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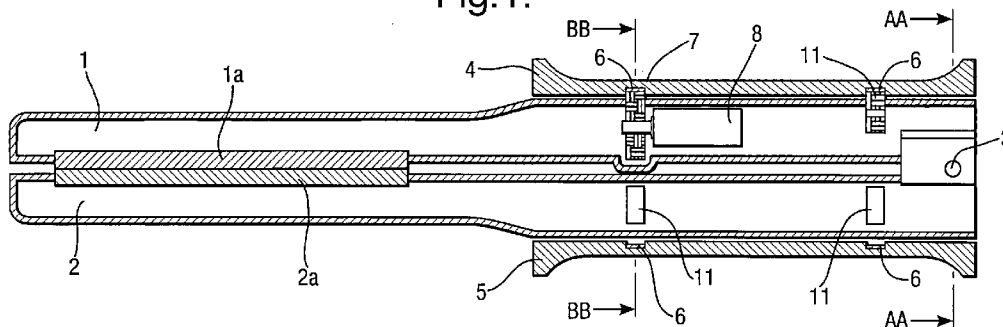
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Fig.1.



(57) Abstract: A hair styling tong arrangement provided with heating and cooling devices which has incorporated a means to mechanically rotate the tong elements to provide a curl forming where normally the operator would not physically be able to manipulate the tongs due to the rotational limitations of the wrist, elbow and shoulder joints.



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MECHANICALLY DRIVEN HAIR TONGS

It is common practice to straighten and curl hair with heated hair tongs. Conventional straighteners rely upon the heated hair being cooled by way of contact with the outer surface (unheated) but usually warm due to leakage from the back of the heating element to the cover surface of the straighteners, or simply by exposure to the ambient air after styling.

Although such electrically heated ceramic straighteners were initially designed for the straightening of hair, it was found that by rotating the device by between 180 and 360 degrees about its longitudinal axis and drawing the hair over the outside of the body of the straighteners, a curl could also be imparted to the hair. In order to further impart a curl effectively, it is necessary to apply tension to the hair, usually by winding the hair strands around the outside of the body of the straighteners.

The winding action required in order to create curls presents a problem for a user of the straighteners, when the operator is attempting to curl her own hair. Whilst the straighteners can be easily operated by someone, such as a salon professional to style another person's hair, it is very difficult to curl one's own hair in this way because of the difficulty in positioning, orientating and winding the straighteners at the back of one's own head. These difficulties are further increased by the limit of rotation placed on the wrist, elbow and shoulder of the average person wishing to carry out the curling action with conventional hair tongs.

The proposed device provides the operator with the convenience and facility of conventional heated curling tongs, but with an additional mechanism which will provide the individual with an additional rotation aid to curl the individual's physically inaccessible parts of the scalp.

Though this device is predominantly concerned with curling the operator may choose to simply use the tongs for straightening.

The present invention provides a hair styling tong arrangement provided with heating and cooling devices which has incorporated a means to mechanically rotate the tong elements to provide a curl forming where normally the operator would not

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physically be able to manipulate the tongs due to the rotational limitations of the wrist, elbow and shoulder joints.

The present invention provides hair tongs comprising: a first arm which is moveable between an open position (for inserting hair) and a closed position (for clamping hair); a housing; and a drive mechanism for rotating the first arm relative to the housing.

In this way it is possible to wind hair which is clamped by the first arm at least partly around the first arm without the operator having to rotate the hair tongs or with the operator only rotating the hair tongs by about 90 or 180°, which is possible with one hand. Thus, the hair can have a curl imparted by heating it (if a heater is provided for heating, for example, clamped hair) and pulling it through the hair tongs and letting it cool or actively cooling it. If the first arm has a heater, or the first arm holds the hair against a heater, heat can be applied to the hair. When the hair cools the curl will remain. Optionally a cooling device can also be provided (for example on the outwardly facing face of the first arm) to cool the hair after it has been heated and thereby to impart the curl more reliably.

Optionally the hair tongs further comprise a second arm which is moveable relative to the first arm between the open position and the closed position, the first and second arms forming a set of arms. In this way hair may be clamped between the first arm and the second arm. The drive mechanism may then rotate the set of arms.

Preferably the arm or set of arms are elongate and have a longitudinal axis and the drive mechanism is for rotating the arm or set of arms, preferably around an axis parallel to the longitudinal axis. Rotation of the arm or set of arms can be around the longitudinal axis of the arm or set of arms or around an axis parallel to the longitudinal axis of the arm or set of arms. In the case of a symmetrical device, the rotation of the set of arms will be around the longitudinal axis of the set of arms. Alternatively, if only one arm is present or the first and second arms which are present are separated from one another, even in the closed position, the arm or arms may move in a circular path around the longitudinal axis of the set of arms i.e. rotate and be displaced around the longitudinal axis.

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Preferably the housing has a longitudinal axis which is common with the longitudinal axis of the set of arms and the drive mechanism is for rotating the set of arms around the common longitudinal axis. This is a simple system to build.

5 Preferably the tongs further comprising an operator selector for selecting an operation of said drive mechanism. Once the user has clamped hair using the arm, the user may select how to rotate the arm. This may include the rotational direction (left handed and right handed users may prefer to rotate the arm in different directions) or it may be preferable to rotate the arm in a certain direction in order to impart a curl right from the root of the scalp rather than a distance away from the
10 scalp. The rotational amount can also be selected. This may be useful depending on user skill in terms of how much rotation can be imparted by the user themselves. In one embodiment rotational speed may be selected.

15 Preferably the arm comprises a heater on an inwardly directed face. If two arms are present then both of those may comprise a heater on an inwardly directed face.

One of the arms may comprise a cooling device on an outwardly directed face. Preferably this face is the face which will be contacted last by the hair, in use, thereby allowing the heated hair to be cooled and thereby set in the curled or otherwise desired shape.

20 The cooling device may be an active cooling device, for example a Peltier element.

25 The apparatus may comprise sensors for sensing the rotational position of the arm relative to the housing. This can help in controlling the apparatus and also help in leaving the first arm in the correct position following rotation. Preferably the tongs further comprise a controller for stopping rotation of the arm at a pre-determined rotational position relative to the housing. This can be important so that the apparatus can be adjusted for optimal use, for example so that the relative position of the arm to the housing is always the same at the start or end of a curling action.

30 In one embodiment an end of the arm or the set of arms is positioned in the housing. This may be advantageous in terms of safety by ensuring that the drive

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mechanism can be placed in the housing.

In one embodiment the drive mechanism comprises a driving wheel attached to the arm or set of arms for engaging with an inner surface of the housing thereby to rotate the arm or the set of arms relative to the housing. This provides a suitable and simple drive arrangement.

5 The housing may comprise a first part and a second part, which parts are moveable relative to one another, the first part and the second part being held to the arm or set of arms by magnetic forces. In that case, the hair tongs may comprise a hinge which rotatably connects the first and second arms, the first part and the second part being mounted on at least one arm.

10 In one embodiment, in the open position, the arm or set of arms protrude further from the housing than in the closed position. This provides the ability to provide a clutch for engaging the arm or set of arms with the drive mechanism in the closed position. This is a good safety feature because it will not be possible to rotate the first arm or set of arms in the open position.

15 In one embodiment, the tongs further comprise a mandrel, the hair tongs being such that, in use, hair is clamped between the first arm and the mandrel. In this way, by rotation of the first arm, hair can be wrapped around the mandrel. If the mandrel is heated and optionally also or alternatively the inner surface of the first arm is heated, then this can be used to impart a curl effectively. In this embodiment, as in other embodiments, preferably the outer surface of the arm is provided with a cooling device. The mandrel is stationary. In this embodiment, it may be important to rotate the first arm towards the scalp in order to obtain the correct curl. A controller may be provided to ensure that.

25 Therefore, in this embodiment the apparatus is constructed and arranged such that when the drive mechanism rotates the arm or set of arms relative to the housing, the arm or arms rotate around the mandrel thereby to wrap hair around the mandrel.

In the embodiment with a mandrel, preferably the tongs further comprise a second arm. The second arm may be moveable relative to the mandrel in a linear way or pivotal way and rotate, with the first arm, around the mandrel. That is, the first arm and the second arm may have an open position and a closed position (in

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which they move away from the mandrel, at least at one end).

The first arm, in the closed, presents an inner surface substantially co-axial to a portion of the outer face of the mandrel with an angular range of between 90 and 180°, preferably between 120 and 180°. In this way, it is not necessary to rotate the arm as far because a turn of up to 180° can be imparted to the hair simply by having the hair between the first arm and the mandrel (which is circular in cross-section) and moving the arm to the closed position so that the hair is clamped between the curved inner surface of the first arm and the curved outer surface of the mandrel.

Preferably the first arm is moveably connected for movement away from the mandrel so that it can move between an open position and a closed position. This movement is preferably pivotal (rotational) and linear motion. This allows the gap between the mandrel and the arm to be made large without needing a large pivoting movement. In one embodiment this is provided by a hinge which connects the first arm to the remainder of the apparatus. The hinge comprises two linkages, each pivotally connected to an end of the member of the apparatus and at a second end to the arm.

In one embodiment the drive mechanism is fixed to the housing. In this embodiment a member which has a point of weakness between the drive mechanism and the housing and/or between the arm and the drive mechanism may be provided. Thus, if the rotating arm encounters a resistance to rotation above a pre-determined force, the member breaks at the point of weakness. This can be an important safety feature if, for example, due to operator error the tongs try and pull hair out of a user's scalp. In that case the member will break at the point of weakness rather than the hair being pulled out of the user's scalp.

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The following is the description of the device with reference to the accompanying drawings in which:

Figure 1 illustrates, in longitudinal cross-section hair tongs of a first embodiment;

Figure 2 illustrates a transverse cross-section along line A-A in Figure 1;
Figure 3 illustrates a transverse cross-section along line B-B in Figure 1;

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Figure 4 illustrates an end view of the first embodiment;

Figure 5 illustrates a longitudinal cross-section of the first embodiment in the open position;

Figure 6 illustrates a side view of the first embodiment in the closed position;

5 Figure 7 illustrates, in longitudinal cross-section, an alternative first embodiment in which an active cooling device is present for cooling the outer face of the arms;

Figure 8 illustrates in cross-section a second embodiment in the open position;

10 Figure 9 illustrates in cross-section the second embodiment in the closed position;

Figure 10 illustrates in cross-section the third embodiment in the closed position;

15 Figure 11 illustrates in cross-section the third embodiment in the open position;

Figures 12 and 13 illustrate in a transverse cross-section through the arms of Figure 10 different positions of relative rotation of the arm relative to the mandrel; and

20 Figure 14 illustrates schematically how the device of Figure 10 is used.

In Figure 1 there is illustrated a specially adapted set of conventional hair straightening tongs comprising a set of arms with first and second arms (1) and (2). The arms each have a heater 1a, 2a. The heaters 1a, 2a are on an inwardly facing face of their respective arm 1, 2. A lock of hair can be placed between the two faces because the set of arms have an open position (Figure 5) and a closed position (Figure 1). The straightening tongs also contain a drive mechanism. Also shown is a housing in the form of a clam shell arrangement (4) and (5) i.e. a housing in two parts. In Fig. 6 the clam shell arrangement (4) and (5) is seen as a solid shell with closed tongs. In practice tongs (1) and (2) are inserted in to the clamshell, both tongs and clamshell have a common axis (3) in section AA shown in Fig. 3. In Fig. 1 clam

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shell (4) and (5) is retained to the clam shell by two sets of three magnetic wheels, one of the wheels (7) is attached to geared motor (8) in section BB (Fig. 3) magnetised rings (6) are attached to each half of the clam shell (4) and (5) and correspond to the magnetic attachment wheels (11) and (12), drive wheel (7). Drive
5 wheel (7) may be provided with a friction drive to assist the magnet holding function, in an alternative arrangement a geared rack and pinion may be introduced, the rack be formed on the face of magnetic ring (6) and the pinion on the corresponding drive wheel (7). In practice the hinge points (3) (Fig. 1 and 2) line up to facilitate the opening of the tongs, this facility is enabled by alignment sensors
10 (not shown) placed at convenient positions in the rotational cycle. In use hair is inserted between the open arms. The hair is then clamped between the arms by closing them. The operator may rotate the tongs by a certain amount and the remainder of the required rotation (to wind the hair around the tongs to a total amount of 180° to 360°) is achieved by rotation of the arms relative to the housing.
15 Initiation of the rotation is provided by the operator after selection of, for example, either 90 degrees (quarter turn) 180 degrees (half turn) or 360 degrees (whole turn) or more or less rotation as required. In Figure 4 the operator may also choose to rotate either clockwise (15) or anticlockwise (14) in order that the operator may use the device to product either left or right handed curls.

20 The hair is heated between the two arms and cooled on the outside of the arm over which it passes last. As the hair is drawn through the tongs it passes along the outside of the second arm 2, between the two arms 1, 2 where it is heated and then over the outer surface of the first arm where it is cooled.

Fig. 7 the device may also incorporate active and non active cooling which
25 this design configuration has provided for by providing sufficient access to mount the active cooling device (16) which is attached to the tongs arrangement, not the outer clam shell, which includes cold plates (22) heat pipes (19) heat transfer block (20) Peltier element (18) heat sink (17) and fan (21) at the back of the tongs and clamshell casing. This can provide the final cooling by the outer face of the arm 1 as
30 described above in an active way.

Figure 5 illustrates the tong arrangement open to receive the lock of hair.

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Figure 8 illustrates a side view of a second embodiment of straightening tongs. The second embodiment is the same as the first embodiment of Figures 1-7 except as described below.

In the second embodiment the first and second arms 1,2 extend into the housing 300, like in the first embodiment. However, the first and second arms 1, 2 are moveable in the axial direction (of the elongate housing and set of arms) relative to the housing 300 also. In the closed position (illustrated in Figure 9) the arms are inserted further into the housing 300 than in the open position in Figure 8. Indeed, the housing 300 may interact with the arms 1, 2 so that when the arms are drawn into the housing (by an electrical actuator or by a user pulling them in using a lever, for example), the housing interacts with the arms thereby to force them into the closed position. A clutch 320, preferably a magnetic clutch, is provided so that the arms can be engaged with the drive mechanism 310 in the closed position. Once in the closed position the drive mechanism 310 may be used to rotate the arms 1, 2. As in the first embodiment, the set of arms are elongate and have a longitudinal axis. The housing 300 is also elongate and also has a longitudinal axis. The longitudinal axis of the set of arms and of the housing 300 is parallel, and in this embodiment common. Therefore, during rotation each of the individual arms 1, 2 follow a circular shape around the common axis, when viewed from the end. Therefore, there is rotation as well as linear movement of each of the individual arms. However, as a set, it can be seen that the set of arms simply rotate around their central longitudinal axis (just as in the first embodiment).

In the second embodiment the drive mechanism 310 is attached to the housing 300 via a point of weakness. This is a safety feature so that should, on rotation of the arms, a force resisting rotation become high, the point of weakness will break at a pre-determined force. In this way no rotational force is applied between the housing 300 and the set of arms 1, 2. Therefore, if, for example the hair becomes stuck, for any reason, there is a fail safe device to prevent excessive force being applied to the hair.

A third embodiment is illustrated in Figures 10-14. The third embodiment is the same as the foregoing embodiments, particularly the second embodiment, except

as described below.

The third embodiment may function with only a first arm 410. However, optionally a second arm 420 may be provided as described below. The first arm 410 is moveable between an open position (illustrated in Figure 11) and a closed position (illustrated in Figure 10). Hair is inserted between the first arm 410 and a mandrel bar 400 when the first arm 410 is in the open position. When the arm 410 is moved to the closed position, hair is clamped between the first arm 410 and the mandrel bar 400. The mandrel bar 400 is heated and/or the inner surface of the first arm 410 is heated.

A lever 420 is provided to move the first arm 410 between the open position and the closed position. The lever acts on a hinge which imparts both rotational and linear movement to the first arm 410. In this way the gap between the first arm 410 and the mandrel 400 may be made quite large without requiring large pivotal movement. That is, the first arm 410 moves away from the mandrel bar 400 linearly as well as by rotation. This is achieved by the hinge which comprises two linkages 435. Each linkage is pivotally attached to a member 437 of the apparatus at a first end and pivotally attached at the second end to the first arm 410. The pivotal connections of the linkages 435 relative to the member 437 and first arm 410 are separated by a distance. This achieves the above described motion. A spring loading and locking mechanism may be provided. The second arm 420 may be attached in the same way, or may not be pivotally and/or linearly moveable relative to the mandrel via a hinge.

Optionally, as can be seen in Figures 12 and 13, the first arm 410 presents an inner surface facing the mandrel. The inner surface may be shaped so that it is co-axial with the outer surface of the mandrel 400. Preferably the inner surface of the first arm 410 extends around the mandrel by an angular distance of 0-180°, more preferably 120-180°. This imparts a first bend into hair clamped between the first arm 410 and the mandrel 400. In order to impart further bending to the hair, the first arm 410 is rotatable relative to the housing as in the other embodiments. For example, the drive mechanism 310 can drive a collar which is rotatably mounted on the mandrel 400 and to which the first arm 410 is connected. For example, the

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member 437 may be such a collar. The mandrel 400 is not arranged to rotate.

As can be seen in Figures 12-13, preferably a second arm 420 is provided. In this embodiment the mandrel 400 is positioned between the first arm 410 and the second arm 420 which form a set of arms. The second arm 420 is desirable for two reasons. First it protects the user from touching the hot mandrel 400. Second, it can impart an extra twist to the hair, which might otherwise not be present if it were not present. The second arm 420 does not need to be pivotally connected to the sleeve or member 437. The second arm 420 rotates in unison with the first arm 410, always being on the opposite side of the mandrel 400 to the first arm 410.

Figure 14 illustrates how the mechanism works in use. First a lock of hair 455 is clamped as close to the scalp of a user 450 as possible. The first arm 410 is then rotated in a direction towards the scalp. The rotation may be by any amount. For example, in Figure 12 the first arm 410 has been rotated by 90° relative to the starting position illustrated in Figure 13. In Figure 14 the first arm 410 has been rotated by a further 90° to a total of 180°. In this way the hair has been forced into an S shape. Thus, as the device is pulled from the scalp towards the free end of the hair 455 the hair is first heated by the mandrel 400, then by the mandrel 400 and the inside of the first arm 410, before being cooled on the outside of the first arm 410 or indeed after passing over the outside of the first arm 410 passively or by an active or passive cooling device on the outside face of the first arm 410 (as in the Figure 7 embodiment).

The third embodiment does not require any rotation of the tongs by user manipulation and so may be particularly suitable for older users.

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CLAIMS

1. Hair tongs comprising:
a first arm which is moveable between an open position and a closed
5 position;
a housing; and
a drive mechanism for rotating the first arm relative to the housing.
2. The hair tongs of claim 1, further comprising a second arm which is
10 moveable relative to the first arm between the open position and the closed position,
the first and second arms forming a set of arms.
3. The hair tongs of claim 1 or 2, wherein the arm or set of arms are elongate
and have a longitudinal axis and the drive mechanism is for rotating the arm or set of
15 arms, preferably around an axis parallel to the longitudinal axis.
4. The hair tongs of claim 2, wherein the housing has a longitudinal axis which
is common with the longitudinal axis of the set of arms and the drive mechanism is
for rotating the set of arms substantially around the common longitudinal axis.
20
5. The hair tongs of any one of the preceding claims, further comprising an
operator selector for selecting an operation of said drive mechanism.
6. The hair tongs of claim 5, wherein said operation comprises at least one
25 selected from the group: rotational direction, rotational amount, rotational speed.
7. The hair tongs of any one of the preceding claims, wherein the arm comprises
a heater on an inwardly directed face.
- 30 8. The hair tongs of any one of the preceding claims, wherein the arm comprises
a cooling device on an outwardly directed face.

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9. The hair tongs of claim 8, wherein the cooling device comprises an active cooling device.
10. The hair tongs of claim 9, wherein the active cooling device comprises a Peltier element.
11. The hair tongs of any one of the preceding claims, further comprising sensors for sensing the rotational position of the arm relative to the housing.
12. The hair tongs of claim 11, further comprising a controller for stopping rotation of the arm at a pre-determined rotational position relative to the housing.
13. The hair tongs of any one of the preceding claims, wherein an end of the arm or the set of arms is positioned in the housing.
14. The hair tongs of any one of the preceding claims, wherein the drive mechanism comprises a driving wheel attached to the arm or the set of arms for engaging with an inner surface of the housing thereby to rotate the arm or the set of arms relative to the housing.
15. The hair tongs of any one of claims 1-14, wherein the drive mechanism comprises a driving wheel attached to the housing for engaging with an outer surface of the arm or the set of arms thereby to rotate the arm or set of arms relative to the housing.
16. The hair tongs of any one of the preceding claims, wherein the housing comprises a first part and a second part which are moveable relative to one another, the first part and second part being held to the arm or set of arms by magnetic forces.
17. The hair tongs of claim 16, wherein the hair tongs comprise a hinge which rotatably connects the first and second arms, the first part and the second part being

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mounted on at least one arm.

18. The hair tongs of any one of the preceding claims, wherein in the open position the arm or set of arms protrude further from the housing than in the closed position.

19. The hair tongs of claim 18, further comprising a clutch for engaging the arm or set of arms with said drive mechanism in the closed position.

20. The hair tongs of any one claims 1-11, further comprising a mandrel, the hair tongs being arranged such that, in use, hair is clamped between the first arm and the mandrel.

21. The hair tongs of claim 20, comprising first and second arms, in use, hair being present between each arm and the mandrel.

22. The hair tongs of claim 20 or 21, wherein the apparatus is constructed and arranged such that when said drive mechanism rotates the arm or set of arms relative to the housing, the arm or arms rotate around the mandrel thereby to wrap hair around the mandrel.

23. The hair tongs of any one of claims 20-22, wherein the arm, in the closed position, presents an inner face substantially co-axial to a portion of the outer face of the mandrel with an angular range of between 90 and 180°, preferably between 120 and 180°.

24. The hair tongs of any one of claims 20-23, further comprising a heater in the mandrel thereby to heat the outer surface of the mandrel.

25. The apparatus of any one of claims 20-24, wherein the first arm is moveably connected for movement away from said mandrel.

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26. The hair tongs of claim 25, wherein said movement is rotational and linear motion.

27. The apparatus of claim 25 or 26, wherein a hinge connecting the first arm to
5 the apparatus comprises two linkages, each pivotally connected at a first end to a member of the apparatus and at a second end to said arm.

28. The hair tongs of any one of the preceding claims, wherein the drive mechanism is fixed to the housing.

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29. The hair tongs of claim 28, further comprising a member connecting the drive mechanism to the housing or first arm, the member having a point of weakness such that if the rotating arm encounters a resistance to rotating above a pre-determined force, the member breaks at the point of weakness.

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30. Hair tongs substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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Fig.3.

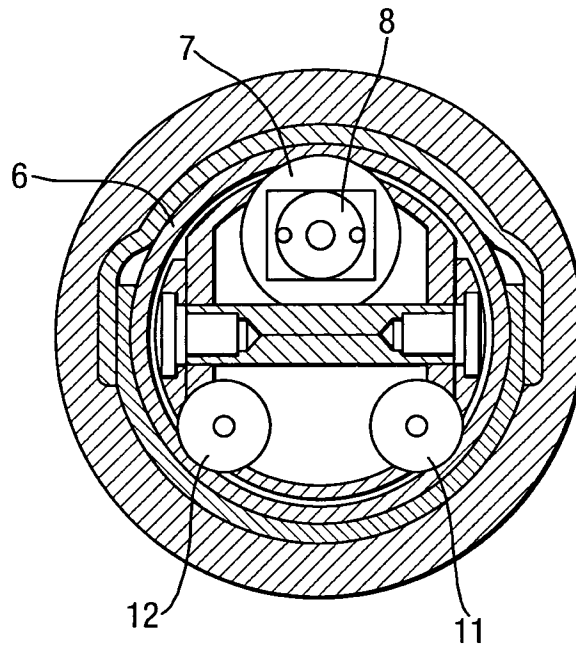
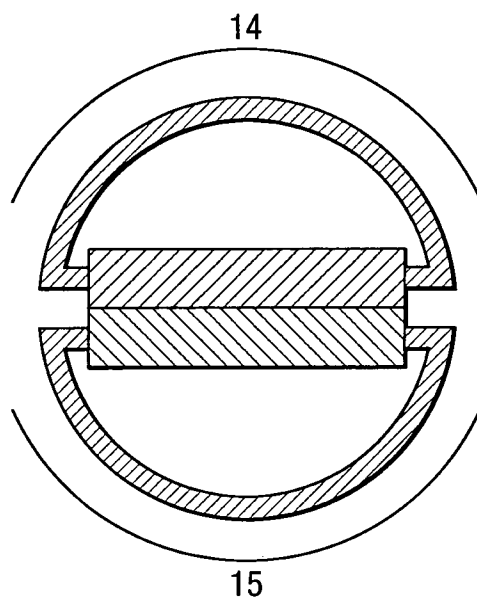
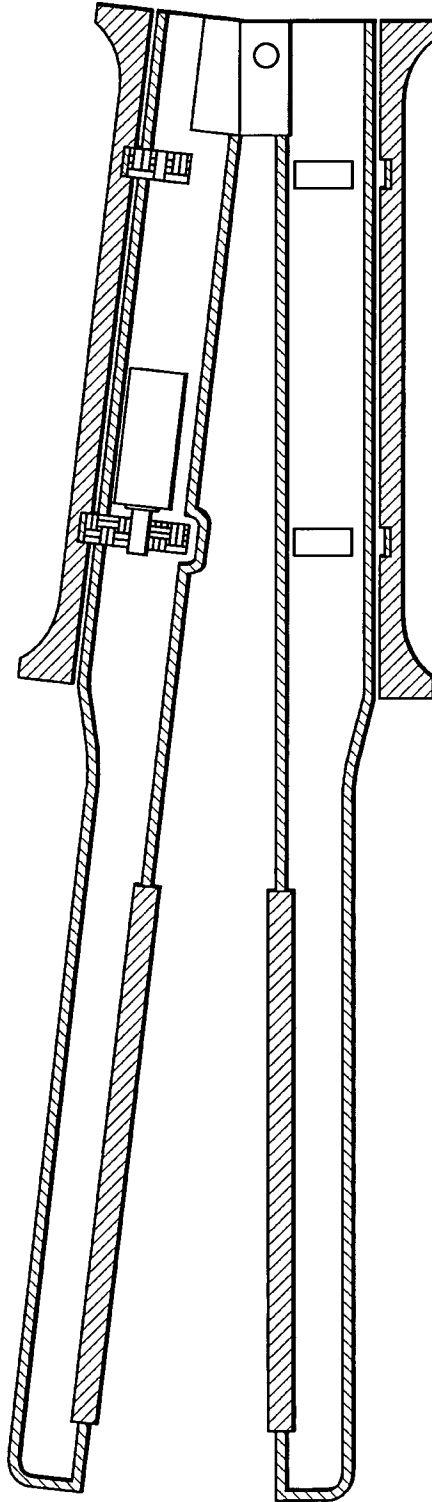


Fig.4.



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Fig.5.



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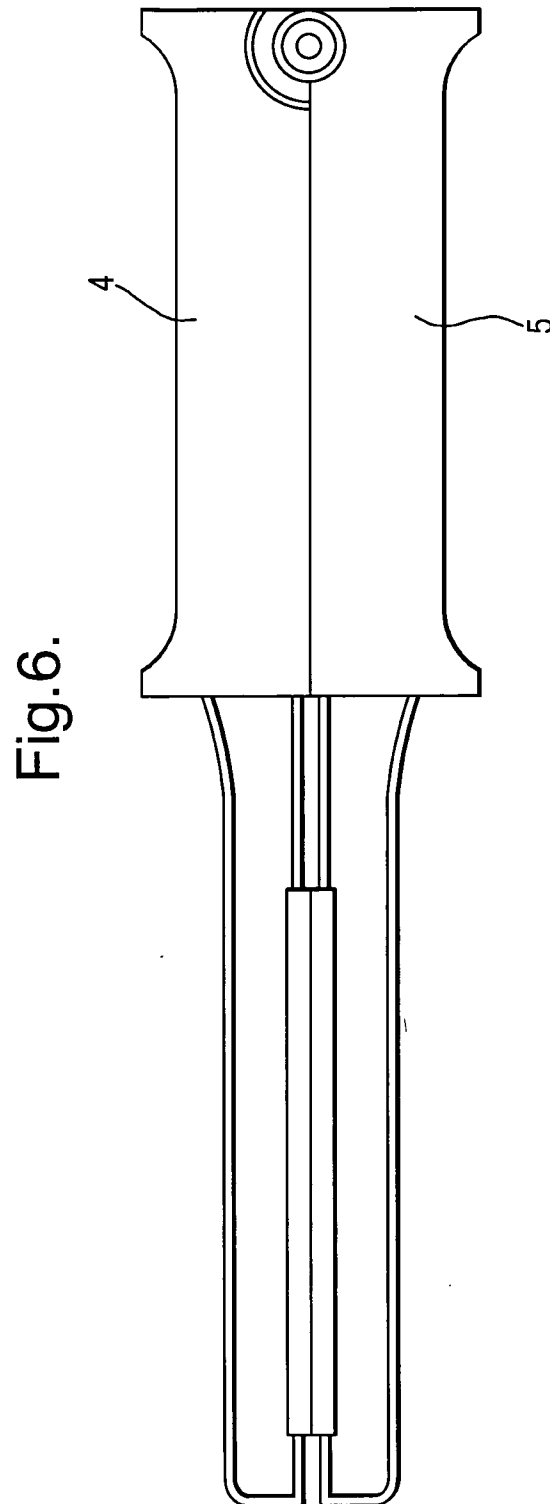
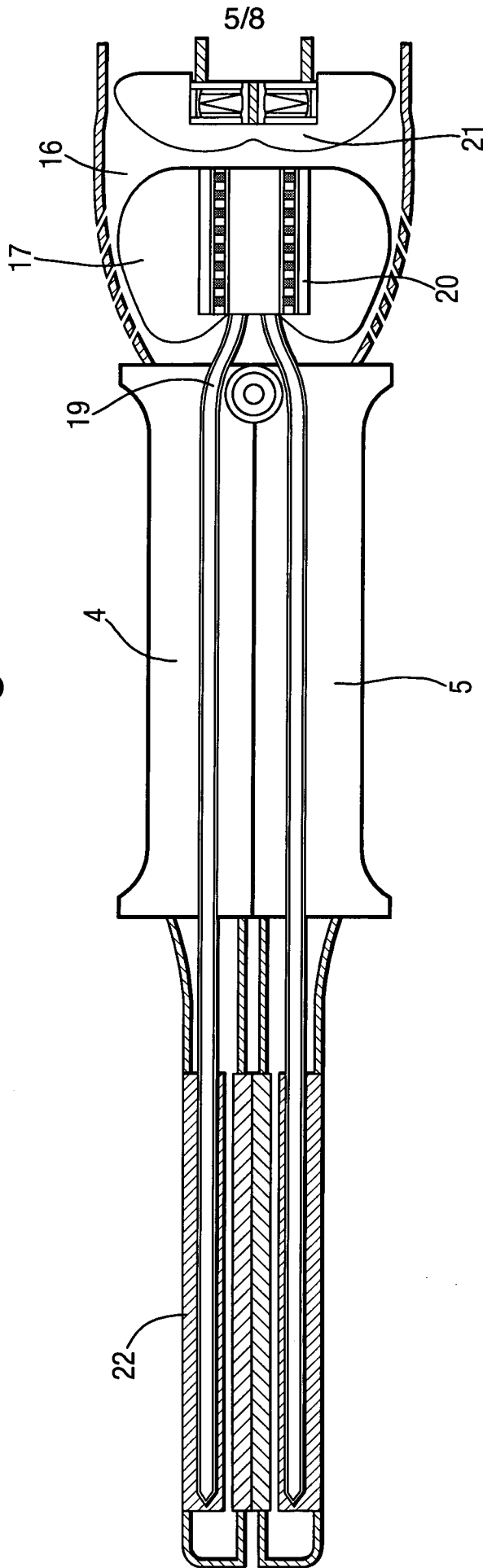


Fig.7.



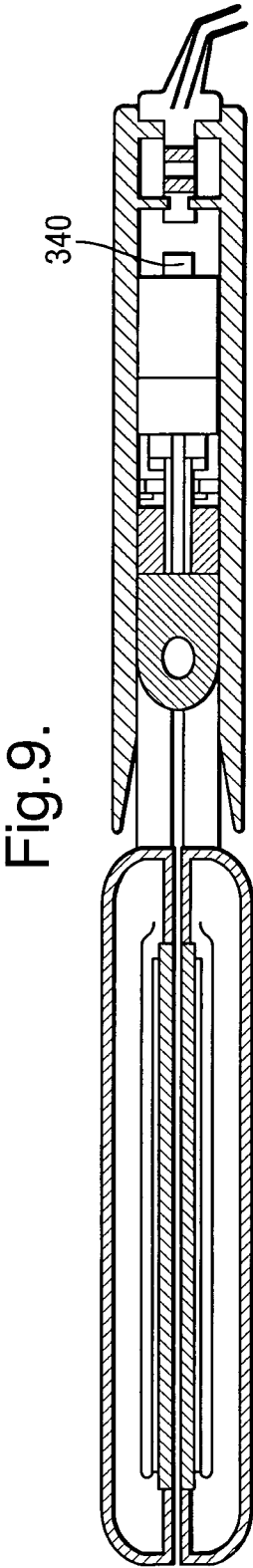
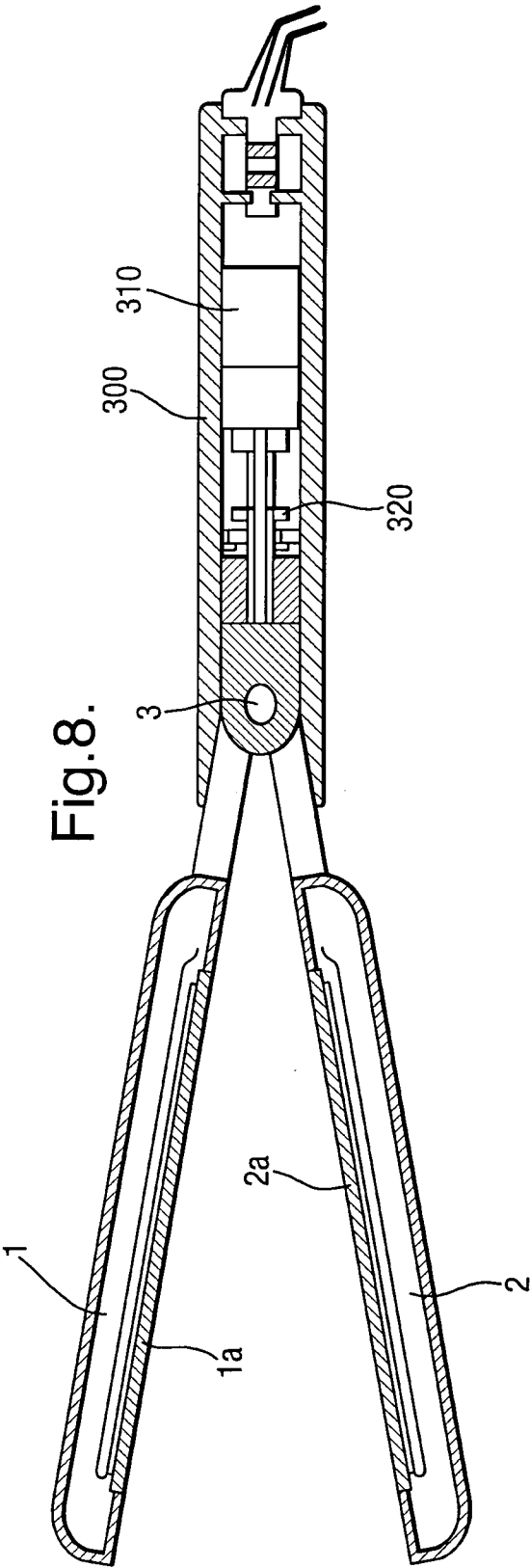


Fig.10.

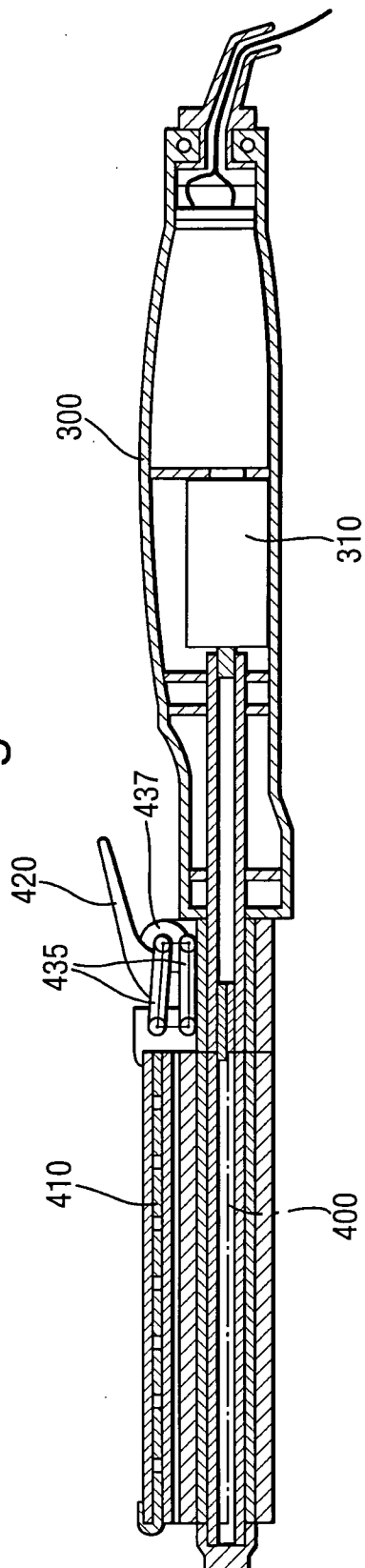
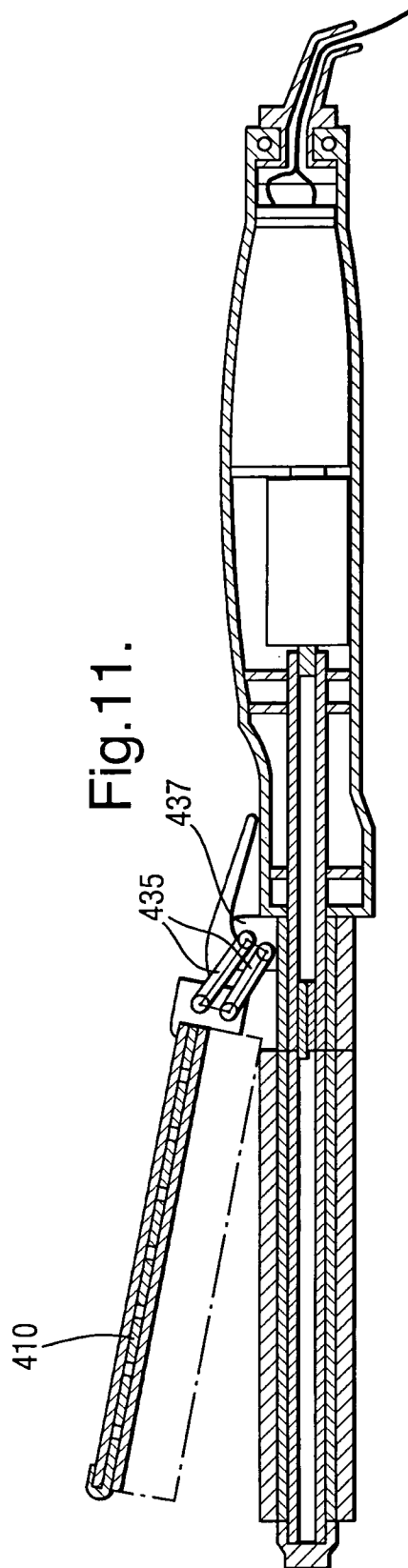


Fig.11.



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Fig.12.

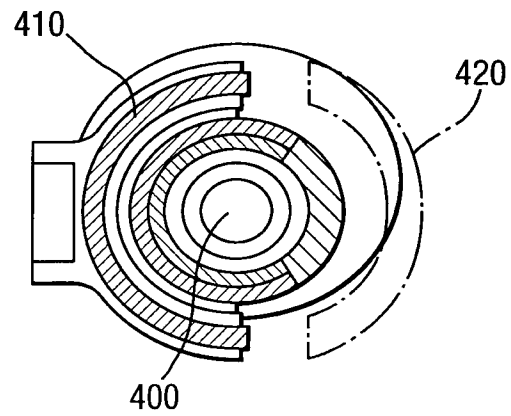


Fig.13.

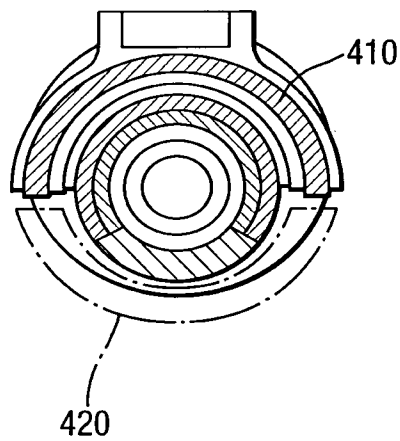


Fig.14.

