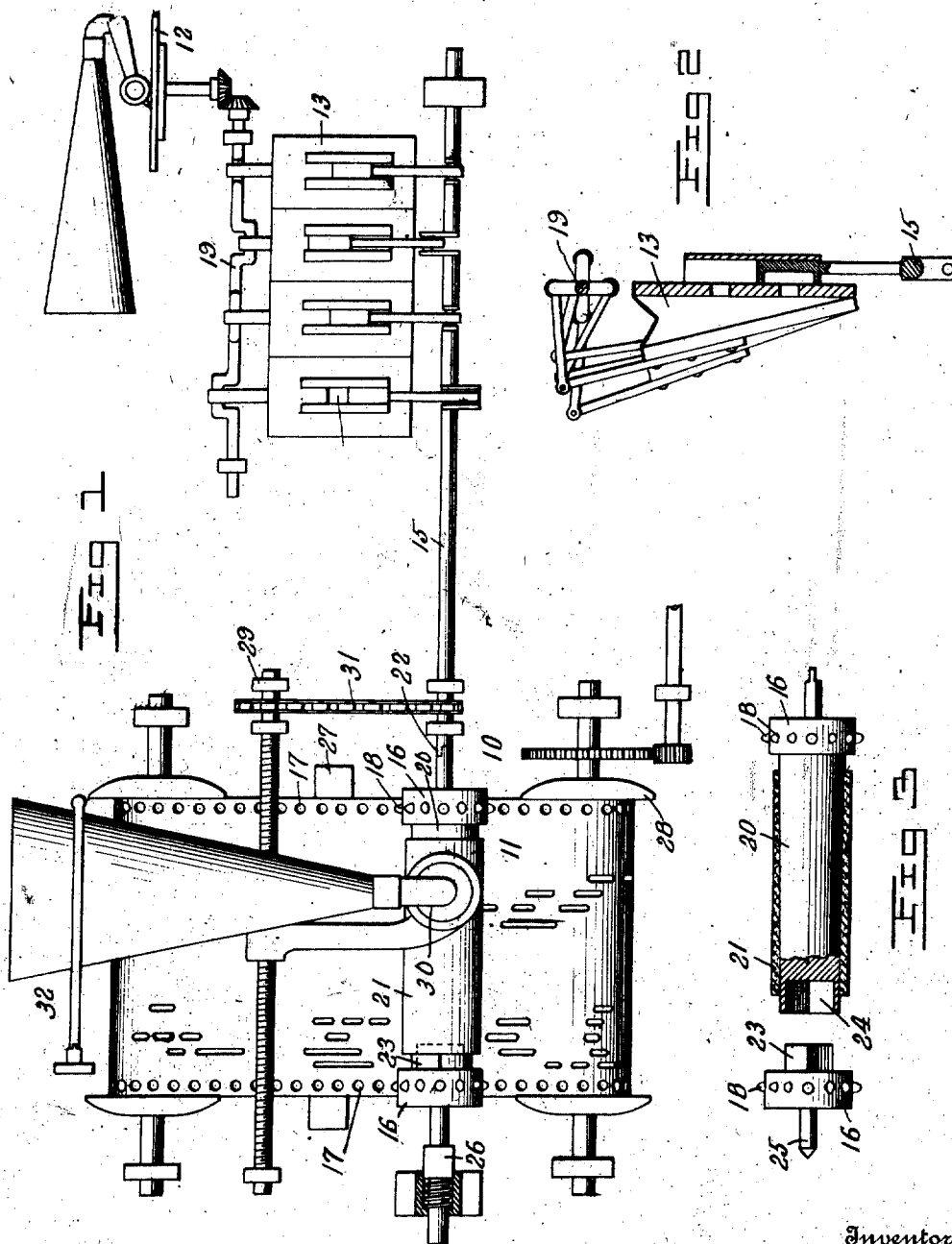


S. S. WATERS.  
 MEANS FOR SYNCHRONOUSLY OPERATING MUSICAL INSTRUMENTS.  
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1,002.100.

Patented Aug. 29, 1911.



Witnesses

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# UNITED STATES PATENT OFFICE.

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MEANS FOR SYNCHRONOUSLY OPERATING MUSICAL INSTRUMENTS.

1,002,100.

Specification of Letters Patent.

Patented Aug. 29, 1911.

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*To all whom it may concern:*

Be it known that I, SAMUEL S. WATERS, a citizen of the United States, residing at Washington, in the District of Columbia, have invented new and useful Improvements in Means for Synchronously Operating Musical Instruments, of which the following is a specification.

The prime object of my invention is the synchronous operation of musical instruments, and particularly musical instruments of the automatic type. It has reference further to that particular type of automatic musical instruments in which use is made of a moving record of some form which controls the operation of the instrument. It is particularly applied to a synchronous operation of an instrument which is controlled by the movement of a record sheet provided with controlling formations in its body, in connection with another musical instrument. The instruments which I show in this connection are a piano controlled by a perforated music sheet, and a phonograph of a disk record type. With all of this in view, however, it will be evident upon an understanding of my invention that it may be used in part or as a whole in connection with musical instruments of other types or in greater number, and that its use is not restricted to the particular instruments or types of instruments disclosed.

In the accomplishment of my invention I make use of a geared connection between the record of one instrument and the driving means for the record of the other instrument. The driving means for the other instrument may be any suitable motor, and in this instance I have shown a pneumatic motor of a commonly used type. I use a geared connection to operate the valves of this motor which directly determine its period of rotation. In effect the record of one instrument is geared directly to the record of the other instrument and moves the same, for all of the fact that the motor is interposed in that connection. It may be that under certain circumstances I shall find it convenient, as for instance when the load of driving the record is light, to omit the motor entirely and drive directly by the geared connection.

My invention will be more clearly understood, and its advantages fully appreciated from the following description, taken in

connection with the accompanying drawings, in which—

Figure 1 is a diagrammatic lay out of the entire apparatus of my invention, Fig. 2 is a transverse section of the pneumatic motor which I employ in this embodiment, and Fig. 3 is a disassembled sectional elevation of a record supporting element especially designed for use directly geared to another record.

Referring to the drawings, 10 represents the perforated sheet moving mechanism of an automatic piano of the now common type, and 11 is the perforated sheet associated with this mechanism.

12 is a phonograph of the disk type which it is desired to operate synchronously with the piano, so that the two instruments may be played together, and the piano may accompany the phonograph or vice versa in the same musical time.

I make use of a pneumatic motor 13 of the slide valve type as shown more clearly in Fig. 2 in section, and control the slide valves 14 of this motor by a geared connection with the record sheet 11 of the piano. This connection is in the form of the shaft 15 connected to a pair of gears 16 driven by the perforated sheet 11. Under some circumstances, these gears 16 may be operated by frictional contact with the sheet 11, but I prefer to provide the sheet 11 on one or both sides as shown with perforations 17, and the gears 16 with projecting pins 18 to engage in the perforations 17. By this means the shaft 15 is driven positively at a speed directly proportional to the linear speed of the perforated sheet 11. The valves of the motor 13 are thus correspondingly moved, and the motor shaft 19 which drives the phonograph 12 is operated likewise at a speed exactly proportionate to the speed of the record sheet 11. The two records are thus compelled to operate in synchronism, and if provided with suitable begin indications, will start in their operation together, and will operate synchronously throughout the retention of any particular selection.

The arrangement just described is particularly suited for the driving of disk phonographs. I have provided in combination with the apparatus already described means whereby phonograph records of the cylinder type may be also used if desired. This means consists of the construction of that

portion of shaft 15 carrying the gears 16 as a drum 20 to carry a cylindrical record 21. The portion 20 is removably jointed at 22 to the shaft 15, and the left hand gear 16 is made removable therefrom, the gear being provided with a stud 23 adapted to fit snugly into a correspondingly shaped socket 24 in the drum 20. On its opposite side the gear is provided with a pointed pintle 25 adapted to be held in the pointed yielding bearing block 26, as shown in Fig. 1. With this understanding it is apparent that the drum 20 may be bodily removed, and the left hand gear 16 removed from it in turn, as shown in Fig. 3, and cylindrical records placed aside or removed from the drum. As shown the drum is located on one side of the reader or tracker board 27 of the piano and between the reader or tracker board and one of the sheet rolls 28. On the other side of the reader or tracker board opposite the drum and parallel thereto, I mount a screw shaft 29 for moving a reproducing member 30 over the cylindrical record. The shaft 29 is geared to shaft 15 by a chain 31 or other suitable means. The reproducing member 30 is provided with a suitable horn, which I have shown supported by an arm 32 which may be attached to a fixed part of the instrument. With this addition, any cylindrical record can be played in synchronism with the piano as controlled by the record sheet 11. The load on a phonograph is usually light, and the perforated sheets of automatic instruments are usually made of heavy paper. It is, therefore, very practicable to drive a phonograph directly from the record.

The efficiency of this apparatus is made greater by reason of the fact that the meshing of the gears 16 with the perforations in the sheet 11 serves to keep that sheet in the proper position with respect to the reader or tracker board, and renders adjustment of the record sheet so as to align the holes in the reader with the perforations in the sheet unnecessary.

What I claim is:—

1. In combination two musical instruments, a movable record for one, a member moved by said record at a rate of speed proportional thereto, and a record for the other musical instrument caused by said member to move at a rate of speed proportional at all times to the speed of said first named record.

2. In combination two self-playing musical instruments, a record for one provided with music controlling formations, a member moved by said record at a rate of speed proportional thereto, and a record for the other instrument caused by said member to move at a rate of speed proportional at all times to the speed of said first named record.

3. In combination two self-playing musical instruments, a movable record for one

provided with music controlling formations, additional formations in said record, a member geared with said additional formations, and a record for the other instrument caused to move by said member.

4. In combination two self-playing musical instruments, a movable perforated record sheet for one of said instruments, additional perforations in said record sheet, a member geared with said additional perforations, and a record for the other instrument moved by said member.

5. In combination two self-playing musical instruments, a record sheet for one of them provided with music controlling perforations, additional perforations in said sheet, a member geared with said sheet by pins projecting into said additional perforations, and a record for the other instrument caused to move by the said member.

6. In combination two self-playing musical instruments, a record for one of said instruments provided with music controlling formations, additional formations on said record, a gear in mesh with said additional formations, and a record for the other of said instruments whose movement is controlled by said gear.

7. In combination two self-playing musical instruments, a movable record for one of them, a member moved by said record at a rate of speed proportional thereto, a record for the other instrument, a motor for driving the same, and means whereby said motor is controlled by said member.

8. In combination two self-playing musical instruments, a movable record for one of them a member moved by said record at a rate of speed proportional thereto, a record for the other of said instruments, a fluid pressure motor for driving the same, and valves for the motor driven by said member.

9. In combination two self-playing musical instruments, a movable record for one of them, a record for the other of them, a fluid pressure motor for driving the same, and valves for said motor driven directly by said first named record.

10. In combination two self-playing musical instruments, a movable record for one of them, a movable record for the other of them, and mechanical means moved directly by said first named record which determines the speed of the second record.

11. In combination two self-playing musical instruments, a movable record for one of them, a member moved by said record at a rate of speed proportional thereto, and a record for the other of said instruments supported on said member.

12. In combination two self-playing musical instruments, one of which is provided with a record supporting member, a record supporting member and a record for the

other of said instruments, and a geared connection between the record of one of said instruments and the record supporting member of the other instrument, said connection being independent of the record supporting member of the one instrument.

13. In combination two self-playing musical instruments, one of which is provided with a record supporting member, a record supporting member and a record sheet for the other of said instruments, said record sheet being provided with music controlling formations, additional formations in said record sheet, and a mechanical connection between said additional formations and said record supporting member of the other instrument first named.

14. In combination a self-playing piano and a phonograph, a removable record supporting member for the phonograph, bearings therefor which normally axially support the same, a record for the piano, and a mechanical connection between said piano record and said record supporting member of the phonograph.

15. In combination two self-playing musical instruments having records, means for moving the record for one of them, a member adjacent the path of movement of said record adapted to be engaged by said record and moved by the same, and record support-

ing means for the other musical instrument connected to be caused to move by said member.

16. In combination two self-playing musical instruments each having its own record, means for moving the record for one of said instruments, a record bearing member of another musical instrument, adjacent to the path of movement of said record of the first named musical instrument, and adapted to be engaged by the same and moved at a rate of speed bearing a fixed ratio thereto.

17. In combination, two self-playing musical instruments, a removable record supporting member for one of these two instruments, bearings for this member, which bearings normally support it axially, a record associated with the other one of said two self-playing musical instruments, a mechanical connection between the record of the last-mentioned self-playing musical instrument and the above-mentioned record support member of the other musical instrument.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

SAMUEL S. WATERS.

Witnesses:

J. P. DARBOX,  
HORACE G. SIETZ.