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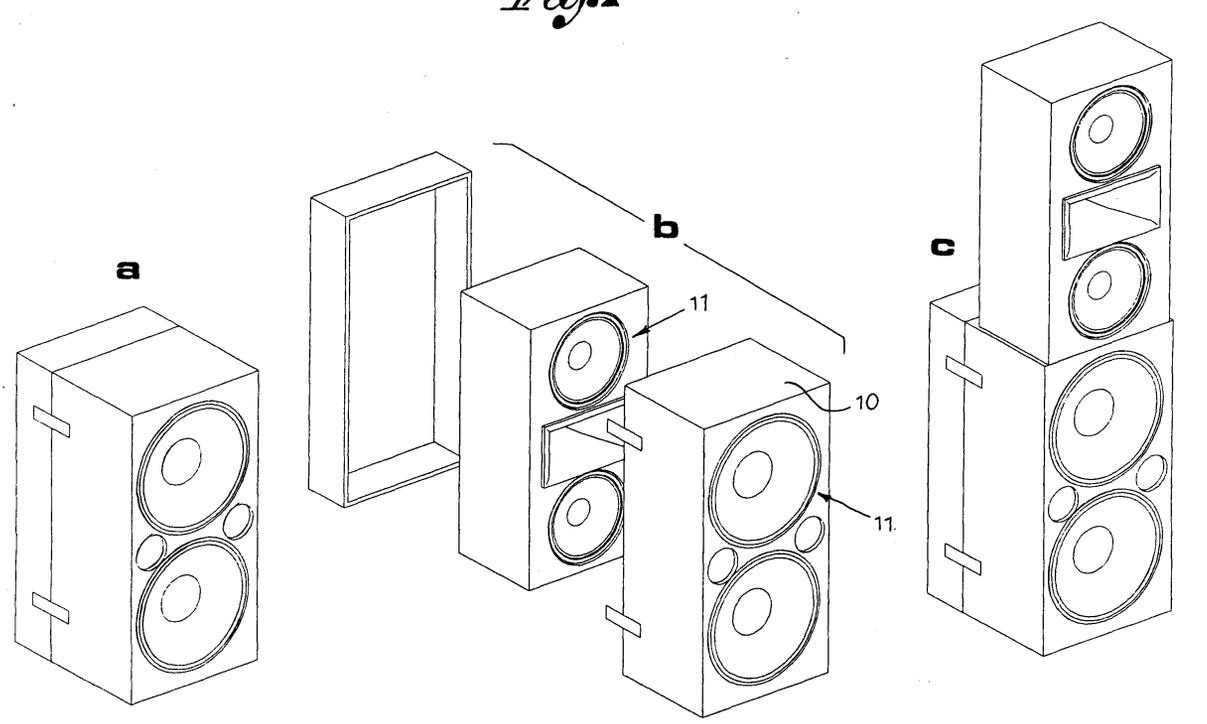
(54) Variable disposition wide band multiway loudspeakers

(57) The invention relates in particular to a sound system employing wide band loudspeakers, which includes one or more loudspeakers constructed to be placed and housed one inside the other in a closed configuration for transporting and storing and to be detached one from the other and positioned in different combinations in a combined functional configuration.

Fig.1



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Description

[0001] The present invention relates to wide band multi-way loudspeakers.

[0002] The professional amplification and sound recording sector is well aware that in order to reach acceptable quality in the reproduction of a musical event such as musical instruments and/or microphones, either using a pre-recorded programme or amplifying live the sound source, the reproduction system of amplification or sound recording must reproduce a wide range of frequencies, from very low (30 Hz, for example) to the highest pitch (15000 Hz for example) in a balanced way and with sufficient distribution of energy.

[0003] Furthermore, this system must be able to reproduce this wide band at the required level, without harmful distortion for those listening to the musical event. In order to achieve high levels capable of covering wide areas with a large public, very high power together with adequate transducer efficiency is necessary, especially and above all at low frequencies.

[0004] Therefore, the speaker which has the task of reproducing the low frequencies must be equipped with a speaker or speakers suitable for supporting high pilot voltage besides having high transducer efficiency, achieved thanks to a large diameter diaphragm and/or a very high peak to peak excursion capacity of the same, or also thanks to a sound reproducer, like the horn, which acting as a true impedance transformer in relation to the means of propagation, the surrounding air, increases its efficiency because of its more favourable adaptation to sound.

[0005] In any case, however, a speaker like this, performing well at low frequencies, in particular if it has a horn sound reproducer, is large and takes up a lot of space. The larger the horn for low frequency is, the larger the phase inverter "cabinet", made according to the principle of recovery of rear emission of the speaker, will be. In the same way the larger the classical and simple closed "cabinet" operating according to the principle of pneumatic suspension is, the lower the frequencies reproduced and the higher the sound energy produced in the surrounding space will be.

[0006] Therefore, in order to reproduce these frequencies it is usual to use separate and dedicated speakers called "subwoofers", because they are used to reproduce lower frequencies than the "woofer" which usually house one or more specialised speakers in "cabinets" varying in size from 100 to 300 cm (litres) of overall volume to well over this figure, which are very large or anyway by no means easy to manage.

[0007] The latter characteristic, necessary to achieve high low frequency efficiency, if on the one hand hardly impairs the result in terms of loss of space in the fixed type of installation, it does on the other hand negatively impair the type designed to be portable where, because of economic reasons and running costs, the means of transport of the necessary materials is only just the right size or even slightly too small.

[0008] This often results in the use of "reduced band" transportable sound systems both for pre-recorded and live music, where the reproduction of the low frequency range, entrusted to the aforesaid "subwoofer", is almost completely lacking, with serious impairment of the musicality and the impact that this specific speaker makes on the musical event.

[0009] In other words, for those using portable amplification systems, such as small bands or small rent-out services who have limited available space because of the few and small means of transport they have at their disposition, bearing also in mind the growing costs of purchasing and running larger vehicles, the sound reproduced is very often penalised because of these people deciding not to use one or more special low frequency speakers in addition to the necessary wide band speakers, the so called satellites, which are usually much smaller.

[0010] This given, the aim of the present invention is to resolve such a problem by introducing a new concept in the construction of a sound system, or better the speakers or cabinets needed to achieve it, suitable for reproducing the whole range of the sound spectrum as far as the lowest frequencies.

[0011] The solution, at the basis of this invention, consists in being able to use wide band speakers which can, either vary in volume, or, when being transported or stored, use the empty space needed by the acoustic volume inside the "subwoofer", or in the largest speakers required for reproduction, to house the wide band speakers or satellites.

This volume, in fact, as it is necessary and therefore cannot be reduced without impairing the reproduction capacity of the lower range of the sound spectrum, is thus fully utilised also with the objective, once again acoustic, of housing the total overall space occupied by the loudspeaker system, with the advantage of reducing running costs, without penalising the available quality of reproduction.

[0012] On the basis of another method of construction, the loudspeaker can be connected to and extracted from a container which, when open helps to increase, using its internal space, the acoustic volume because of an increase in the load of the low frequencies.

[0013] The enclosed indicative and non-limiting drawings, illustrate some practical examples of how the variable disposition sound system. In these drawings:

Figures 1a,b, and c show a loudspeaker system closed, in the opening phase and open ready for use, in that order;

Figures 2a, b and c show the same views of another system with exponential tube reflex chord;

Figures 3a and b show a system with a satellite speaker in the open position ready for use and closed ready to be repositioned;

Fig. 4 shows a telescopically extractable loud-

speaker system.

Fig. 5 shows a system with a variable volume satellite speaker which slides out using a mechanical means (either pneumatic or electromechanical);

Figures 6a, b, c and d, show various vies of a speaker hinged to a container which can house it; and

Figures. 7a, b, c, d, e, f and g show another system of closed loudspeakers, in the opening phase and in various different combinations.

[0014] The concept according to the present invention can be adapted and used, following appropriate construction changes to the cabinet, 10, with any sound system made up of loudspeakers, 11, of whatever material and type, including those already housing a pilot amplifier for the loudspeakers it is equipped with, to form an almost infinite series of compositions and configurations, differing in size and shape, from the simplest to the more complex, in order to suit the needs.

[0015] In addition mechanisms,12, can be used to either automatically or semi-automatically or manually introduce andlor extract the satellite speakers,14, from the housing cabinet when they have to be used, as shown, for example in figures. 3-5.

[0016] In the system in Fig. 3, the satellite 14, once removed from the container cabinet, 10, (subwoofer) is turned upside down and attached to it to form a loudspeaker system to reproduce sound giving high performance even in the low bass frequencies. When the system is closed the satellite, 14, enters the subwoofer box, 14, and at the same time it closes the container ready to be transported: in this way the satellite is protected (the subwoofer becoming a container and a means of transport).

[0017] In the example in Fig. 4, with the system open, the satellite, 14, remains between the two end sections which, when open act as front or rear chambers of two symmetric or double reflex loads. After use, the system is closed and the above end sections become the container for the satellite, which in this way remains protected and the system halves its overall size.

[0018] In the shape used in Fig.5, the satellite is raised either by a mechanical, pneumatic or electromechanical means which places it in its operating position.

[0019] The box left empty by the satellite thus becomes the housing for the subwoofer (the loudspeaker of which is housed in the satellite but its output is at the front of said box).

[0020] The system has the enormous advantage of not being cumbersome for transporting and storing while at the same time it gives high sound quality.

[0021] In the arrangement in Fig.6. the speaker 11 is attached to a cabinet 10. When not used or during transport the speaker is housed in the cabinet; when in use the loudspeaker is turned upside down onto the cabinet which, now being empty, helps to increase the sound volume by increasing the output at low frequencies.

[0022] In creating the systems according to the invention, different materials for the loudspeaker/housing can be used which are, to a greater or less degree, resistant to knocks and/or casters mounted in key positions so that it is possible to move it about easily so that it acts, not only as a means of transport but also as a means to protect the loudspeakers housed inside.

[0023] Worthy of mention is also the possibility of inserting material and objects into the "sound cabinet", either separately or together with the "satellite" speakers, which otherwise would occupy further precious space.

[0024] In conclusion, the idea of the described invention is fully achieved, without having to come to compromises, by creating a housing and protection system of a PA system, which is housed inside it during transport and which greatly facilitates this operation.

This system is achieved in such a way that, once free of its contents, it becomes in itself either a fully operational speaker in the frequency level it is required to reproduce or it becomes a sound load for the loudspeaker extracted from it.

Claims

1. A sound system using special wide band loudspeakers characterised by the fact that it includes two or more loudspeakers constructed in such a way as to be placed and housed one inside the other in a closed configuration for transporting and storing and detachable one from the other and positioned in various combinations in order to operate together.

2. A sound system according to claim 1, characterised by the fact that the empty space inside the cabinet of at least one loudspeaker is used to house in a closed configuration, at least one other wide band speaker or satellite, the latter speaker or satellite being extractable from the housing loudspeaker cabinet to be used in conjunction or in combination with the components, each using the pre-set band axis.

3. A sound system according to claims 1 and 2, characterised by the fact that cabinet of the loudspeaker which is to house another speaker or satellite is the one for a subwoofer.

4. A sound system according to claims 1 and 2, characterised by the fact that cabinet of the loudspeaker which is to house another speaker or satellite is the one for the largest of the speakers necessary for sound reproduction.

5. A sound system according to claims 1 and 2, characterised by the fact that cabinet of the loudspeaker which is to house another speaker or satellite forms, when open in the operating configuration, at least

one chamber for one or two sound loads, the so called crossovers.

6. A sound system according to claim 5, characterised by at least one loudspeaker attached to a cabinet which can be either turned over and protected in this closed cabinet or extracted from said cabinet to operate, the internal space in the cabinet in the latter case interfacing with the loudspeaker to increase the acoustic capacity of the loudspeaker itself.

7. A sound system according to any of the previous claims, characterised by the fact that the loudspeakers in the system are connected either by some mechanical, electromechanical or pneumatic means to facilitate the insertion into and the extraction from one component into the other.

8. Method of sound and amplifying system combinations to reduce the overall size at least during transport, according to which, the sound cabinet necessary to reproduce the sound frequencies anticipated in an AP system is used as a container to house at least one other satellite speaker system in a closed configuration.

9. Method according to claim 8 where a sound system is housed in a speaker cabinet of another satellite system by sliding or rotating one in relation to the other.

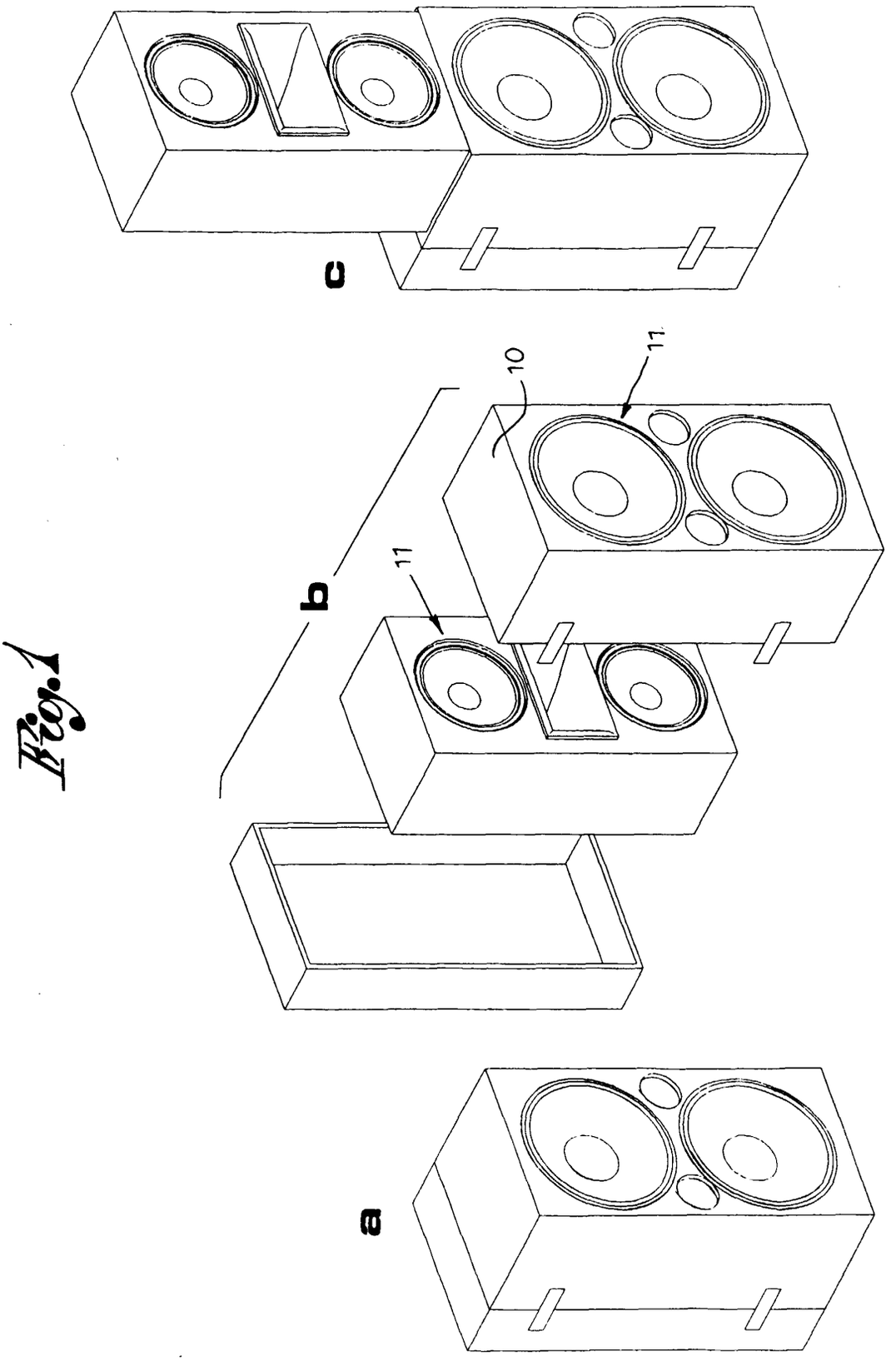


Fig.1

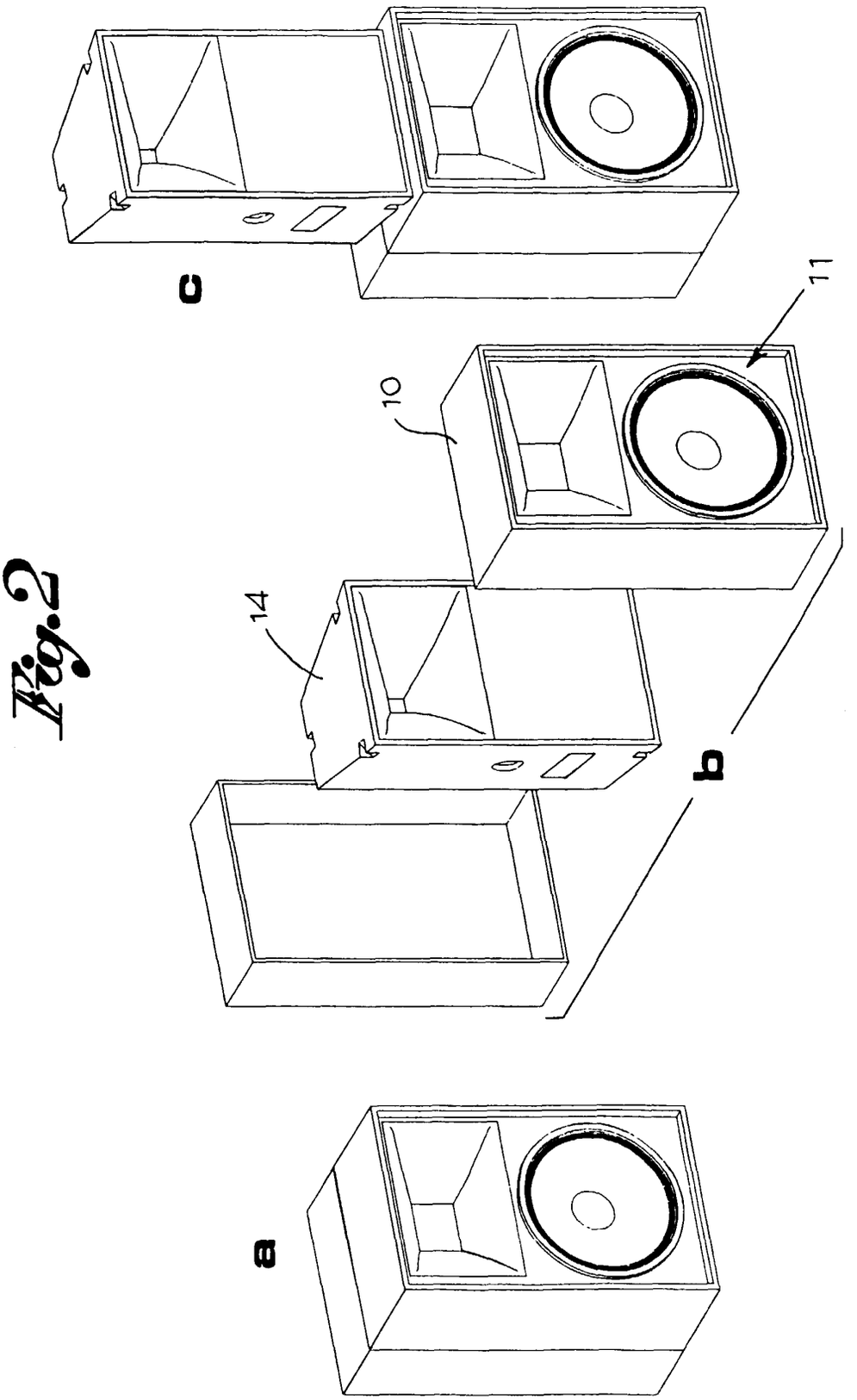


Fig.2

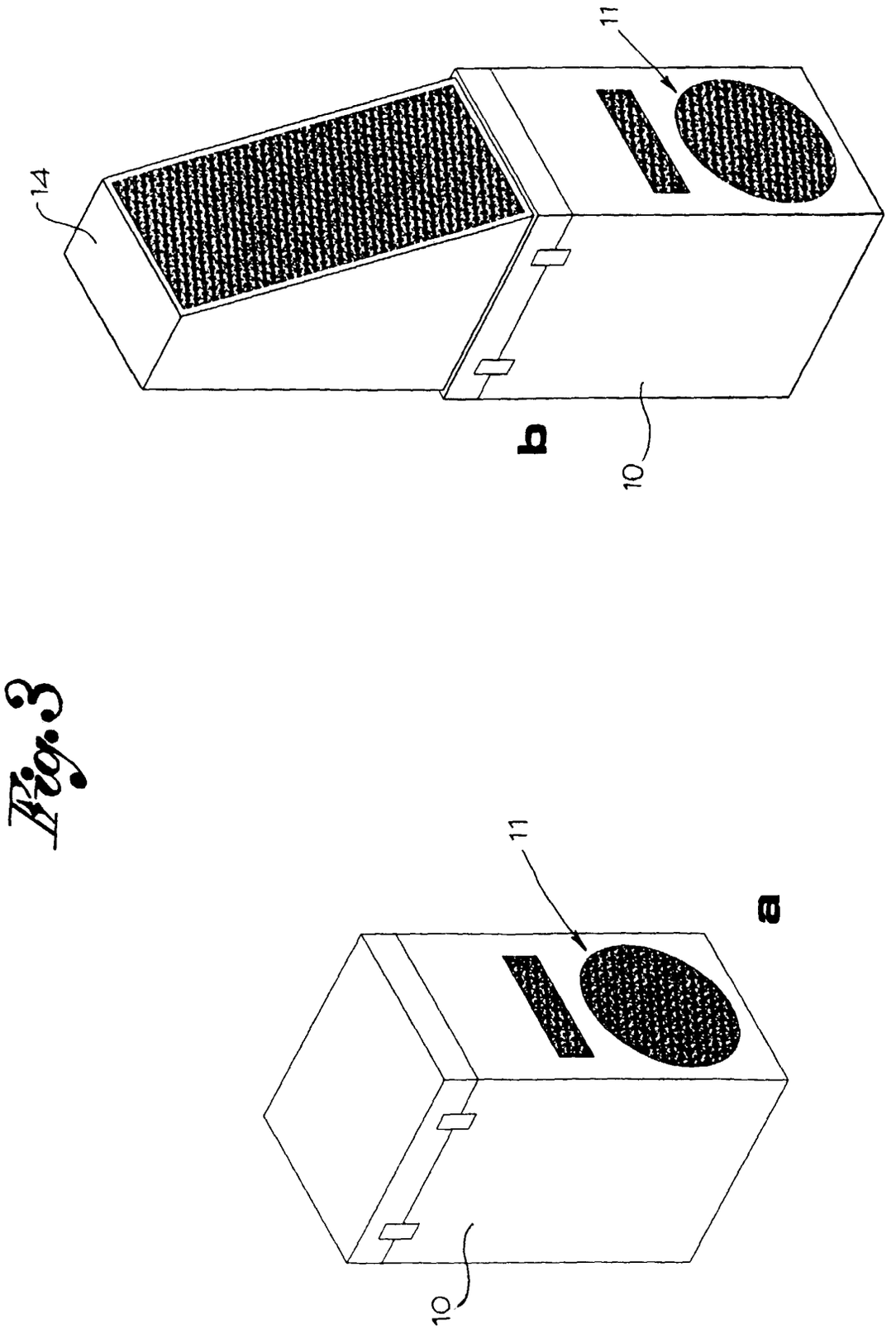


Fig. 3

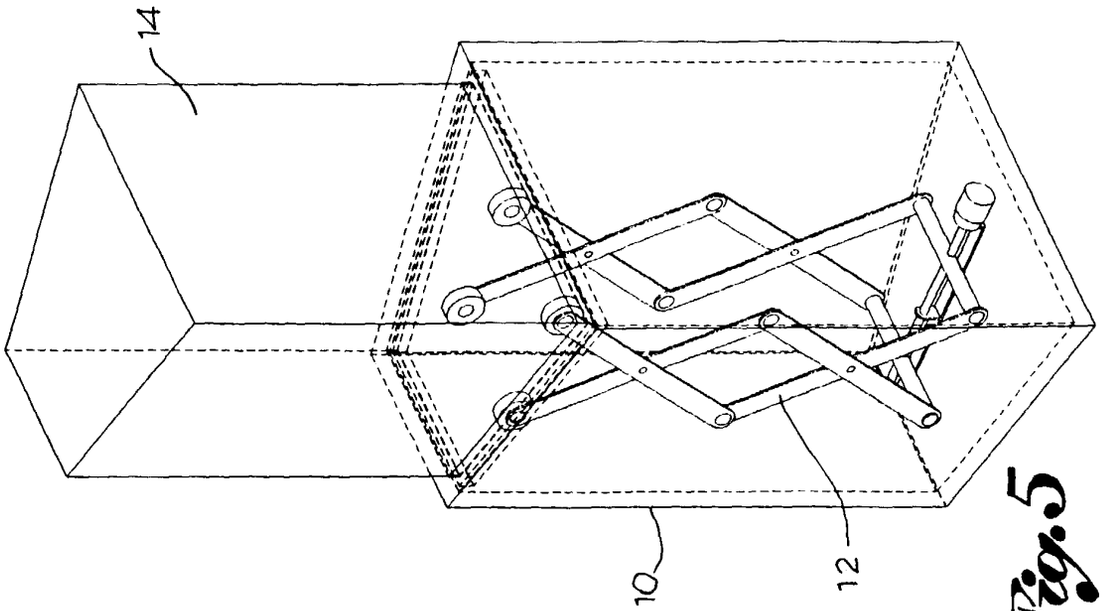
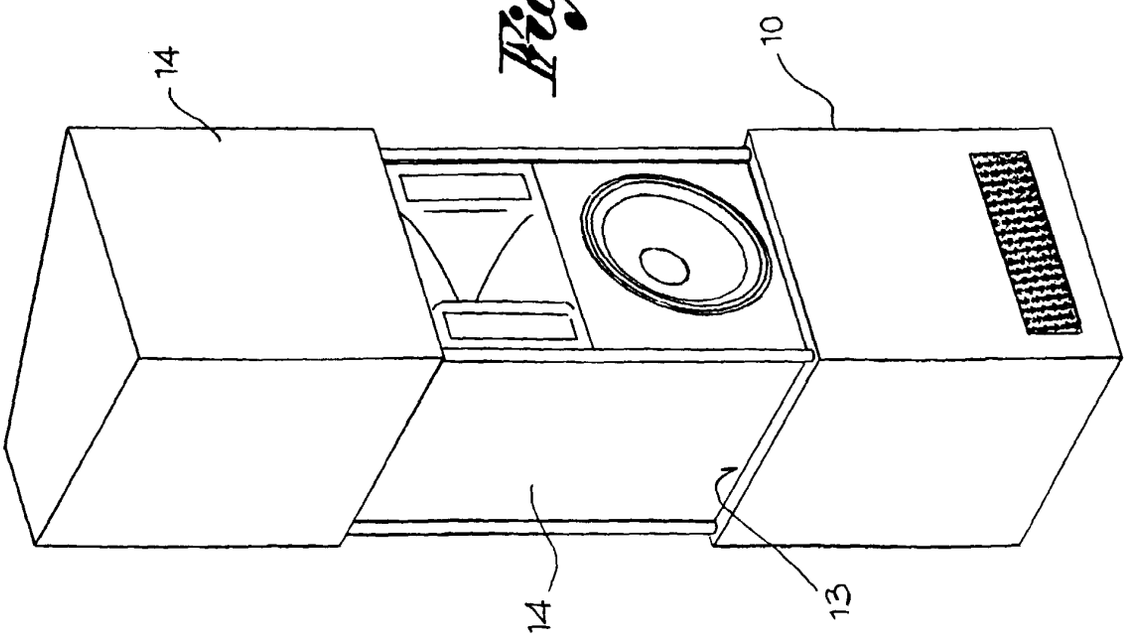


Fig. 5

Fig. 4



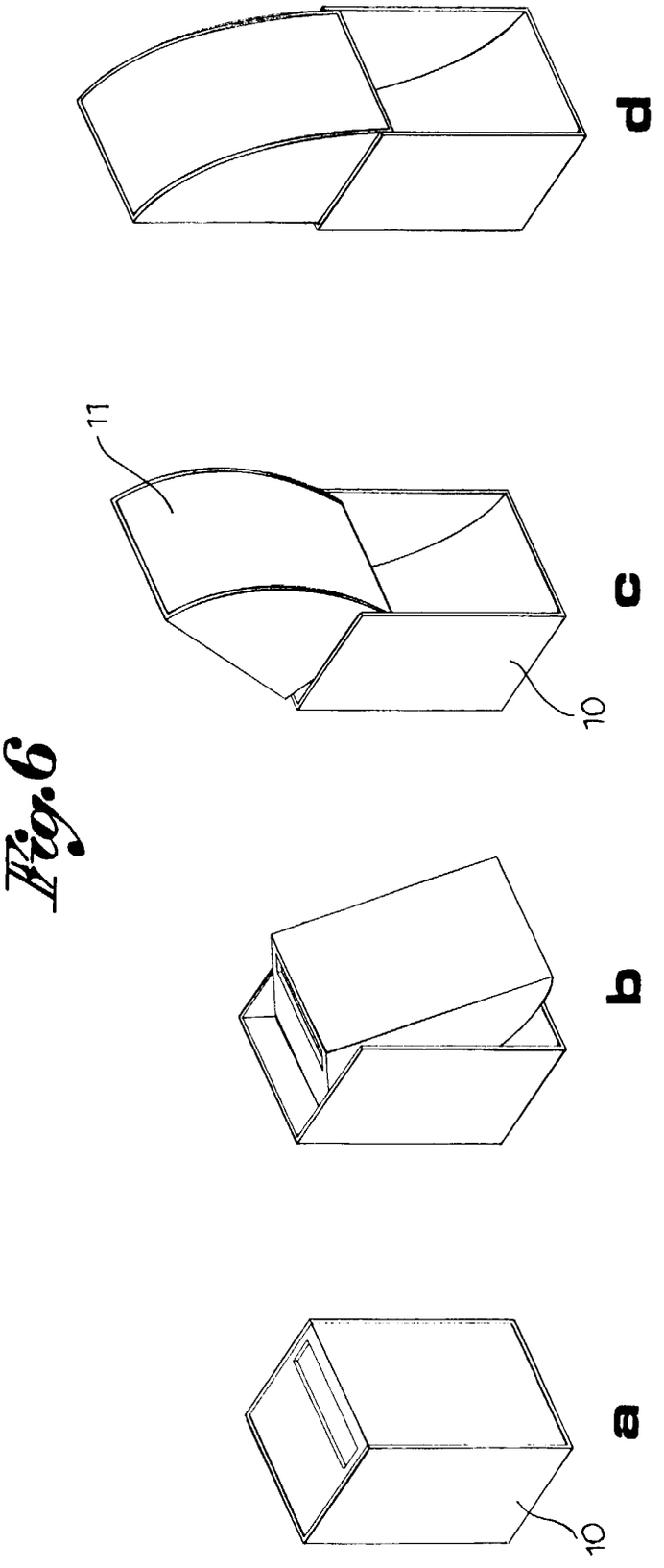


Fig.6

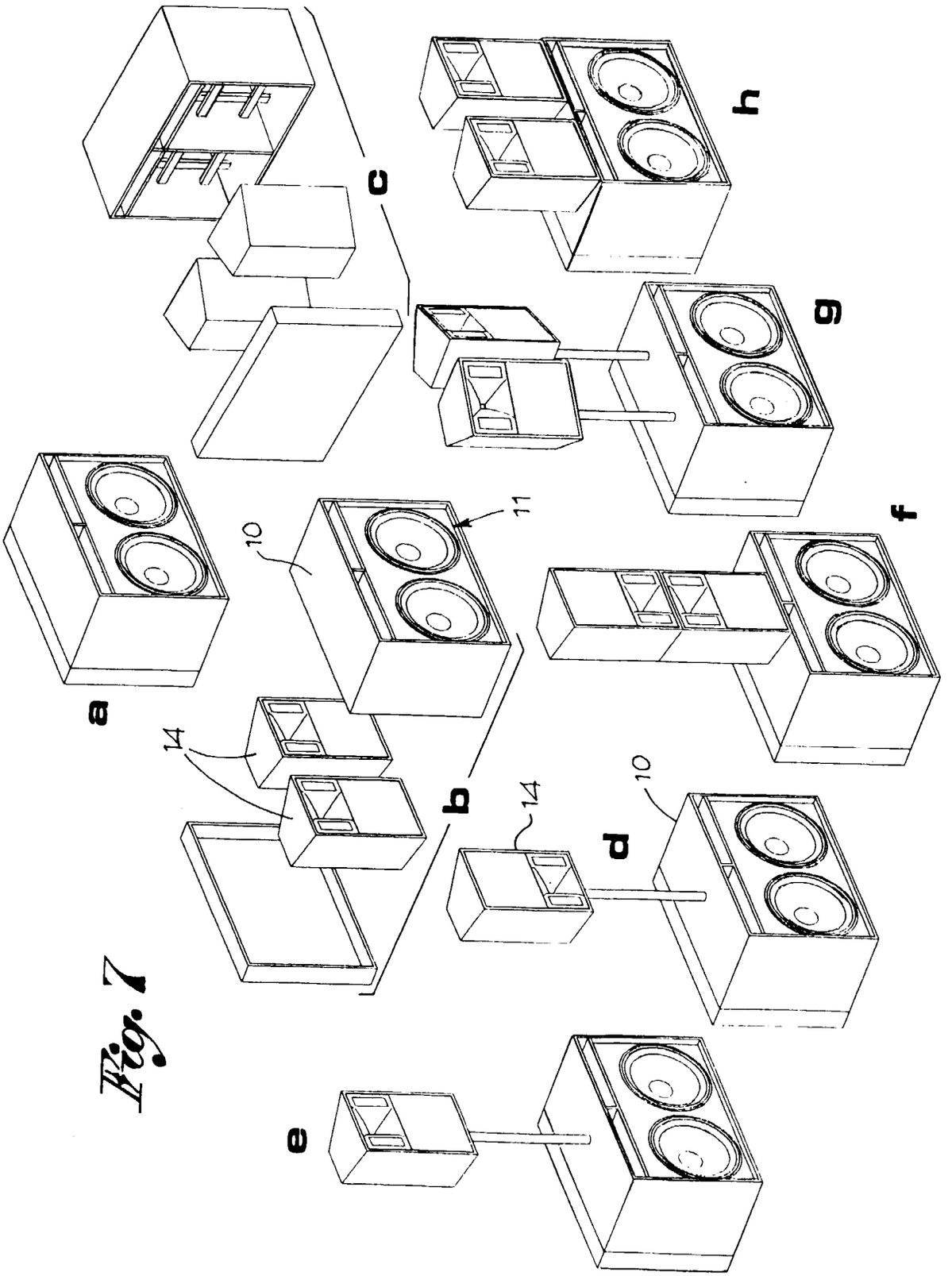


Fig. 7