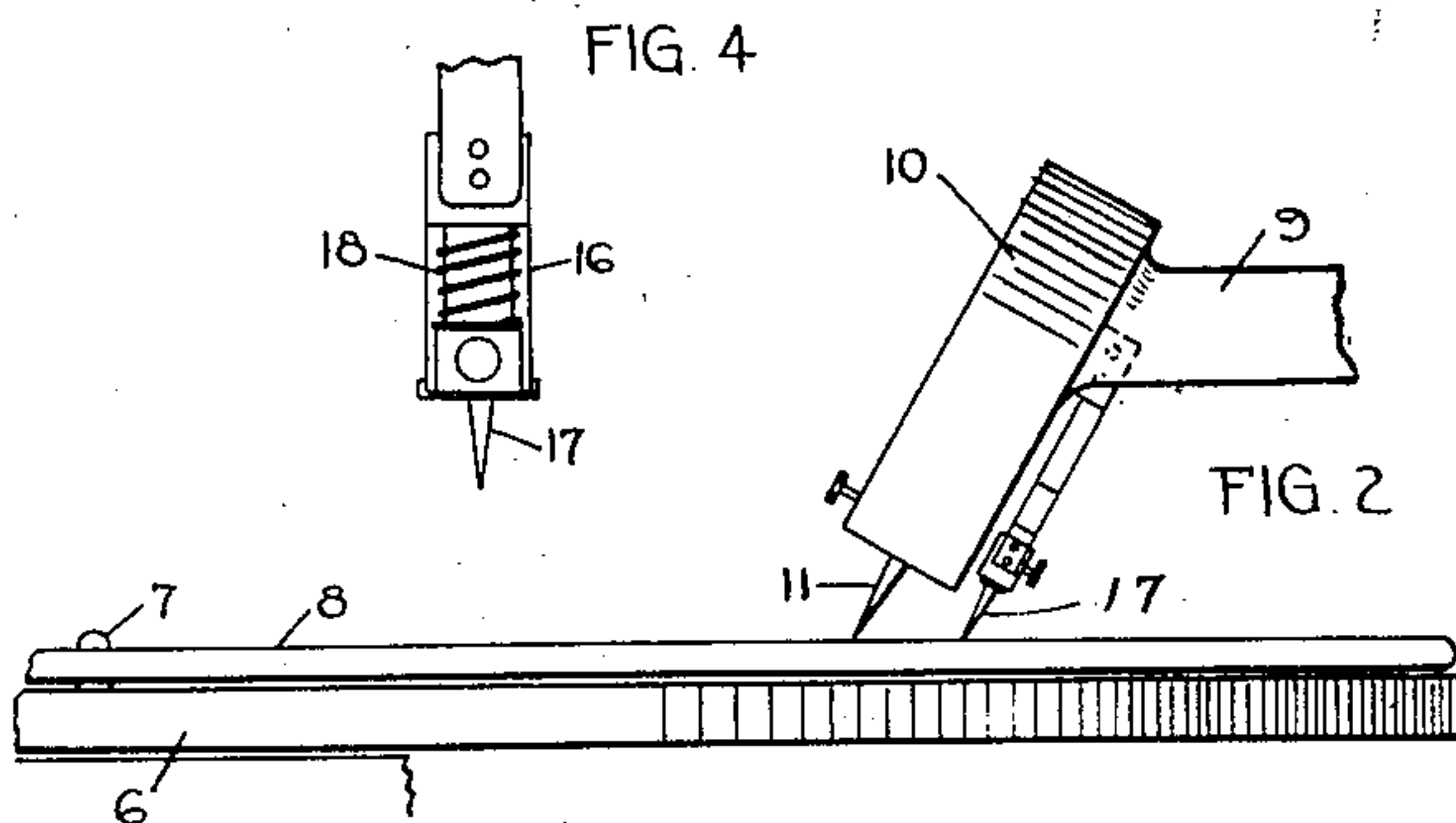
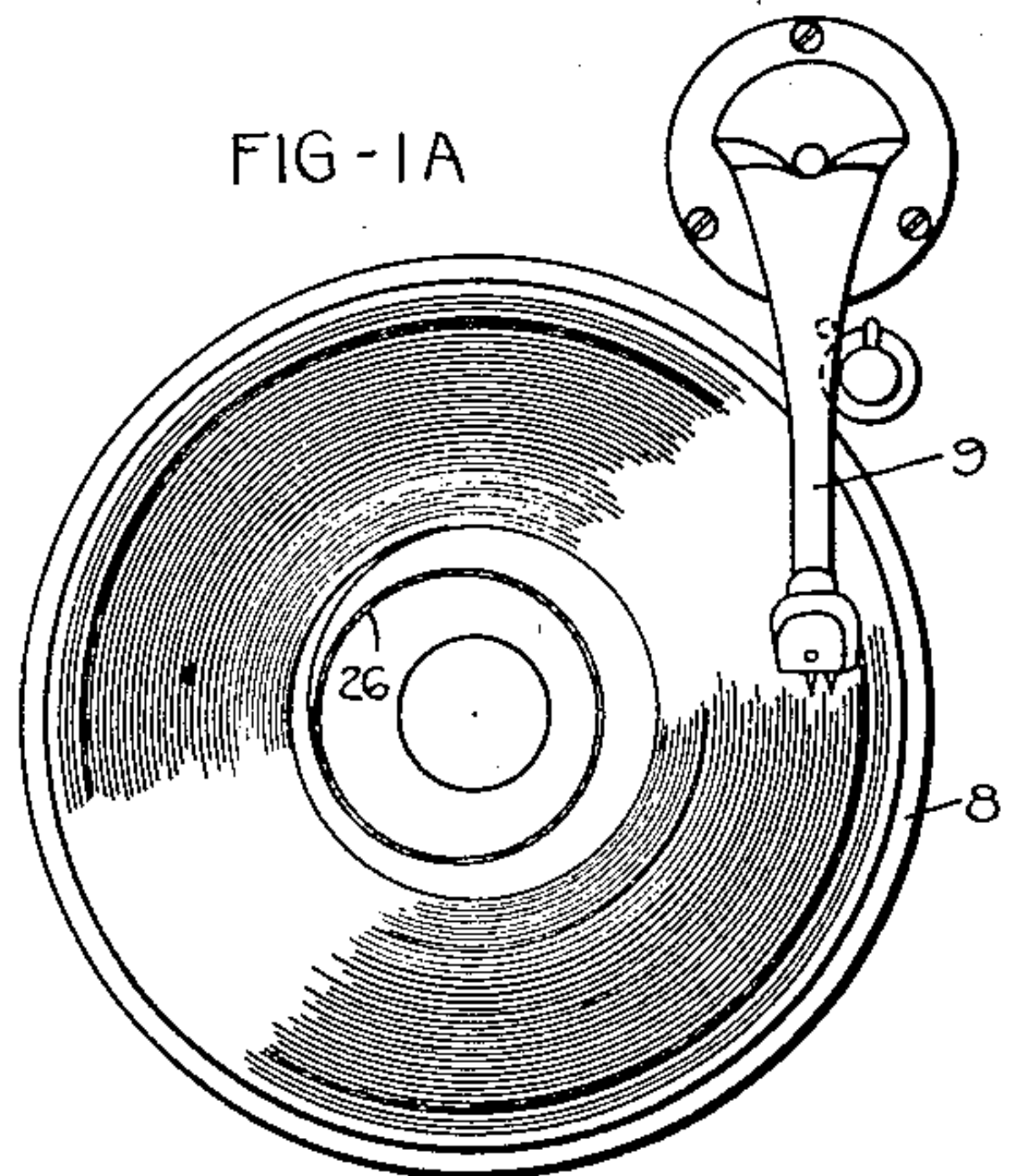
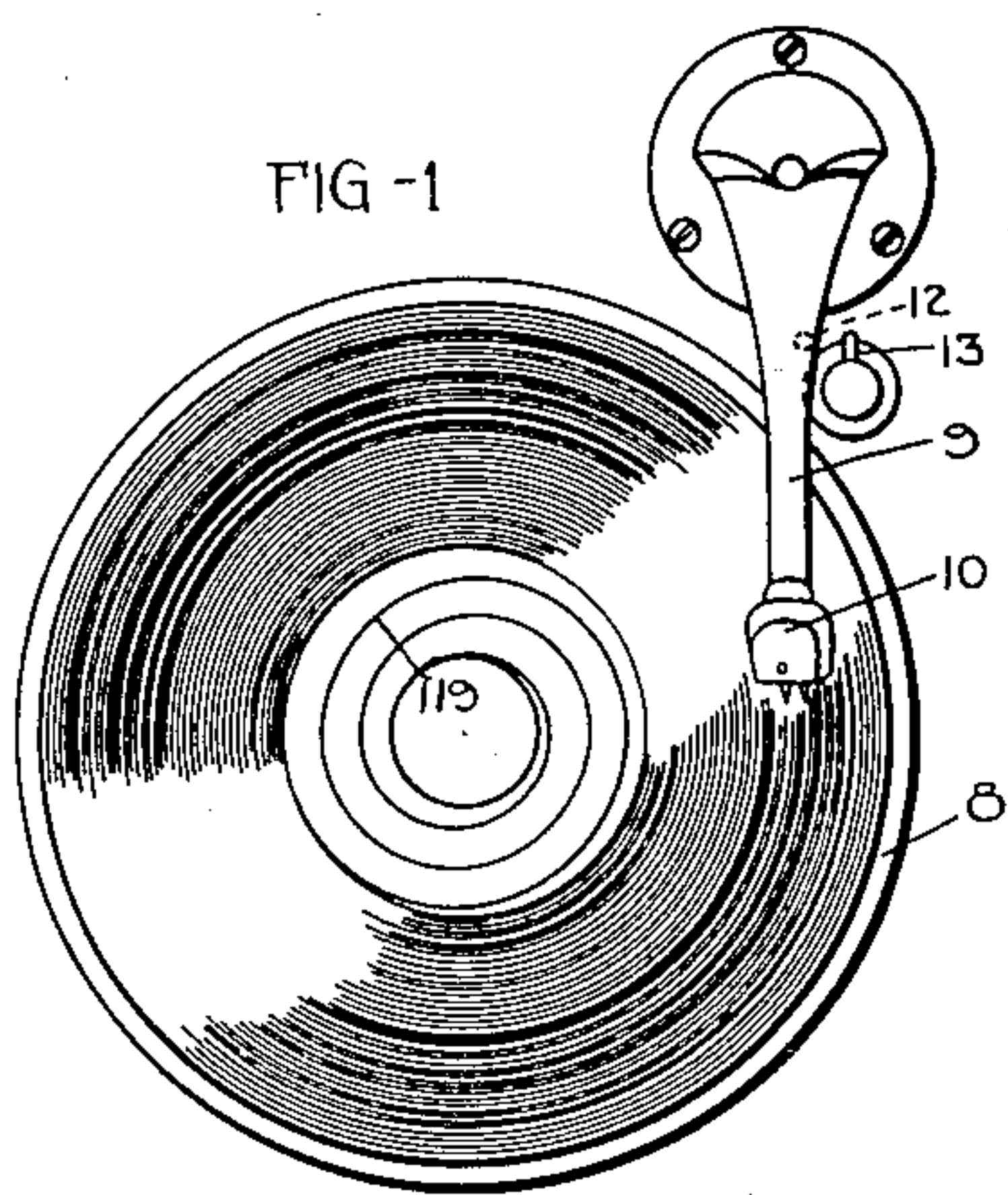
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AUTOMATIC PHONOGRAPH STOP MECHANISM

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AUTOMATIC PHONOGRAPH STOP
MECHANISM

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7 Claims. (Cl. 192—119)

This invention relates to the method and apparatus for stopping the operation of a phonograph at the conclusion of the playing of the record.

In the past many arrangements have been proposed for automatically stopping the rotation of the phonograph turntable when the needle of the reproducer reached the end of the sound record groove. All of these arrangements have been complicated and certain of them have only been adapted for use with records having a particular type of terminal for the needle groove.

The present invention has for its purpose an automatic stop for a phonograph turntable which is simple in construction and reliable in operation and which furthermore is inexpensive to manufacture.

The main feature of the invention resides in the method of stopping a phonograph turntable by utilizing the relative movement between two elements carried by the reproducer or pick-up of the phonograph, to disable the driving motor. A further feature of the invention includes the use of electrical circuits controlled by a non-uniform movement of the pick-up radially of the record, for disabling the phonograph motor. An additional feature of the invention includes the use of means controlled by a relative movement of two record engaging elements for disabling the phonograph motor.

These features and others will appear from the detailed description and claims when taken with the drawing in which Fig. 1 is a top view of a portion of a phonograph including a turntable with one type of record thereon, the pick-up and the arm for carrying it together with associated mechanism; Fig. 1A is a similar view showing an eccentric terminal groove record instead of the spiral terminal groove of Fig. 1; Fig. 2 is a side elevation of the turntable and record together with the pick-up device; Fig. 3 is another side view of the phonograph mechanism showing especially the rear of the pick-up device; Fig. 4 is a detailed view of the means for actuating certain of the electrical contacts in the control system; Fig. 5 is a circuit diagram showing one arrangement by which the turntable may be electrically controlled; while Fig. 6 shows a modified form of circuit arrangement for a similar purpose.

Referring especially to Figs. 1, 2 and 3, the numeral 6 designates a turntable which may be driven in any desired manner such as by an electrical motor. The turntable is provided with the usual central pin 7 which holds the phonograph record 8 thereon. The record 8 in addition to the

usual spirally cut sound groove is provided with means coacting with the mechanism of the phonograph to stop the motor. As shown in Fig. 1 this means is in the form of a spiral groove 119 terminating near the center of the record. The pitch of this portion of the groove is much greater than that between adjacent sound grooves. Instead of using a high pitched spiral as shown in Fig. 1 the sound record groove may lead into a groove in the form of a circle 26 having its center eccentrically positioned with respect to the pin 7 as shown in Fig. 1A. The phonograph also includes an arm 9 rotatably mounted on a fixed part of the phonograph so that a pick-up or reproducer 10 carried thereby and a needle 11 detachably secured in the pick-up may be advanced from a point from the outer edge of the record to a point near its center in the course of the rotation of the record by the turntable while the record is being played. The pick-up arm 9 may be provided with a pin 12 to extend downward to engage an extension of switch 13.

As a part of the stop mechanism the pick-up 10 has secured thereto a pair of contact springs 14 and 15 which are normally closed, the spring 15 terminating in a support 16 and a groove engaging element 17 which may be in the form of a fiber needle. The element 16 includes a carriage for the needle 17 which carriage includes a spring 18 tending to hold the needle at its lowermost position but permitting the needle to rise when inequalities such as the uncut margin of the record are encountered. As shown in Fig. 5 the phonograph has associated therewith, the turntable motor 19 and a relay 20 together with circuits for actuating the same. These circuits include 110 volt alternating current source, an off and on switch 21 for manually starting or stopping the phonograph, contacts 13 and 22 actuated by the pin 12 on the pick-up arm, the relay 20, and turntable motor 19. It is believed that the invention will best be understood by describing its operation. When it is desired to operate the phonograph, the off and on switch 21 is closed and the pick-up 10 is moved toward the right as viewed in Fig. 1 until the needle 11 engages the beginning of the sound groove. This movement of the pick-up arm closes contact between the springs 13 and 22, which initially completes a circuit from one side of the alternating current source through the winding of the motor 19, thence through the contacts 22 and 13, and the contacts of the switch 21 to the other side of the current source. The relay 20 is connected in multiple of the motor winding through the con-

tacts 15 and 14 actuated by the groove-engaging element 17. This circuit energizes the motor 19 and also energizes the relay 20 which holds the armature spring 13 in engagement with the contacts 22 as long as it is energized, and thereby completes a locking circuit for the relay and a circuit for the motor winding. At the time the needle 11 was placed in the sound groove the needle 17 of course moved into engagement either with the margin of the record or a portion of the sound groove. During the normal playing of the record, the needles 11 and 17 maintain the same relative position, that is, the same distance is maintained between them. However, at the end of the record the needle 11 engages the portion of the sound record groove designated 119 in Fig. 1 and 26 in Fig. 1A, so that the needle 11 advances radially faster than the needle 17 thereby causing relative movement between these two elements, which movement breaks contact between the springs 14 and 15 to open the circuit of the relay 20 causing it in turn to release its armature 13. This action interrupts the circuit of the motor 19 to stop the rotation of the turntable 6.

The modification shown in Fig. 6 is similar to that shown in Fig. 5 except that the winding of the relay 20 is connected in series with the winding of the motor 19, and the contacts 14 and 15 are normally open. In this circuit arrangement the added needle 17 on the pickup is arranged to close contacts 14 and 15 instead of opening them as shown in the circuit diagram of Fig. 5. This may be effected by placing the spring contact 14 at the right of spring contact 15 as shown in Fig. 3. In the operation of this form of the invention, the contacts 13 and 22 are closed when the arm 9 is rotated to place the pickup stylus at the beginning of the sound groove. This energizes both the relay 20 and the motor 19 in series. The relay 14, when thus energized attracts its armature 13 to lock closed the energizing circuit of this relay and the motor until the end of the sound groove is reached. The pickup then swings sharply toward the center of the record which closes the contacts 14 and 15, in this case normally open. This short-circuits the relay 14 causing it to release its armature 13, and thereby interrupt the relay circuit. The circuit of the motor is also interrupted at this time. The contact 22 with armature 13 is opened before the contacts 14 and 15 are opened, therefore, no precautions are necessary to guard against arcing.

The pick-up 10 herein shown is of the well-known electrical type but it will be understood that the present invention is equally applicable to a mechanical reproducing type of phonograph, that is, one in which the needle mechanically drives a diaphragm to set it into vibration.

What I claim is:

1. In a phonograph including a turntable actuated by a motor, and a swingable arm provided with a reproducer carrying two elements to engage a sound groove on a record carried by said turntable, the method of stopping said turntable

when said reproducer reaches the end of the sound groove which comprises utilizing the relative movement between two groove-actuated elements due to an irregular movement of said reproducer to electrically disable said motor.

2. In a phonograph including a turntable actuated by a motor and a swingable arm having a reproducer to engage a sound groove on a record carried by said turntable, the method of stopping said turntable when said reproducer reaches the end of the sound groove which comprises utilizing a differential movement between two elements on the reproducer due to an acceleration of lateral movement of said reproducer to electrically disable said motor.

3. In combination with a phonograph including a turntable, a motor for actuating said turntable, a phonograph pick-up, and an arm carrying said pick-up rotatable in an arc in the plane of said turntable, a record carried by said turntable, said record being provided with a spiral groove increasing in pitch, and electrical contacts carried by said pick-up and actuated by an increase in the velocity of said pick-up radially of said record due to said spiral groove for electrically stopping the motor.

4. In combination with a phonograph including a turntable, a motor for actuating said turntable, a phonograph pick-up, and an arm carrying said pick-up rotatable in an arc in the plane of said turntable, a record provided with a spiral groove increasing in pitch, said record being rotated by said turntable, two groove-engaging elements normally movable radially with said pick-up at the same velocity, and means controlled by the separation of said elements due to the increasing pitch of said groove for electrically stopping the motor.

5. In combination with a phonograph pick-up arm having a pick-up carried thereby, a stylus for said pick-up, a pair of electrical contacts carried by said pick-up, one of said contacts being provided with an extension, and a second stylus carried by said extension.

6. In combination with a phonograph pick-up arm having a pick-up carried thereby, a stylus for said pick-up, a pair of electrical contacts carried by said pick-up, one of said contacts being provided with an extension, and a second stylus carried by said extension, the free end of said styluses being substantially in the same plane.

7. In combination with a phonograph including a turntable, a motor for actuating said turntable, a phonograph pickup, and an arm carrying said pickup rotatable in an arc in the plane of said turntable, a record carried by said turntable, said record being provided with a spiral groove terminating in a circular groove eccentrically placed on the record with respect to the center thereof, and electrical contacts carried by said pickup and actuated by its movement in said eccentric circular groove for electrically stopping the motor.

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