A. R. TRIST.

ELECTROPNEUMATIC PIANO PLAYER.

APPLICATION FILED NOV. 10, 1906.

941,432.

Patented Nov. 30, 1909.

2 SHEETS—SHEET 1.

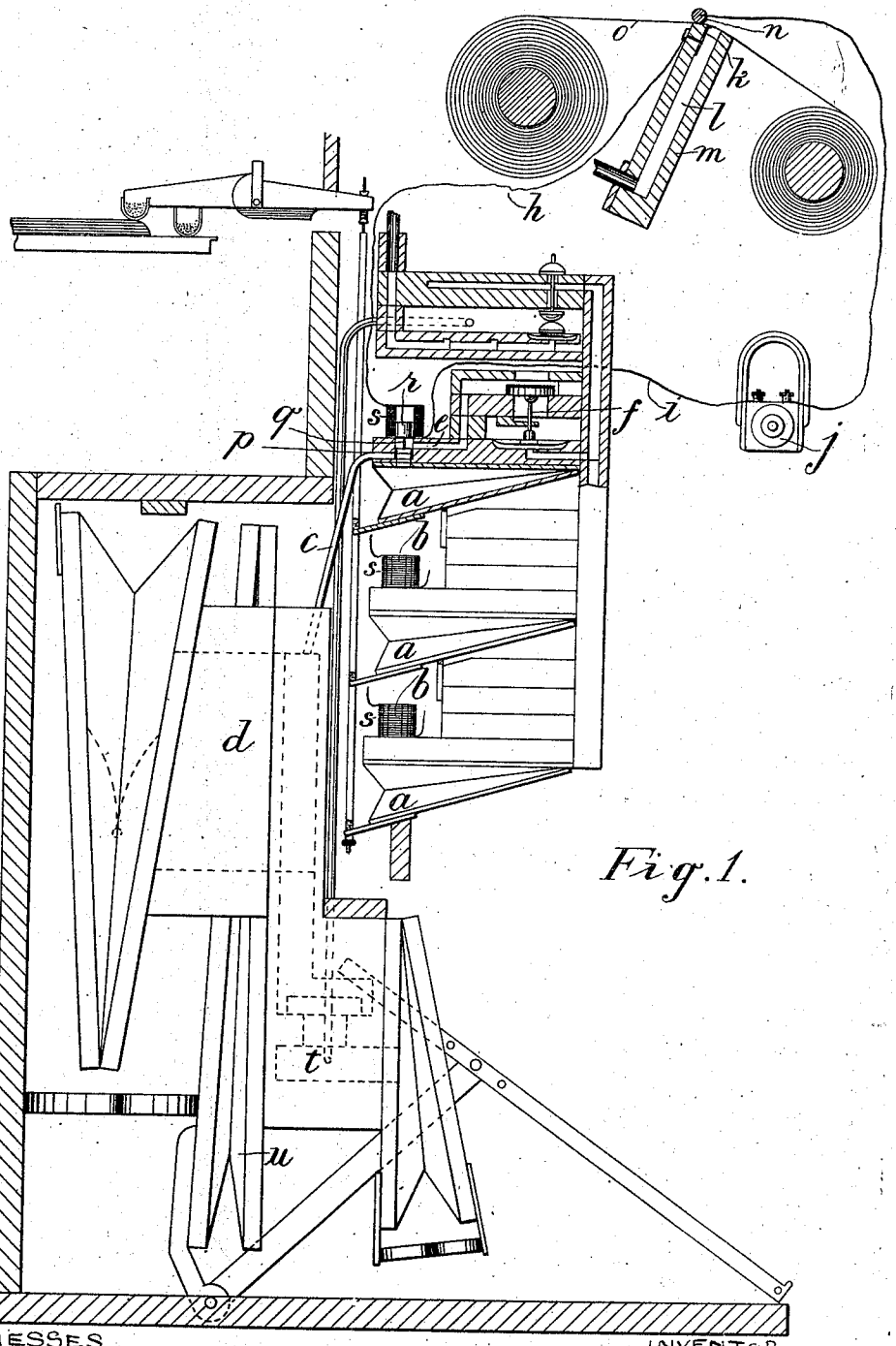

Fig. 1.

WITNESSES

Alvin S. White

W. P. Burke

INVENTOR

Arthur Ronald Trist

BY Richardson & Co.

ATTYS

A. R. TRIST.

ELECTROPNEUMATIC PIANO PLAYER.

APPLICATION FILED NOV. 10, 1906.

941,432. Patented Nov. 30, 1909.

2 SHEETS—SHEET 2.

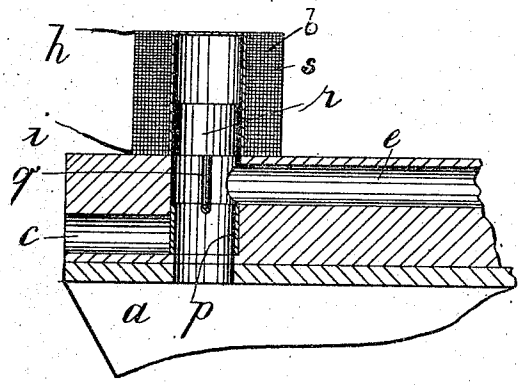

Fig. 2

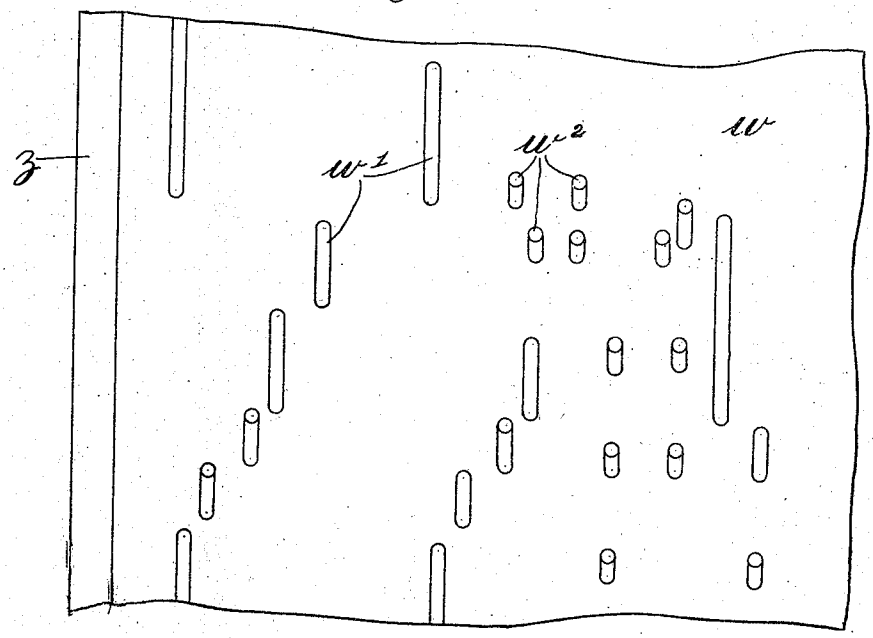

Fig. 3.

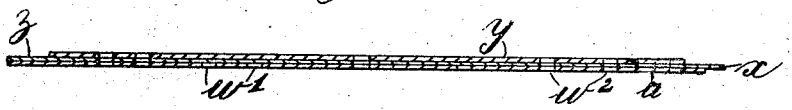

Fig. 4.

WITNESSES

Alvin G. White

W. P. Burke

INVENTOR

Arthur Ronald Trist

BY Richards & Co

ATTYS

UNITED STATES PATENT OFFICE.

ARTHUR RONALD TRIST, OF ST. ALBANS, ENGLAND, ASSIGNOR TO TRIST PIANO PLAYER LIMITED, OF LONDON, ENGLAND.

ELECTROPNEUMATIC PIANO-PLAYER.

941,432. Specification of Letters Patent. Patented Nov. 30, 1909.

Application filed November 10, 1906. Serial No. 342,891.

To all whom it may concern:

Be it known that I, ARTHUR RONALD TRIST, a subject of the King of Great Britain and Ireland, residing at St. Albans, in the county of Hertford, England, have invented new and useful Improvements in Electropneumatic Piano-Players, of which the following is a specification.

This invention relates to automatic piano playing mechanism and the like, and has for its object the provision of means whereby the accentuation of specific notes in any composition is effected in a simple and easily controlled manner. Much of the charm of rendering of music when performed by mechanical apparatus is lost owing to the inability of effecting the accentuation of individual notes. Considerable effort has been directed in the past to effect this object, however without success.

My invention consists in the arrangement of electric mechanism by which the strength with which each note is struck can be modified. The remainder of the mechanism may be of any well known character.

In connection with each note I provide an electromagnet or solenoid or other equivalent device which is energized by an electric current and is controlled in its action by the music sheet itself.

In order that my invention may be the better understood I will now proceed to describe the same in relation to the accompanying drawings reference being had to the letters marked thereon.

Like letters refer to like parts in the various figures.

Figure 1 is a sectional view of a known pneumatic piano playing device adapted according to my invention with electric means for controlling the strength of blow with which a given note is struck. Fig. 2 is a detail sectional view of the electrically-operated control valve to an enlarged scale. Fig. 3 is an underside plan of the form of music record sheet I use with my invention. Fig. 4 is an exaggerated sectional view of the same.

To carry my invention into effect with a pneumatically operated piano player as shown in Figs. 1 and 2, I arrange upon each power pneumatic *a* an electrically operated valve *b* controlling the passage of air through the duct *c* from an orifice in the power pneumatic to the high vacuum reservoir *d*, and also controlling the duct *e* leading from the upper side of the ordinary pneumatic valve *f*. The valve *b* is actuated by a coil *s* connected by conductors *h* and *i* with a source of electric current, for example a magneto generator *j*. The conductor *h* is connected with a metal brush *k* arranged in the air duct *l* of the ordinary tracker *m*; on the upper side of the tracker a metal roller *n* is arranged so as to press upon and make a moving contact with the record sheet *o* and the conductor *i*.

By reference to Fig. 2, it will be seen that the valve consists of a tubular body *p* adapted to slide within a cylindrical chamber and is connected by a stem *q* to a magnetic core *r* disposed so as to slide in the center of the coil *s*. When the valve *p* is drawn suddenly by the magnetic core *r* into the upper position, the communication by the duct *e* with the ordinary governing chamber *t* (where the partial vacuum created by the pumping bellows *u* is maintained at a fairly constant pressure by a known governing device), is closed and the duct *c* is opened to the power pneumatic *a* so that the high vacuum reservoir is in direct communication with the power pneumatic *a* so that a harder blow and louder note is struck thereby.

Referring to Figs. 3 and 4 it will be noticed that the music record sheet I use with the device consists of the ordinary perforated tune sheet *w* having a layer *x* of tin foil or other electrical conductor attached thereto. A backing of paper *y* is applied to the tin foil in order to protect the same, an exposed strip *z* of tin foil being arranged at the edge of the music-record sheet on which the roller *n* bears so as to complete the electric circuit through the record sheet. It is obvious that the backing layer *y* may be omitted without interfering with the function of the sheet, it being only necessary for protective purposes from mechanical injury of the tin foil or other metallic layer.

The paper layer *w* of the record sheet is perforated in the ordinary way with the usual perforations *w'* through which the tin foil layer is exposed. The perforations w^2 are subsequently cut right through the record sheet at the beginning of the note to permit the air to enter the particular orifice in the tracker so that the said notes (say forming the accompaniment) are struck softly and the notes are held on by the elec-

tric circuit being completed by the tin foil which is exposed through the remainder of the perforation of the music sheet. It will be thus seen that when a perforation w^2 at the beginning of a note comes over the tracker the ordinary valves of the pneumatic action are operated in the usual manner and the particular note is struck by means of the governed vacuum, the duration of such note can be controlled either by the length of complete perforation or by the exposed foil in the perforation. Any note unperforated can be perforated at will by a person desiring such note to be softened in addition to the original perforations provided on the sheet. When an unperforated note viz: one where the tin foil only is exposed, comes into operative position the electrical circuit is completed, the valve p lifted, the orifice in the power pneumatic is put into direct communication with the high vacuum of the reservoir d_7 and the duct c is closed, thus causing the power pneumatic to strike a hard blow and loud note. It will be readily understood that the function of the perforated and non-perforated parts of the record sheet together with the corresponding mechanism controlled by same can be reversed viz: the loud notes can be produced by the perforated notes and the soft notes by the tin foil or non-perforated notes. It is obvious that the high vacuum can be regulated or controlled by the usual mechanism if thought desirable.

Having now described my invention, what I claim and desire to secure by Letters Patent is:—

In an automatic piano player, a tracker, sources of air supply at different pressures, a pneumatic note actuating mechanism adapted to be actuated normally at one pressure of air, in combination with a perforated music record sheet having circuit-closing arrangements carried thereby, and an electric control device fitted to each orifice on the tracker, and to each note actuating mechanism and adapted to give a supply of air at another pressure to the pneumatic note-actuating mechanism when the electric circuit of the electric control device is completed by the music sheet, substantially as described.

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

ARTHUR RONALD TRIST.

Witnesses:
CHARLES CARTER,
H. D. JAMESON.