

RESERVE

PATENT SPECIFICATION



Inventor: FRANCIS ROCK CARLING

799,294

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COMPLETE SPECIFICATION

Improvements in and relating to Hearing Aids

We, FORTIPHONE LIMITED, a British Company, of 247, Regent Street, London, W.1, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to hearing aids constructed in the form of pairs of spectacles.

When attempting to combine a hearing aid with spectacles, certain difficulties arise from the need to provide spectacle frames which fit individual users. Thus it may be necessary to provide a number of different sizes of front, a number of different lengths of side arms for both right and left side arms, and hearing aid units for right or left ear; that is a large number of different combinations for any one style of spectacle frame. To make each pair of spectacles individually to prescription therefore results in unreasonably high cost. The same general problem arises although not to such a high degree, in the case of a head-band hearing aid.

It is the principal object of the present invention to provide a hearing aid of the type referred to which can be manufactured more cheaply than known devices of the type.

Another object of the invention is to provide a construction of spectacle hearing aid such that when the user needs refracting lenses for eyesight correction, the spectacle frame should be well adapted by its shape and size for its optical purpose, and that this should be possible without the need to manufacture a large number of different spectacle frame components.

According to the present invention, a hearing aid in the form of a spectacle frame comprises a front portion having lens frames adapted to receive lenses (or plain glass windows) and connected by a bridge, and two side members, the front portion having on the outer side of each lens frame a hinge portion provided with a plurality of electrical contact-

making members, the said members of the two hinge portions being connected together respectively by conductors passing through, or in a channel around, the front portion, and each side member supporting hearing aid components connected to further electrical contact-making members associated with a further hinge portion adapted with one of the first-named hinge portions and a hinge pin, to form a hinge with the contact-making members of the first-named hinge portion in sliding, contact-making engagement with the corresponding contact-making members of the further hinge portion respectively, and the hearing aid components supported by the two side members being connected together electrically through the electrical contact-making members on the front portion and side members and through the said conductors.

By this construction the number of different sized components required to be manufactured is limited because the side members, or at least a large part thereof, may be made suitable for a wide range of different fittings.

The invention will be described by way of example, as applied to a spectacle hearing aid, with reference to the drawings accompanying Provisional Specification No. 21,809/56 in which

Fig. 1 is a much enlarged view in section of part of a spectacle hearing aid according to the invention,

Fig. 2 is an enlarged perspective view of a part of the hearing aid with a side arm and front separated.

Fig. 3 is a view in the direction of the arrow 3 in Fig. 1 with the side arm removed,

Fig. 4 is a view in the direction of the arrow 4 in Fig. 1 with the spectacle front removed,

Figs. 5 and 6 are perspective views in two different aspects of the brush-supporting block in Figs. 1 and 4,

Fig. 7 is a perspective view of the slip ring-supporting block in Figs. 1 and 3 and of one slip ring detached from the block, and

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Fig. 8 is an enlarged and exploded view in partial section of an attachment to the end of a side arm of the spectacles that is to lie over and behind the ear.

5 Referring to the drawings, and more particularly to Figs. 1 to 6, the spectacle front 10 has fixed thereto a hinge plate 11, of moulded plastic, such as a phenolic material or a resilient plastic such as "Nylon," (Registered Trade Mark), having two lugs 12 projecting therefrom. In an aperture in the plate 11 between the lugs is an insulating block 13, which may be of the same material as the plate 11, grooved to receive three slip rings 14 which may be formed in the manner shown in Fig. 7 of doubled silver wire. A conductor is connected to each of the pairs 15 of ends projecting from the silver wire loop and is passed through a groove 16 formed in the front 10, either above or below the lens aperture 29 (Fig. 2), to a further slip ring (not shown) in the opposite hinge which is constructed in the same way as that described. The three conductors are of course insulated from one another.

The brushes to engage the slip rings 14 are shown at 17. They are formed of wire bent as best shown in Fig. 1 and are mounted in grooves 18 in a brush-supporting block 19. This block 19 is clamped to the end of one side arm 20 by a hinge plate 21 having lugs 22 projecting therefrom. The contacting parts 23 of the brushes project through an aperture in the plate 21 between the lugs 22. A hinge pin 24 passes through aligned apertures in the lugs 12 and 22 and in the block 13. A conductor 25 (Fig. 1) is connected to each brush and the three conductors, insulated from one another, pass through a slot 26 in the side arm, the slot being covered by a strip 27 which may be cemented in position. An insulating member 28 prevents electrical contact between the brushes 17 and the plate 21.

Fig. 8 shows at 30 the end of one side arm remote from the hinge, the conductors 25 emerging from the slot 26 and each terminating in a loop 31 which is clamped within a counter-bored aperture 32 by a bush 33. Clamping screws 34 pass freely through the bushes 33 and are threaded into bushes 35 set into the upper wall of a hollow container 36, each bush 35 being connected to a lead 37. The container 36 is closed by a lid 38 and is so shaped as to be adapted to lie behind the ear.

55 Within the container 36 is arranged one unit (not shown) of a hearing aid. For instance the container at the end of one side arm may carry a microphone and a transistor amplifier and the container at the end of the other side arm may carry another amplifier (if required) and a sound reproducer such as a bone-conduction device or a reproducer adapted to be coupled to the ear canal by means of a short tube. One of the units also

accommodates a low tension battery required to supply power to the transistor amplifier.

All the electrical connections needed between the two units are provided by the leads 25 in the two side arms and the leads connected to 15 passing through the front. Owing to the slip rings and brushes in the hinges, the side arms and fronts can be assembled in the same way as normal spectacle frames, no additional skill being required. Similarly standard hearing aid units can be fitted within the containers 36 and all the electrical connections needed to these units are made automatically when the screws 34 are inserted to fasten the containers to the ends 30.

WHAT WE CLAIM IS:—

1. A hearing aid in the form of a spectacle frame comprising a front portion having lens frames adapted to receive lenses (or plain glass windows) and connected by a bridge, and two side members, the front portion having on the outer side of each lens frame a hinge portion provided with a plurality of electrical contact-making members, the said members of the two hinge portions being connected together respectively by conductors passing through, or in a channel around the, front portion, and each side member supporting hearing aid components connected to further electrical contact-making members associated with a further hinge portion adapted, with one of the first-named hinge portions and a hinge pin, to form a hinge with the contact-making members of the first-named hinge portion in sliding, contact-making engagement with the corresponding contact-making members of the further hinge portion respectively, and the hearing aid components supported by the two side members being connected together electrically through the electrical contact-making members on the front portion and side members and through the said conductors.

2. A hearing aid according to claim 1, wherein the contact-making members of one hinge portion are in the form of slip rings and those of the other hinge portion are in the form of brushes.

3. A hearing aid according to claim 2, wherein the slip rings are disposed in grooves in an insulating block which is held in position by the hinge pin.

4. A hearing aid according to claim 1, 2 or 3, wherein the hearing aid components supported by one side arm comprise a microphone and those supported by the other side arm comprise a sound reproducer.

5. A hearing aid according to any of the preceding claims wherein the hearing aid components associated with each side member are mounted within a casing attached as a unit to the side member.

6. A hearing aid according to claim 5, wherein the unit is attached to the side member by means of screws which serve also as

means for making electrical connections between the components in the unit and the conductors in the side member.

7. A hearing aid according to claim 5 or 6, wherein the said unit is adapted to lie behind the ear of the user.

8. A hearing aid substantially as hereinbe-

fore described with reference to the drawings accompanying Provisional Specification No: 21,809/56.

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REDDIE & GROSE,
Agents for the Applicants,
6, Bream's Buildings, London, E.C.4.

PROVISIONAL SPECIFICATION

No. 34634 A.D. 1955

Improvements in and relating to Hearing Aids

We, FORTIPHONE LIMITED, a British Company, of 247, Regent Street, London, W.1, do hereby declare this invention to be described in the following statement:—

- 15 The present invention relates to hearing aids constructed in the form of pairs of spectacles.

- 20 In order that such devices should be manufactured at a reasonable price it is necessary that the number of different sizes and shapes of component parts should be as small as possible. Another requirement is that when the user needs refracting lenses for eyesight correction, the spectacle frame should be well adapted by its shape and size for its optical purpose, and that this should be possible without the need to manufacture a large number of different spectacle frame components.

- 30 The invention has for its object to provide a spectacle hearing aid in which the requirements set forth can be met more readily than with known hearing aids of this kind.

- 35 According to the present invention, a hearing aid in the form of a spectacle frame comprises a front portion having frames adapted to receive lenses (or plain glass windows) and connected by a bridge, and two side members, the front portion having on the outer side of each lens frame a hinge portion provided with electrical contact-making means, the two said means being connected together by conductors passing through, or in a channel around, the front portion, and the side members accommodating hearing aid components connected to further electrical contact-making means associated with further hinge portions adapted with the first-named hinge portions and a hinge pin, to form hinges, the hearing aid components in the two side members being connected together electrically through the electrical contact-making means on the front portion and side member and through the said conductors.

- 55 According to a feature of the invention the hearing aid components in each side member together with the hinge portions and electrical contact-making means associated with that side member are constructed as a unit slidable within a casing.

- 60 By this construction the number of different sized components required to be manufactured is limited because the side members, or at least a large part thereof, may be made

suitable for a wide range of different fittings.

In one embodiment of the invention the front portion is of metal, which may be covered with plastic, and is adapted to be opened for the insertion of lenses (or plain glass). It is also provided with a tube or a channel extending from one side to the other to accommodate a fine cable which may be as described in the specification of co-pending Application No. 3445/55. Two twin strands of such cable may be cemented together to form a four-core cable.

On each side of the front portion are four mutually-insulated metal eyelets, which may be rhodium plated, arranged to form elements of a hinge. Each eyelet is connected to one of the cable cores.

The construction of each side member may be likened to a dagger in its scabbard. Thus it comprises, as the blade of the dagger, an elongated chassis bearing components of a hearing aid which may include a transistor amplifier. The hilt of the dagger is constituted by a block which in one side member accommodates a microphone and in the other side member accommodates a sound reproducer and a battery. At the tip of the dagger are three eyelets of nylon which interleave with the eyelets on the front portion and form a hinge. A nylon hinge pin may be used. The nylon eyelets are provided on their four inner surfaces with wire rings or wipers thereby providing electrical contacting means engaging the conducting eyelets on the front portion acting as slip-rings. The contacting means are electrically connected to the hearing aid components.

The dagger blade is slidable into a scabbard, open at both ends, and formed for instance of imitation tortoise-shell or a light metal alloy with an anodised finish. When the blade is in position within the scabbard the hinge elements project from its front end. The dagger may be held within the scabbard by two or three retaining screws.

In order to disassemble the device described for servicing, it is only necessary to remove the hinge pins and the retaining screws and pull the daggers out of the scabbards. There are no wires to disconnect.

Moreover it is an easy matter when fitting a user to select a suitable front portion and combine this with suitable side members. No

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great variety of pairs of side members are needed and the dagger portion of all the right and all the left side members may be the same for all sizes.

- 5 Various steps may be taken to avoid self-oscillation due to "ringing round." Thus instead of the metal eyelets on the front portion eyelets of a soft material, such as polythene, may be used. Suitable conducting washers may be provided on the surfaces of the eyelets to act as slip-rings.

- 10 It may for the same reason be desirable to make the blocks containing the microphone and sound reproducer of soft material, such as polythene, and to make the contact between the blocks and the scabbards as light and tenuous as possible. For instance the blocks may be so designed that there is a very small contact area between them and the scabbard or the joints between the blocks and

the scabbards may be lined with damping material, such as flannel. The scabbards may be moulded in a material such as nylon or polythene reinforced with metal strips which do not, however, extend sufficiently far to touch the blocks.

The so-called "ear-curls" of the side members which rest on the ears may be in the form of extensions of rolled gold, as in many normal spectacle frames, or of a formable plastic.

The cross-section of the side members may be V-shape, with the apex, of the V downwards, at least in the region where the side member rests upon the ear, in order to increase the comfort of the device.

REDDIE & GROSE,
Agents for the Applicants,
6, Bream's Buildings, London, E.C.4.

PROVISIONAL SPECIFICATION

No. 21809 A.D. 1956

Improvements in and relating to Hearing Aids

- We, FORTIPHONE LIMITED, a British Company, of 247, Regent Street, London, W.1, do hereby declare this invention to be described in the following statement:—

- 40 The present invention relates to hearing aids of a type adapted to be supported upon the head of a user, for example hearing aids built into pairs of spectacles or into headbands.

- 45 When attempting to combine a hearing aid with spectacles, certain difficulties arise from the need to provide spectacle frames which fit individual users. Thus it may be necessary to provide some twelve different sizes of front, some five different lengths of side arm for both right and left side arms, and hearing aid units for right or left ear: that is about 240 different combinations for any one style of spectacle frame. To make each pair of spectacles individually to prescription therefore results in unreasonably high cost. The same general problem arises, although not to such a high degree, in the case of a head-band hearing aid.

- 60 It is the principal object of the present invention to provide a hearing aid of the type referred to which can be manufactured more cheaply than known devices of the type.

- 65 According to the principal feature of the invention there is provided a hearing aid of the type referred to comprising a supporting structure adapted to pass across the head from one side thereof to the other and a hearing aid unit mounted upon the said structure at or near to each of the two ends thereof, one such unit comprising a microphone and associated circuit elements, and the other unit comprising a sound reproducer and associated circuit elements, and the necessary electrical connecting leads between the two units pass-

ing through the said structure, wherein each of the said units is detachably fixed to the said structure by means of two or more screws which also serve to provide electrical connections between the said leads and circuit elements of the units. The circuit elements in one or both units include an amplifier, which may be a transistor amplifier.

80 In the case of spectacles the units may be mounted within the parts of the side arms behind the ears of the wearer. Thus with the aid of the invention it is possible to stock side arms of various lengths and spectacle fronts of various sizes and styles, and to fit standard hearing aid units in all of the spectacles assembled from any of these parts.

The side arms of spectacles may be hinged to the front by hinges embodying slip rings and brushes and the present invention also provides a preferred form of such hinges.

The invention will be described by way of example, as applied to a spectacle hearing aid, with reference to the accompanying drawings in which

100 Fig. 1 is a much enlarged view in section of part of a spectacle hearing aid according to the invention,

Fig. 2 is an enlarged perspective view of a part of the hearing aid with a side arm and front separated.

Fig. 3 is a view in the direction of the arrow 3 in Fig. 1 with the side arm removed,

Fig. 4 is a view in the direction of the arrow 4 in Fig. 1 with the spectacle front removed,

Figs. 5 and 6 are perspective views in two different aspects of the brush-supporting block in Figs. 1 and 4,

Fig. 7 is a perspective view of the slip ring-supporting block in Figs. 1 and 3 and of

one slip ring detached from the block, and

Fig. 8 is an enlarged and exploded view in partial section of the end of a side arm of the spectacles that is to lie over and behind the ear.

Referring to the drawings, and more particularly to Figs. 1 to 6, the spectacle front 10 has fixed thereto a hinge plate 11, of moulded plastic, such as a phenolic material or a resilient plastic such as "nylon," having two lugs 12 projecting therefrom. In an aperture in the plate 11 between the lugs is an insulating block 13, which may be of the same material as the plate 11, grooved to receive three slip rings 14 which may be formed in the manner shown in Fig. 7 of doubled silver wire. A conductor is connected to each of the pairs 15 of ends projecting from the silver wire loop and is passed through a groove 16 formed in the front 10, either above or below the lens aperture 29 (Fig. 2), to a further slip ring (not shown) in the opposite hinge which is constructed in the same way as that described. The three conductors are of course insulated from one another.

The brushes to engage the slip rings 14 are shown at 17. They are formed of wire bent as best shown in Fig. 1 and are mounted in grooves 18 in a brush-supporting block 19. This block 19 is clamped to the end of one side arm 20 by a hinge plate 21 having lugs 22 projecting therefrom. The contacting parts 23 of the brushes project through an aperture in the plate 21 between the lugs 22. A hinge pin 24 passes through aligned apertures in the lugs 12 and 22 and in the block 13. A conductor 25 (Fig. 1) is connected to each brush and the three conductors, insulated from one another, pass through a slot 26 in the side arm, the slot being covered by a strip 27 which may be cemented in position. An insulating member 28 prevents electrical contact between the brushes 17 and the plate 21.

Fig. 8 shows at 30 the end of one side arm remote from the hinge, the conductors 25 emerging from the slot 26 and each terminating in a loop 31 which is clamped with-

in a counter-bored aperture 32 by a bush 33. Clamping screws 34 pass freely through the bushes 33 and are threaded into bushes 35 set into the upper wall of a hollow container 36, each bush 35 being connected to a lead 37. The container 36 is closed by a lid 38 and is so shaped as to be adapted to lie behind the ear.

Within the container 36 is arranged one unit (not shown) of a hearing aid. For instance the container at the end of one side arm may carry a microphone and a transistor amplifier and the container at the end of the other side arm may carry another amplifier (if required) and a sound reproducer such as a bone-conduction device or a reproducer adapted to be coupled to the ear canal by means of a short tube. One of the units also accommodates a low tension battery required to supply power to the transistor amplifier.

All the electrical connections needed between the two units are provided by the leads 25 in the two side arms and the leads connected to 15 passing through the front. Owing to the slip-rings and brushes in the hinges, the side arms and fronts can be assembled in the same way as normal spectacle frames, no additional skill being required. Similarly standard hearing aid units can be fitted within the containers 36 and all the electrical connections needed to these units are made automatically when the screws 34 are inserted to fasten the containers to the ends 30.

In the case of a head-band hearing aid, the two hearing aids may be attached to the two ends of a head-band through which the necessary connecting leads run. Connections between these leads and the two units are made in the manner described with reference to Fig. 8. That is to say the hearing aid units are attached to the head-band by means of screws which also effect the necessary electrical connections.

REDDIE & GROSE,
Agents for the Applicants,
6, Bream's Buildings, London, E.C.4.

Fig. 2.

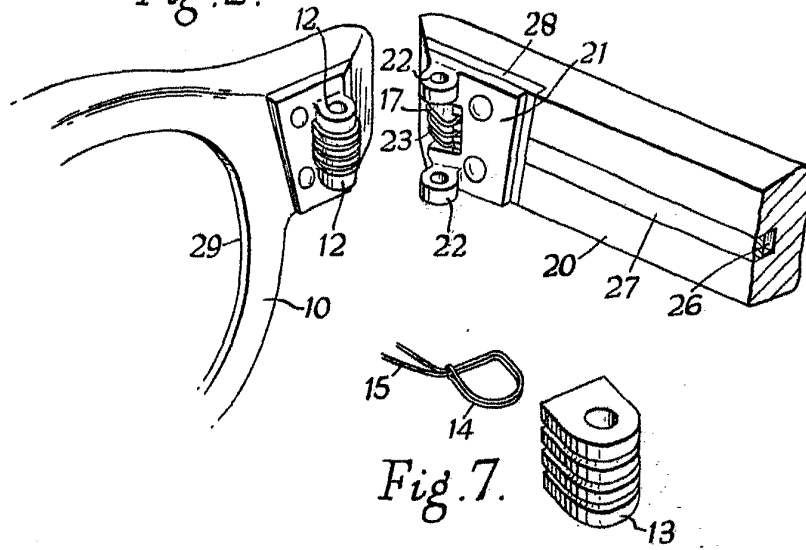


Fig. 7.

Fig. 1.

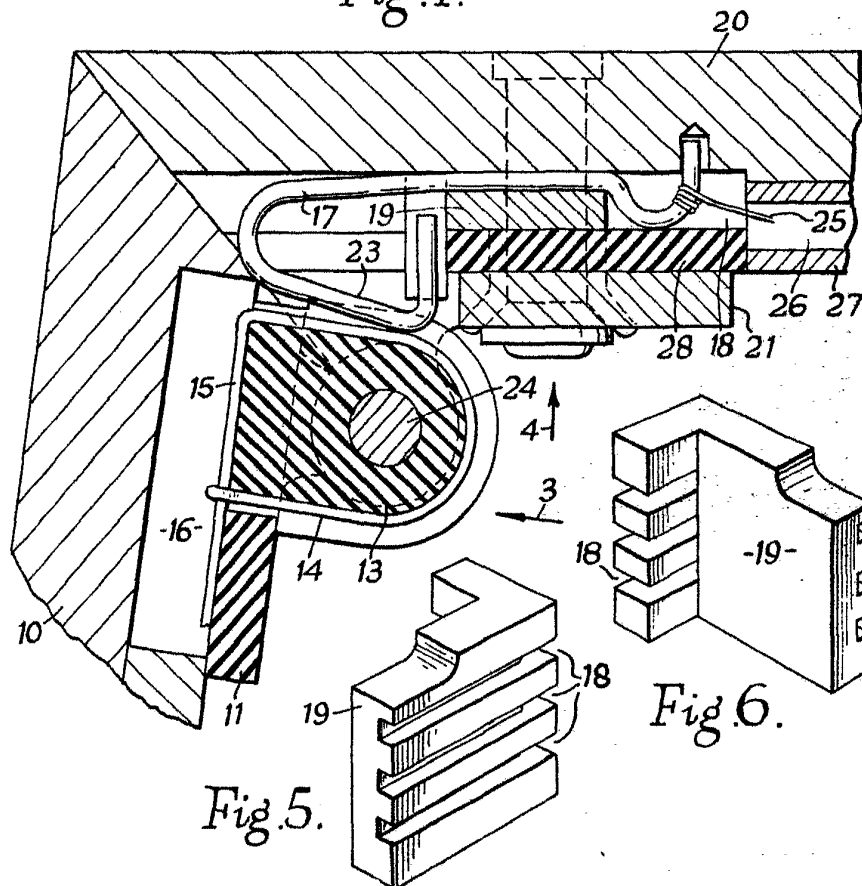
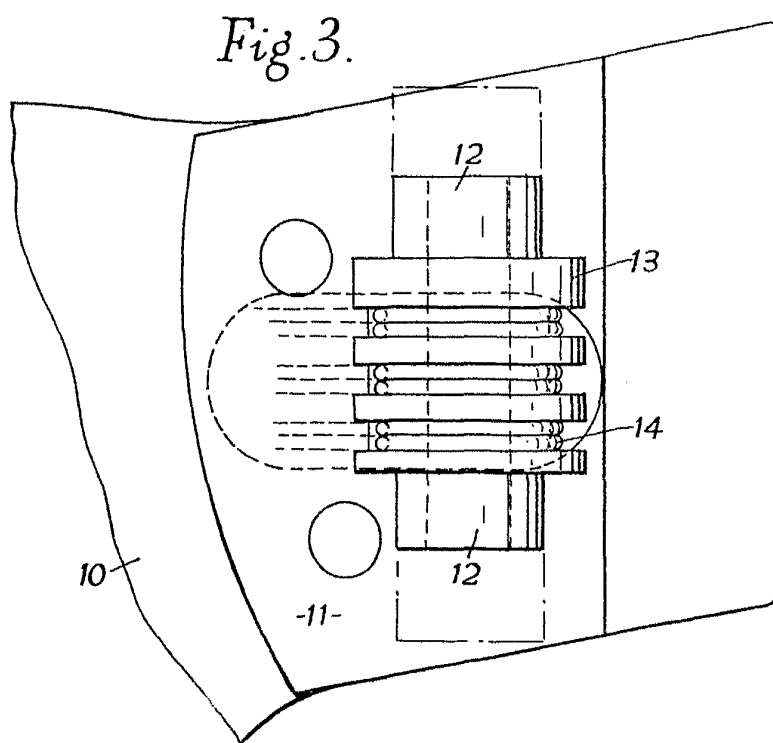
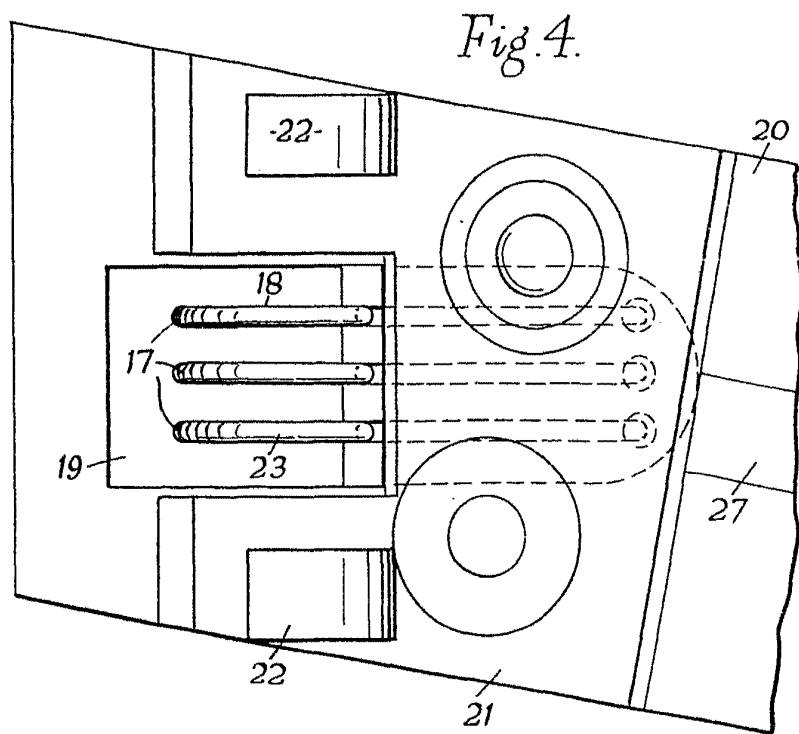


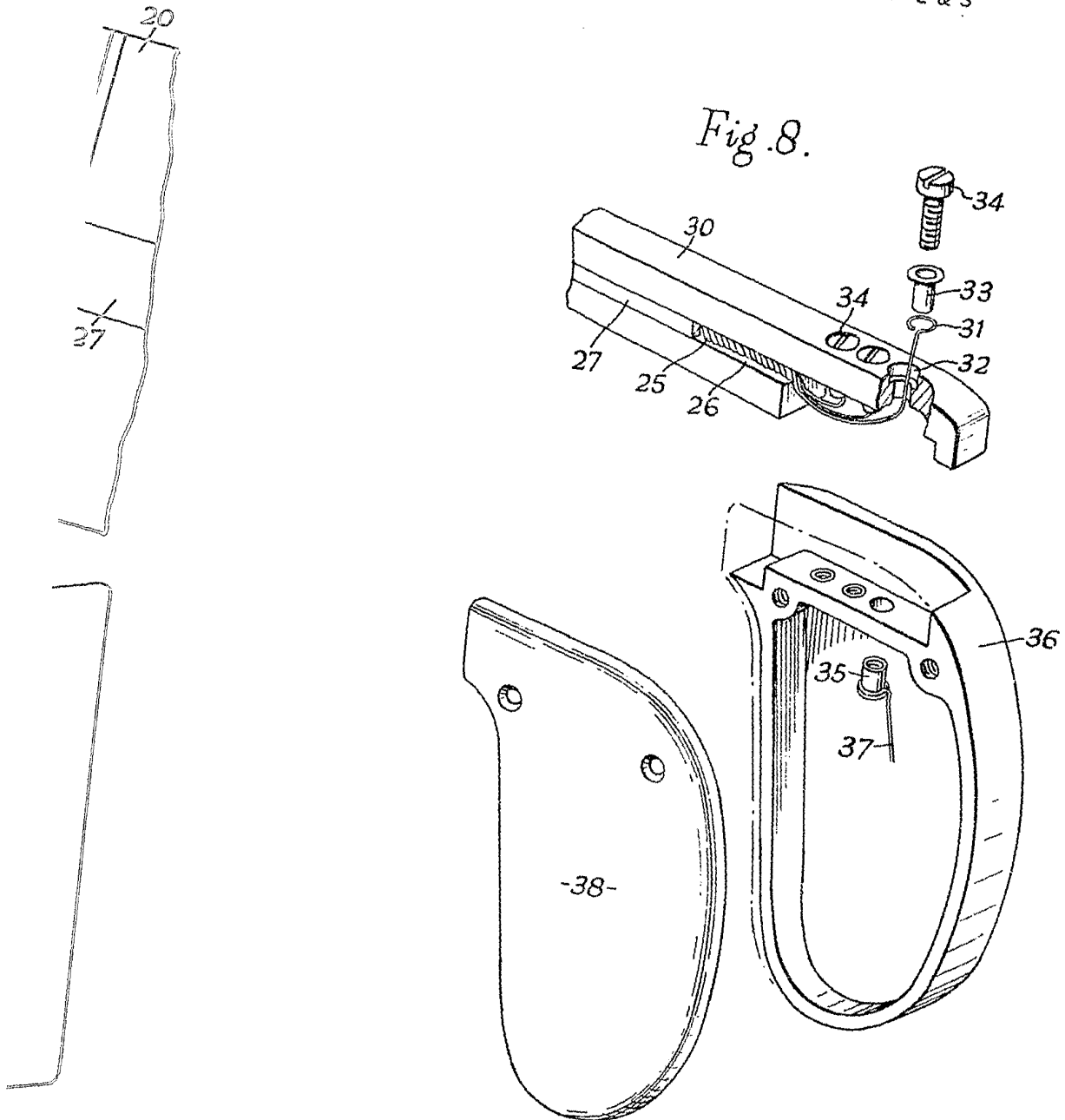
Fig. 5.

Fig. 6.



This drawing is a reproduction of
 the Original on a reduced scale.
 SHEETS 2 & 3

Fig. 8.



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