T. E. R. PHILLIPS.

ELECTRIC AUTOMUSICAL INSTRUMENT.

APPLICATION FILED AUG. 8, 1908.

1,003,201.

Patented Sept. 12, 1911.

3 SHEETS—SHEET 1.

Fig. 1.

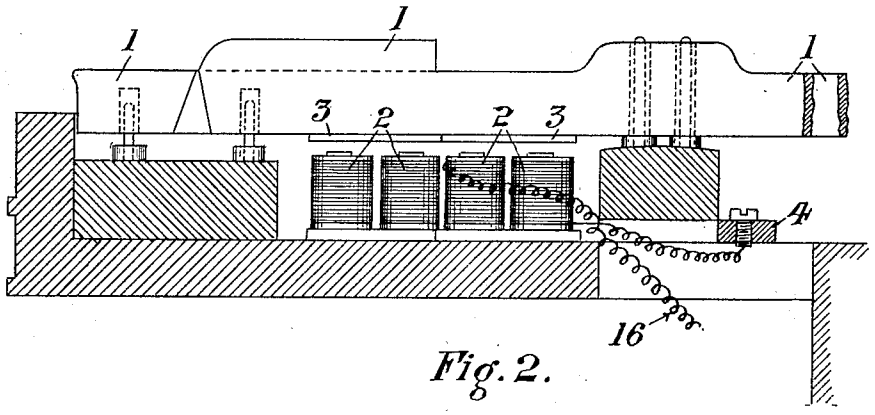
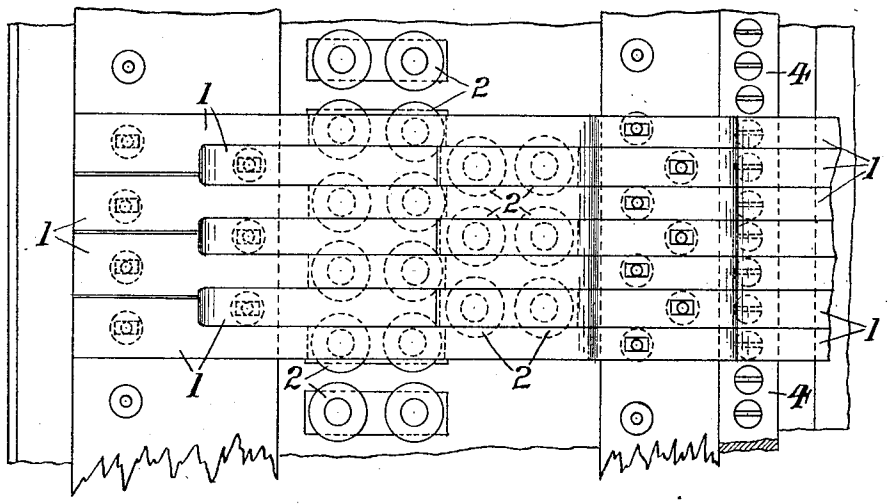


Fig. 2.



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3 SHEETS—SHEET 2.

Fig. 4.

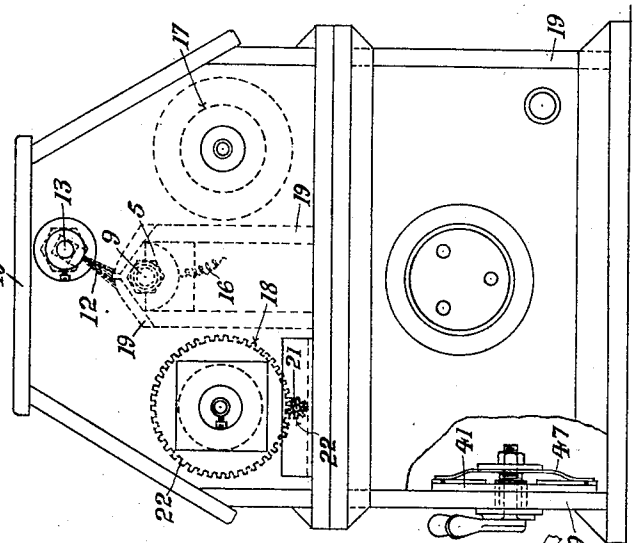


Fig. 3.

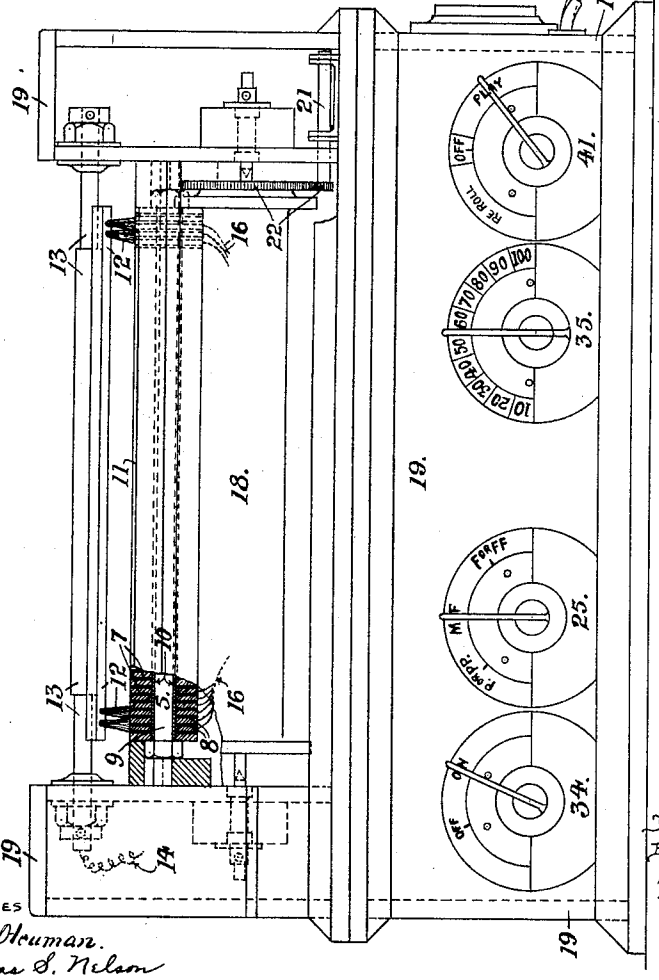


Fig. 7.

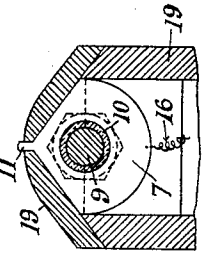
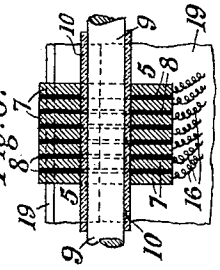


Fig. 6.



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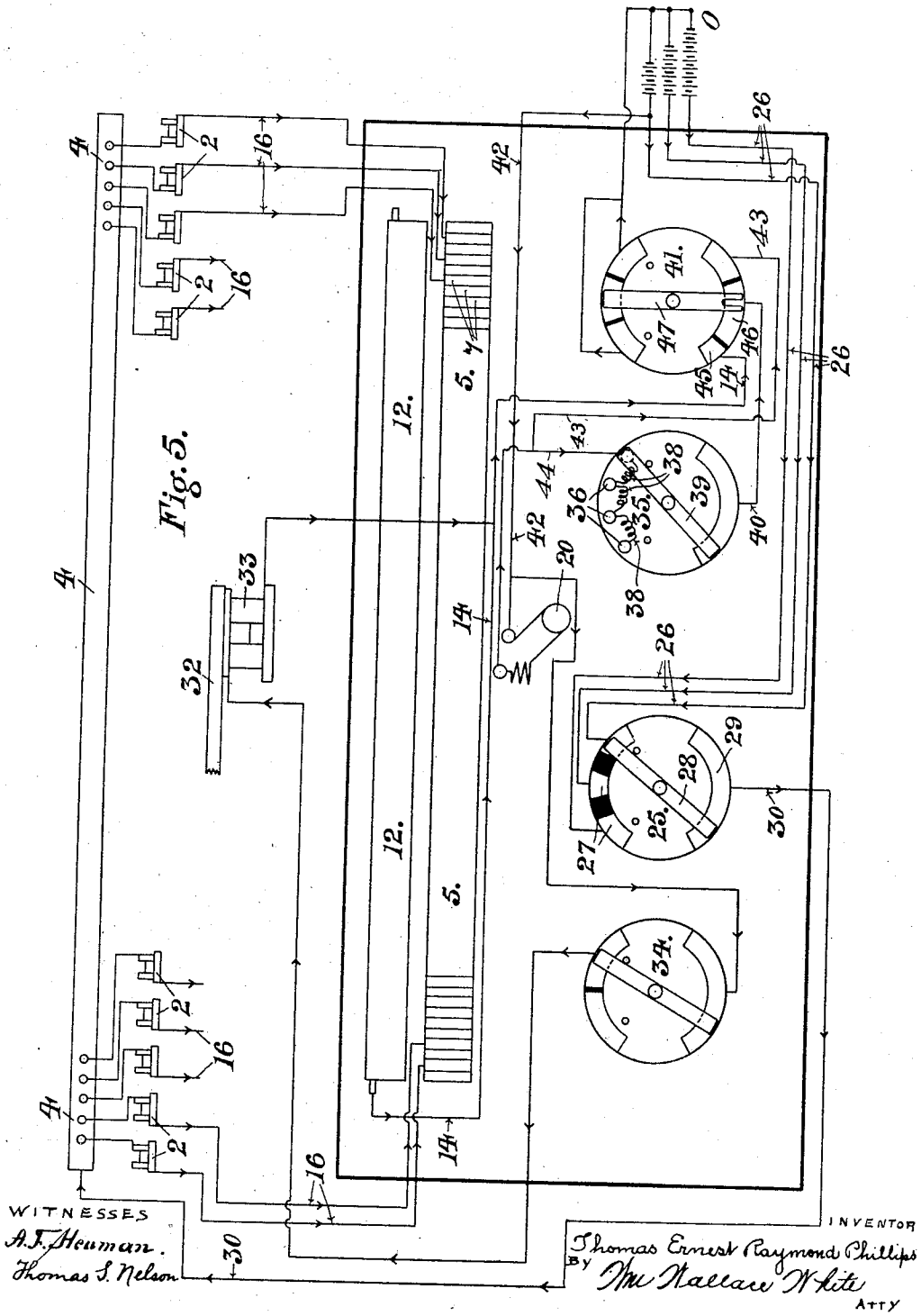
3 SHEETS—SHEET 3.



UNITED STATES PATENT OFFICE.

THOMAS ERNEST RAYMOND PHILLIPS, OF LIVERPOOL, ENGLAND.

ELECTRIC AUTOMUSICAL INSTRUMENT.

1,003,201. Specification of Letters Patent. Patented Sept. 12, 1911.

Application filed August 8, 1908. Serial No. 447,597.

To all whom it may concern:

Be it known that I, THOMAS ERNEST RAYMOND PHILLIPS, a subject of the King of England, residing at Liverpool, in the county of Lancaster, England, have invented new and useful Improvements in or Connected with Electric Automusical Instruments, of which the following is a specification.

This invention has reference to electrically-operated auto-musical instruments, such as pianos, organs, and other similar instruments, or instruments which are equivalent to them for the purposes of this invention; but for convenience, the invention will be described in connection with auto-pianos or like instruments in which the notes are caused to be struck or operated through the agency of a roll or sheet of paper or equivalent material, which is perforated, and passed or moved in connection with an electric contact mechanism or means, which causes the notes to be actuated by electro-magnets, whose action is controlled by such perforated sheet or strip.

One of the chief objects of the present invention has been to simplify, and render more practical and cheaper, auto-musical instruments of the kind referred to, in which the existing type or kind of paper rolls of music can be used.

In the drawings, Figure 1 is a cross section through the keyboard of a piano provided with improvements hereunder; and Fig. 2 is a plan of same. Fig. 3 is a front elevation partly in section; and Fig. 4 is a side elevation showing the controlling and actuating apparatus. Fig. 5 is a view showing diagrammatically all the various controlling and actuating parts, and the various electric connections and appliances. Figs. 6 and 7 are front elevation and cross section showing a part of the circuit opening and closing device, in detail.

Referring now to the drawings, 1 represents the keys of a piano, which may be assumed to be of the existing type, or those of an existing piano; and in connection with each of these keys, there is a horse shoe electro-magnet 2 which acts in connection with an armature 3 on the underside of each of the keys; and these various magnets are separately connected up electrically by suitable connections with a bus-bar 4, and also with the separate metallic sections of the tracker bar—that is, the contact or circuit closing and opening devices 5, as hereinafter described. This contact device is comprised of metal disks or plates 7, with washers or rings of fiber, paper, or like insulating material 8 between them, all mounted upon a suitable spindle 9, with an insulating sleeve or tube 10 between it and the disks 7 and washers 8. The upper part of this contact or circuit opening and closing device projects up at 11 with a comparatively narrow upper contact surface, over which the perforated music paper band passes; and above this upper contact part 11, are the contact "fingers" 12, which are in the form of a plurality of wires bunched together in the form somewhat of a brush, and which are normally pressed toward the contact portion 11 of the contact device 5, the music paper, band or strip passing between the tips of these wire "fingers" and the portion 11. By passing the music band or tune sheet over the comparatively narrow contact surface 11, a quick acting make and break is effected between the brush and the contact surface, and this prevents the notes slurring as occurs when the tune sheet passes over a comparatively wide surface.

The "fingers" 12 are carried in a common metallic bar 13, which is supported from the frame 19 of the machine, at each end, and insulated and it is connected electrically by a return wire 14 with the source of current. The bar 13 can be turned upon its axis; its end supports in the frame 19 being in the form of trunnions or pivots, so the fingers can be raised off the contact device 5, or turned down onto it, as and when required.

Each of the metallic disks or plates 7 is connected with a particular magnet 2 of the keyboard of the piano by a separate wire, 16, all of which will be preferably made up into a cable.

17 is the "music" roller, and 18 is the winding roller, onto which the paper music band is wound when playing, and the roller 18 will be operated by a suitable motor 20, (see Fig. 5) through the shaft 21 and toothed gearing 22.

To give expression and various degrees of sound volume, there is employed a switch 25, connected up by wire 26 with the batteries or other source of supply 0, such switch being arranged and adapted to vary the power supplied to the electro-magnets 2, by varying the number of cells in circuit.

The switch 25 has a number of contacts 27 (see Fig. 5), and each contact 27 is connected up with the different parts of the battery 0, by the connecting wires 26. And a contact bar 28 works over said contacts, and the common contact 29, which is connected by a wire 30 with the bus-bar 4 connected with the piano magnets 2.

One or both of the pedals—marked 32 in Fig. 5—of a piano can be operated electrically by electro-magnets 33; the current to which is controlled by a switch 34 connected up by suitable wires with the electric supply and the magnets 33; and by moving this switch, the current can be supplied to, or cut off from, the pedal operating magnets 32.

To vary the speed of the winding of the roller 18, and therefore the rate at which the music is performed, a rheostat 35 is employed, having a plurality of contacts 36, which are connected up by a plurality of wires 37 with a number of resistances 38, these wires, connections, and resistances being so arranged that more or less resistances are in, according to the position of the arm 39.

40 designates a return lead connecting the rheostat 35 with the general regulating switch 41.

The motor 20 receives current from the source of supply through the supply conductor 42 and its return takes place through the conductor 43 and controlling switch 41 or through the conductor 44, resistance switch 35 and controlling switch 41.

When the instrument is in play, the current from the circuit closing and opening device 5 passes by way of the finger brush device 12, wire 14, and contact strip 45, to the controller 41; the wire 40 from the rheostat 35 being connected to the contact 46, with which one of the fingers of the bifurcated end of the bar 47 of the controller 41 will be in contact, the other finger being on the contact 45. When the upper end of the bar 47 is on this center piece, and its lower end on the contact 46, no current can pass through any of the apparatus, and the mechanism will be stopped. The re-roll of the tune sheet is accomplished by moving the contact arm 47 of the switch 41 into the position, whereby the current is caused to flow through the lead 43 to the motor.

In Fig. 3, the fronts of the various controlling devices 41, 35, 25, and 34 are shown, they being mounted on the front of the case or cabinet 19; and their operation is effected by suitable handles disposed outside, and working over dials containing the necessary indicia.

What is claimed is:

1. In an electric piano or keyed instrument, the combination of keys having armatures on their under surfaces, electro-magnets disposed beneath the armatures, a plurality of alternate metal disks and insulating washers all provided with projecting portions, and constituting an electrical contact device provided with a projecting rib; a contact brush arranged in front of the projecting portions, a perforated tune sheet, means for passing the tune sheet between the rib and the brush, an electric motor for operating the said means, an electrical source of energy, a switch for controlling the electrical energy supplied to the circuits, and a rheostat for regulating the speed of the motor.

2. In an electric piano or keyed instrument, the combination of keys having armatures on their under surfaces, electro-magnets disposed beneath the armatures, a plurality of alternate metal disks and insulating washers provided with projections, a brush device common to all the metal disks and composed of bunched wires, a perforated tune sheet, an electric motor for operating the tune sheet, means for passing the tune sheet between the rib and the brush, a source of electrical energy, a switch for controlling the electrical energy supplied to the contact device, and a rheostat for regulating the speed of the motor.

3. In an electric piano or keyed instrument, the combination of keys having armatures on their under surfaces, electro-magnets disposed beneath the armatures, a plurality of insulated metal disks having projecting portions, the whole of which constitute a projecting rib, a brush device composed of bunched wires disposed to engage the said rib, a perforated tune sheet, an electrical source of energy, a switch for varying the power supplied to the contact device and electro-magnets, an electric-motor for operating the tune sheet, means for passing the tune sheet between the rib and the brush and a rheostat for regulating the speed of the motor.

4. In an electric piano or keyed instrument, the combination of a plurality of keys having armatures on their under surfaces, electro-magnets disposed beneath the armatures, a plurality of insulated metal disks provided with projecting portions, a bunched wire brush device, a casing inclosing the electrical contact device with the exception of the projecting portions, a perforated tune sheet, means for passing the tune sheet between the projecting portions and the brush, an electrical source of energy, an electric motor, a switch for varying the power supplied to the contact device and the magnets, and a rheostat for regulating the speed of the motor.

5. An electric piano or keyed instrument, comprising a plurality of keys having armatures on their under surfaces, electro-magnets disposed beneath the armatures, a plu-

rality of insulated metal disks having projecting portions and constituting an electrical contact device with a projecting rib, a bunched wire brush device, a casing inclosing the contact device having an opening through which the rib thereof projects, a perforated tune sheet, tune sheet rollers arranged on each side of the casing inclosing the contact device, an electrical source of energy, an electric motor, gearing for engaging the electric motor with the tune sheet rollers, a switch for varying the electrical power supplied to the contact device and magnets, a rheostat for regulating the speed of the tune sheet motor, and a cabinet for inclosing the contact device, brush, and tune sheet rollers.

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

THOMAS ERNEST RAYMOND PHILLIPS.

Witnesses:

SOMERVILLE GOODALL,

RICHARD JENKINS.