J. O. FUNKHOUSER.

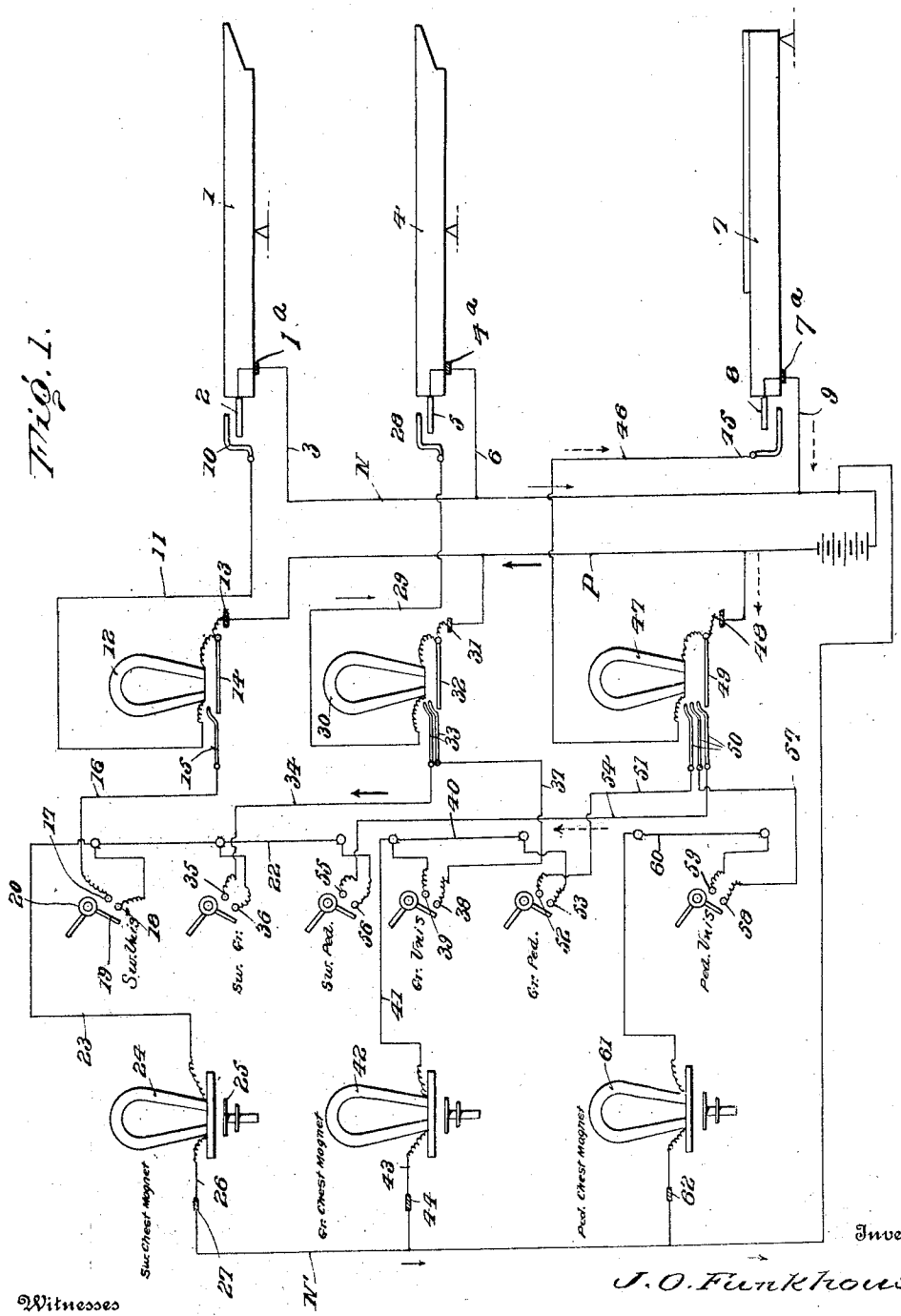
ELECTRIC COUPLER ACTION FOR ORGANS.

APPLICATION FILED FEB. 6, 1908.

948,010. Patented Feb. 1, 1910.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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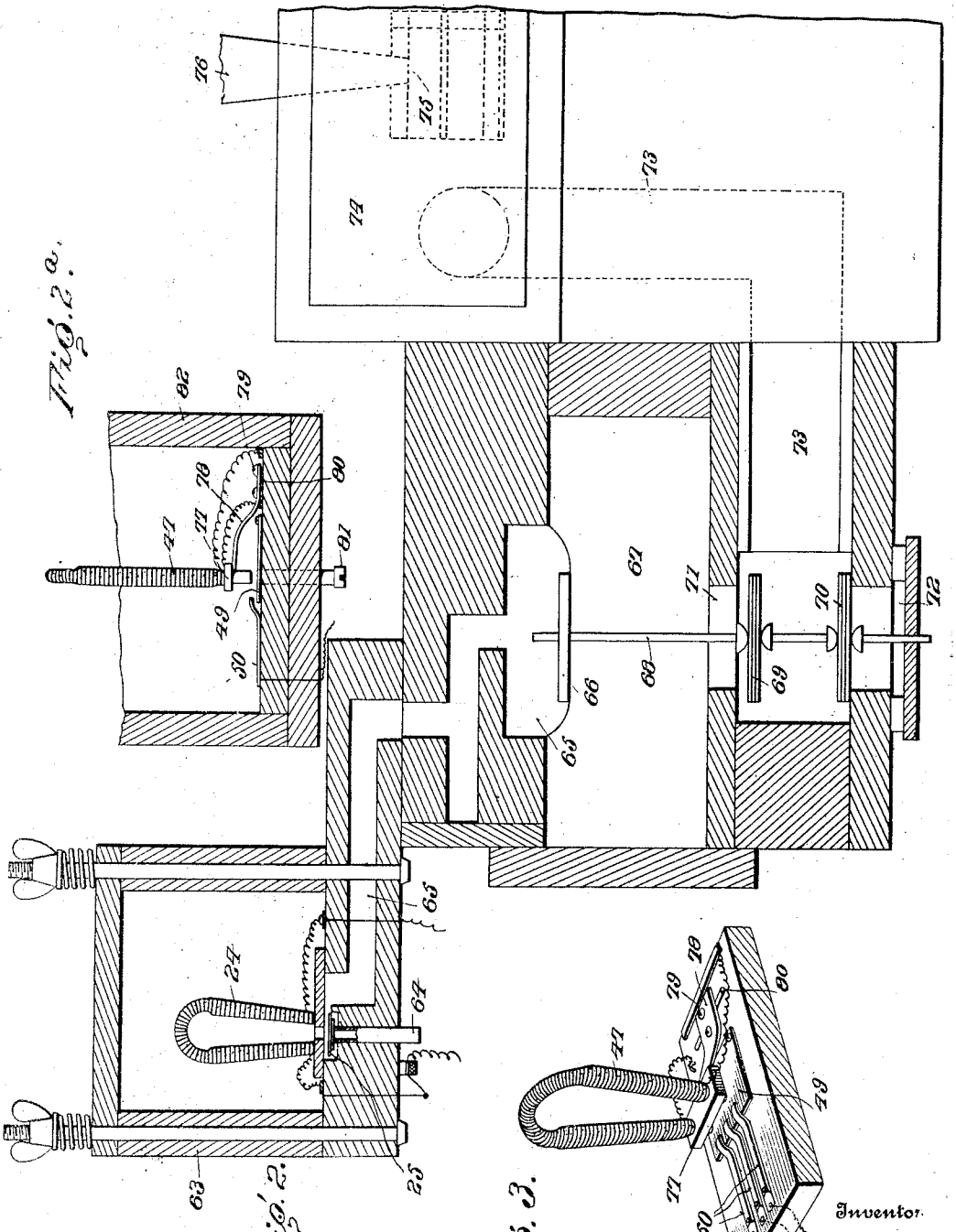

Fig. 2.

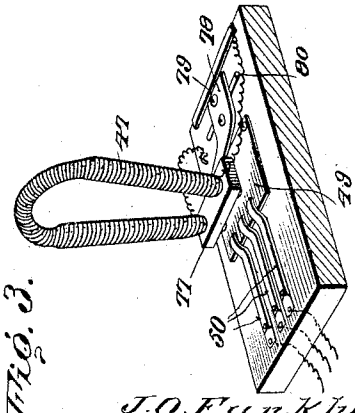

Fig. 3.

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ELECTRIC COUPLER-ACTION FOR ORGANS.

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Application filed February 6, 1908. Serial No. 414,547.

To all whom it may concern:

Be it known that I, JACOB O. FUNKHOUSER, citizen of the United States, residing at Hagerstown, in the county of Washington and State of Maryland, have invented certain new and useful Improvements in Electric Coupler-Actions for Organs, of which the following is a specification.

This invention comprehends certain new and useful improvements in pipe organ actions, and relates particularly to an electrically coupled pipe organ in which the coupler action is designed to be manipulated by the organist at the console to couple together the different banks or registers of pipes, by electrically actuated means.

The invention has for its primary object, a simple and efficient coupler action which will be wholly electric, and in which the multiple point switches may be entirely separate from the console whereby the cables leading to the keys may be of relatively small diameter, which is a desideratum where a movable console is necessary, only one contact being required for each key with my invention. And the invention also has for its object a coupler action of the character above mentioned which will possess the characteristics of reliability and simplicity, and which will effect, a saving in installation and maintenance.

With these and other objects in view as will more fully appear as the description proceeds, the invention consists in certain constructions, arrangements and combinations of the parts that I shall hereinafter fully describe and claim.

For a full understanding of the invention, reference is to be had to the following description and accompanying drawings in which:—

Figure 1 is a diagrammatic view illustrating the application of my invention; Fig. 2 is a transverse sectional view through one of the wind chests of a pipe organ, the view being also in the nature of a diagram; Fig. 2ª is a cross sectional view through the box containing a set of switch magnets; and, Fig. 3 is a detail perspective view of one of the switch magnets employed, and hereinafter specifically described.

Corresponding and like parts are referred to in the following description and indicated in all the views of the accompanying drawings by the same reference characters.

For the purpose of illustration only, I shall show in Fig. 1 of the drawings, my invention as it would appear diagrammatically applied to a pipe organ of the two manual type, having a bank of say sixty-one Swell keys, a lower bank comprising the same number of Great keys, and the ordinary bank of Pedal keys, the same being designated 1, 4 and 7.

In carrying out the invention, each of the Swell keys is provided with a single contact member 2, connected electrically at all times by a lead 3 with the main N leading to the battery or other source of electric supply. Similarly, each pipe of the Great keys 4 is provided with a single contact finger 5 connected by a lead 6 to the main N, and each one of the Pedal keys 7 is provided with a single contact finger 8 electrically connected by a corresponding lead 9 to said main.

The switch of which the finger 2 is one element has its corresponding element in the contact member 10, it being understood that there are a plurality of contact members 10 one for each of the keys of the Swell organ. Each one of these contact members 10 is connected by a lead 11 to one of the poles of a switch magnet 12 of the ordinary horse-shoe type, there being a plurality of these magnets provided, one for each key in the Swell register. The opposite pole of each switch magnet 12 is electrically connected to a common conductor 13 for the entire series of switch magnets 12, and to this end the conductor 13 is electrically connected to the other main P leading from the battery.

From the description up to this point, it will be understood that whenever one of the Swell keys is depressed by the player the circuit through the battery or other source of supply is closed at the point 2—10, whereupon the current flowing through the main P will energize the switch magnet 12 which is included in the circuits controlled by the particular key and attract its armature 14 so as to cause said armature to contact with a switch point 15. This switch point is connected by a lead 16 to one of the pins 17 of the stop switch, the circuit being bridged from the pin 17 to its complementary pin 18 by means of a blade 19. The blades 19 are duplicated for as many keys as there are in the Swell organ, and all of said blades 19 project from a shaft 20 journaled in the framework (not shown) of the switch board, the shaft being turned to effect the simultaneous engagement of its blades 19 with the

entire series of complemental switch pins 17 and 18 entirely across the switch board by any desired means well known to those versed in the art to which this invention appertains.

The pin 18 is connected by a lead to a coupler conductor 22 for the Swell couplers, and this conductor in turn is connected by a lead 23 to a pipe controlling magnet 24. It is to be understood that there are a plurality of pipe controlling magnets 24, sixty-one, for instance; one for each of the Swell keys 1, and it is the function of these magnets to sound the pipes when the magnets are energized. It is also to be understood that there are, say, sixty-one of the coupler conductors 22 in the switch board, one for each of the Swell organ keys and circuits controlled by said keys.

25 designates a pallet armature for the magnet 24, the same controlling the air passages of the wind chest, as will be presently described in Fig. 2 of the drawings. A lead 26 connects the other pole of the magnet 24 with a conductor 27 in the form of a plate common to all the magnets of the Swell chest, and said plate 27 is connected by the main N′ to the main N, as clearly illustrated in the drawings in Fig. 1.

Referring further to Fig. 1, it will be seen that the finger 5 of the Great key 4 is adapted to contact with the contact member 28. This contact member 28 is connected by means of a lead 29 to a switch magnet 30, the latter in turn being connected to a conductor 31, common to the entire set of magnets 30, the conductor 31 being connected as shown to the positive main P. The armature 32 of each magnet 30 is adapted to form simultaneous contact with a plurality of switch points 33 which are two in number in the present instance. One of these switch points is connected by a lead 34 to a switch pin 35 similar to the pin 17 and adapted to coact with a complemental pin 36, the latter being electrically connected to the conductor 22 as shown and thereby also connected to the pipe-controlling magnet 24 of the wind chest. The other of these switch points 33 is connected by a lead 37 to a switch pin 38 adapted to be electrically connected or bridged to a switch pin 39 electrically connected to a coupler conductor 40. The coupler conductor 40 is connected by a lead 41 to a pipe controlling magnet 42, there being a plurality of these magnets 42 which govern the pipes of the wind chest of the Great organ, as the magnets 24 govern the wind chest of the Swell organ. Each of the magnets 42 is connected by a lead 43 to a conductor 44, and the latter is connected as shown to the main N′.

Each Pedal key is adapted to have its single contact finger 8 engage the contact member 45, and a lead 46 connects the contact member 45 with the switch magnet 47. The switch magnet 47 is connected to a common conductor 48, and said conductor is in turn connected to the positive main P as shown in Fig. 1. The armature 49 of the switch magnet 47 is adapted to make simultaneous contact with a plurality of switch points 50 of which there are three in the present instance. One of these switch points is connected by a lead 51 to a switch point 52 adapted to be bridged to a switch pin 53 that is electrically connected to the coupler conductor 40 above mentioned. The second of these switch points 50 is connected by a lead 54 to a switch pin 55 coacting with a similar pin 56 leading to the coupler conductor 22 before mentioned. And the third of these switch points 50 is connected by a lead 57 to a switch pin 58 adapted to be bridged to the corresponding pin 59, and this last named pin is connected to a conductor 60 leading to the pipe controlling magnet 61 of the Pedal wind chest. There are a plurality of magnets 61, for instance either seventeen or thirty as the case may be, one for each of the Pedal keys 7 and they are adapted to control the Pedal chest just as the magnets 42 control the Great chest and the magnets 24 the Swell chest. All of the magnets 61 are connected to a common conductor 62. The latter in turn is electrically connected to the main N′, before mentioned.

As has been before stated, I have selected for the purpose of illustration only, a two manual organ capable of coupling the Great to the Pedal, the Swell to the Great and the Swell to the Pedal. For the purpose of making the detail operation of the operation perfectly clear, I have marked the several contact points governed by the switch board as follows: "Sw Unis, Sw to Gr: Sw to Ped: Gr Unis; Gr to Ped; and Ped Unis" indicating the following couplers, to wit, Swell Unison, Swell to Great, Swell to Pedal, Great Unison, Great to Pedal, and Pedal Unison. In describing the different circuits, I deem it necessary to only refer to, say two instances or examples. I shall first describe the circuits and the electrical actuation of the parts when the Swell is coupled to the Great organ and then describe the coupling of the Swell to the Pedal. When it is desired to couple the Swell organ to the Great, so that the actuation of each key of the Great organ will effect the sounding of a corresponding pipe in the Swell, the organist at the console will draw the properly designated coupler stop or push the proper button, or depress a foot pedal or other mechanical means, as the case may be, so as to turn the shaft of the switch board in a direction to bridge all of the sixty-one contacts designated 36 and 35. Consequently, upon the depression of the key 4, that is,

anyone of the keys of the Great organ, the circuits at the points 5 and 28 will be closed and the current from the battery will flow along the main P in the direction of the heavy darts, through the corresponding switch magnet 30 and back through the lead 29, contact members 28 and 5, and lead 6 and main N to the battery or source of supply as indicated by the relatively light darts. At the same time, the current flowing from the battery through the armature 32 that has been moved by the energization of the switch magnet 30 against the two switch points 33, will continue through the lead 34 and switch points 35 and 36 that have been bridged, as before described, to the couple conductor 22, and thence through the magnet 24 of the Swell chest and back to the battery through the lead N', the direction of the current from the switch magnet 30 to the magnet 24 being designated by heavy darts and the return from said magnet to the source of supply by relatively light darts.

In the second of the examples, that is, in coupling the Swell organ to the Pedal, the contact points 55 and 56 will be bridged, and thereupon as soon as any of the keys 7 of the Pedal key board are depressed, a circuit will be closed by the contact of the members 8 and 45. The circuit will be set up from the battery through the main lead P and magnet 47, as indicated by the heavy darts in dotted lines, and back through the lead 46 and points 45 and 8 and lead 9 to the battery by the relatively light darts in dotted lines. And another circuit will be established through the armature 49 and one of the contact members 50 and through the lead 54, as indicated by the darts in heavy lines, to the points 55 and 56 and thence by means of the coupler conductor 22 to the magnet 24 and back through the common return lead N'.

From these two instances, it is believed that all of the circuits necessary for any amplification of the arrangement shown will be thoroughly understood. For instance, although I have not carried out the arrangement to such an extent, it is manifest that in a three manual organ, the switch magnets and other parts may be so arranged as to effect, say, nine different coupling combinations, for instance, Swell Unison, Swell to Great, Swell to Great Super, Swell to Great Sub, Choir to Great, Choir to Great Super, Swell to Great Sub, Great to Great Super, and Great to Great Sub, in addition to the ordinary Pedal couplers.

I have hereinbefore stated that there are as many of the switch magnets for each wind chest and as many pipe controlling magnets such as those designated 24, 42 and 61, for the respective wind chests, as there are keys in the different key boards controlled thereby. For the purpose of illustrating conventionally just how each one of the magnets 24, 42 and 61 operates, reference is to be had to Fig. 2, wherein I have illustrated a portion of a conventional wind chest, although it is to be understood that my invention is not limited to any particular construction thereof. Each set of magnets, say the magnets 24, is contained in an air tight box 63 containing air under pressure, and extending the full length of the key board, the armatures 25 of the respective magnets being adapted to seat upon vent pipes 64 extending down through the bottom of the case or box 63. Air passages 65 are adapted to communicate at one end with the respective vent tubes 65 and at their other ends said passages 65 are in communication with the upper side of diaphragms 66, and the lower sides of said diaphragms are in communication with the chest or trunk 67 containing air under pressure. Each diaphragm 66 has a rod 68 connected thereto with valves 69 and 70 attached to said rod, the said valves being arranged to alternately close ports 71 and 72, the ports 72 being in communication with the atmosphere. The passage 73 between the two ports 71 and 72 leads to the usual channeled cap plate 74 so as to supply air to the rear face of the ordinary membrane controlling the passage of air past the partition 75, so that the air from the space in the wind chest boxes may pass around said partition and escape through the pipe 76 to sound the same. It will thus be seen that as soon as any one of the magnets 24 is energized, its pallet will be attracted to it so as to permit the air from the passages 65 to vent through the tube 64. This will result in causing the diaphragm 66 to rise so as to permit the passage 73 to be vented to the atmosphere and consequently the membrane, which otherwise closes across the partition 75, will be drawn backwardly from the partition so as to permit the air from the wind chest box to escape around the partition and through the pipe to sound the same. This action takes place whenever any of the keys of the organ are depressed so as to close the circuit for the energization of the wind chest magnets. In the coupling action before described, it is obvious that by a very simple arrangement of the parts, without any compounding of the windings of the several magnets, and without causing the several magnets to act through intermediate wind chests, any of the keys of one portion of the organ may be caused to sound not only corresponding pipes of the chest to which they belong, but any corresponding pipes of one or more of the other chests, so far as the wiring permits this coupling action to take place, this being, of course, governed according as judgment may dictate.

Mechanically, each of the switch magnets 12, 30 or 47, the magnet 47 being selected in the present instance for the purpose of description, may be of the ordinary horseshoe type with simple winding, and it is supported by a yoke piece 77 on the outer end of a rocker 78, the rocker being slightly arched, as best illustrated in Figs. 2 and 3. Each of the rockers 78 is preferably secured to its foundation board by means of a pair of screws 79, between which a fulcrum rod 80 is mounted, the said rod being interposed between the rocker and the foundation board, so that by loosening up on one screw and screwing down on the other, the magnet may be raised or lowered, or adjusted vertically in proper juxtaposition to its armature 49. The latter may be adjusted as desired by means of a screw 81 passed up through the foundation board of the switch box 82, as best seen in Fig. 2ª.

It is of course to be understood that each of the conductors 13, 31 and 48; 27, 44 and 62; and the common conductors 1ª, 4ª and 7ª under the keys all extend the full width of the organ. It is also to be understood that the switch magnets of each set are inclosed in a dust proof box, such as that designated 82 in Fig. 2ª, so as to insure against dust collecting on the contacts which would obviously affect the proper working of the system.

Having thus described the invention, what is claimed as new is:

1. An electrically coupled pipe organ, embodying a plurality of wind chests, a pipe connecting magnet in each wind chest, a plurality of switch magnets one for each pipe controlling magnet, a plurality of keys, one for each switch magnet, electric circuits in each of which one of the switch magnets is included, each key being provided with a single member to open and close the circuit of its corresponding switch magnet, means for energizing each of said pipe controlling magnets upon the energization of its switch magnet, means for energizing one of said pipe controlling magnets upon the energization of the switch magnet of another pipe controlling magnet, and stop switches controlling said energizing means.

2. An electrically coupled pipe organ, embodying a plurality of wind chests, a pipe controlling magnet in each wind chest, a plurality of switch magnets one for each pipe controlling magnet, a plurality of keys one for each switch magnet, electric circuits in each of which one of the switch magnets is included, each key being provided with a single contact member arranged to open and close the circuit of its corresponding switch magnet, a direct electrical connection between each of the pipe controlling magnets and its corresponding switch magnet, a connection between one of said pipe controlling magnets and the switch magnet of another pipe controlling magnet, all of said connections being normally open, the last named connection and one of the first named connections being arranged to be simultaneously closed by the energization of one of the switch magnets, and stop switches arranged to open and close all of such connections independently of the switch magnets.

3. An electrically coupled pipe organ embodying a plurality of wind chests, a pipe-controlling magnet in each wind chest, a switch magnet, a key, an electric circuit in which the switch magnet is included, the key having a single contact member arranged to open and close said circuit, electric circuits one for each of the pipe controlling magnets, each of said circuits including a switch point, an armature arranged to contact with said switch points simultaneously upon the energization of the switch magnet, said armature being included in both of the circuits in which the pipe controlling magnets are included, and stop switches arranged to open and close said last named circuits.

4. An electrically coupled pipe organ embodying a plurality of wind chests, a pipe controlling magnet in each wind chest, a switch magnet, an electric circuit in which said switch magnet is included, a key having a single contact member arranged to open and close said circuit, other electric circuits, in each of which one of the pipe controlling magnets is included, said circuits each including also a switch point, an armature in all of said last named circuits arranged to engage all of said switch points upon the energization of the magnet for the purpose specified, and stop switches in said last named circuits.

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

JACOB O. FUNKHOUSER. [L. S.]

Witnesses:
E. O. SHULENBERGER,
G. S. FUNKHOUSER.