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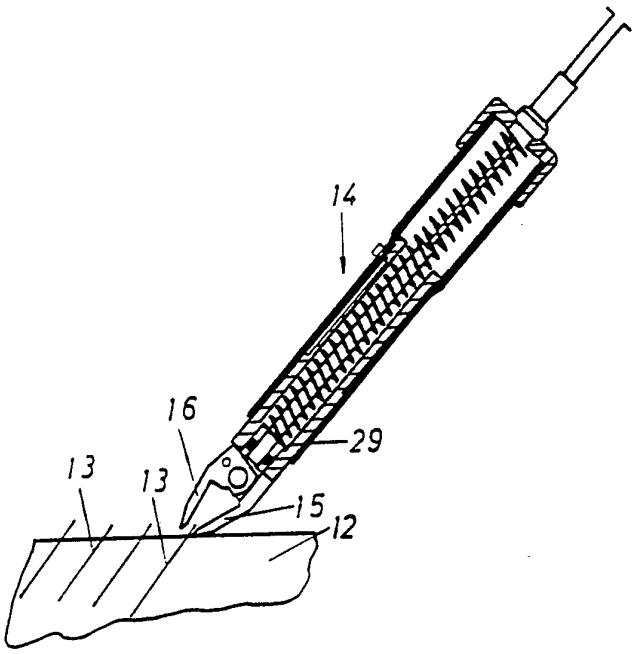

(57) Abstract

A tool (14) for the plucking of nerve bones (13) from fish fillets (12) comprises an elongate holder (18) which is coupled to a double-acting, power-driven movement mechanism (19) and is equipped with a combined gripping and pulling arrangement. The arrangement comprises a support head (17) axially moveable in te holder having an associated first stationarily arranged jaw member (15) and an associated second, pivotably mounted jaw member (16). The movement mechanism (19) ensures that the jaw members (15, 16) jointly grip around a nerve bone (13), pull the latter out of the fish fillet (12) and return position the jaw members to the starting position during release of the extracted fish bone.

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TOOL FOR CLAMPING, LIFTING AND RELEASING OF PARTS FROM A BASE.

The present invention relates to a tool for clamping, lifting and releasing of one or more specific parts from a base, for example for the plucking of bones (nerve bones) from fish fillets, comprising an elongate holder having a support head axially moveable in the latter, which at the one end is coupled to a power-driven, double-acting movement mechanism and which at the other end is provided with a combined gripping and pulling arrangement having associated jaw members directed outwards substantially axially, where the jaw members are pivotable relative to each other about a common or each about its respective transverse axis on the support head or where a first jaw member is stationarily arranged on the support head, with an associated jaw fase projecting endways freely outwards from one side of the support head, while a second jaw member is pivotably mounted about a transverse axis on the support head, with an associated jaw face projecting endways freely outwards from the other side of the support head, for swinging of the second jaw face towards and from the equivalent jaw face of the first jaw member.

The present invention is generally directed to a tool for clamping, lifting and releasing of one or more specific parts from a base, but finds in addition particular

application to certain definite technical areas for handling foodstuffs by virtue of special detailed solutions which make it possible to reduce the danger of contamination of the foodstuffs on treatment of the latter. In certain instances, the object or the part, which is to be clamped, lifted and thereafter released, can be arranged to lie freely on a base, while in other instanses it can be secured relative to the base in a different manner, for example secured by means of extra holding and gripping means or secured in the foodstuff itself which is to be treated.

It is an objective to develop a manually operable tool and particularly a one-handed operable tool, which is readily available for use in connection with a particular work location and which is of a particular light weight design which is easily constructed and easy to operate. In particular the aim is to reduce muscle-straining labour movements for the operator and also as far as possible a reduction of noise in connection with the operation of the tool. However the tool will also be able to be utilised in connection with a machine which requires minimal manual attention.

For certain applications the tool is adapted for use in connection with the treatment of foodstuffs in humid (for example extremely humid) and aggressive environments, where maximum demands are placed on hygiene and bacteriological control. The tool is illustrated and described herein as an example in connection with the plucking of bones (nerve bones) from fish fillets. However the tool can also find application in a succession of other areas, with respect to both foodstuffs and other arbitrary goods. The tool can be used in connection with special labour operations and particularly labour operations which are preferably carried out by means of manual labour power.

A current alternative application in connection with the filleting of fish, is for scraping off of fish flesh from cut out backbone columns after the filleting operation.

Correspondingly the tool can find application for removing stalks, casings, root parts, protuberances and the like from fruit, berries, vegetables, flowers, plants, and the like.

The tool can also be used for pulling loops, knots, threads, nails, and the like from textiles, mats or other objects. The tool can also be applied for general gripping and lifting of objects of regular and irregular form from a base.

In the following the invention shall be particularly described as an embodiment in connection with the plucking of bones (nerve bones) from fish fillets.

After a fish is filleted and one has removed the backbone and side bones there remain a series of bones, so-called nerve bones, which are localised about the middle in the thick fillet of the fish fillet. An amount of work is involved in effecting removal of the said nerve bones and with respect to the marketability of the product it is necessary that these bones are also removed before further treatment of the fish fillet (dividing up into pieces and the like). In some instances the series of such nerve bones is collectively cut out of the fish fillet by means of incisions in the fish fillet. This is undesired for several reasons, for one thing as a result of losses of fish flesh and for marketing reasons, such as aesthetic grounds, when the remaining portion of the fish fillet is concerned. In other instances, and this applies in particular to more refined sorts of fish such as salmon, trout among others, each of the nerve bones is extracted from the fish fillet one after the other with the aid of manual labour power. The extraction of the nerve bones has hitherto been performed by the operator gripping each individual bone with pincers and thereafter drawing the bone out of the fish fillet by a combined pulling and bending movement. The operation assumes that one can draw out such bones in rapid succession, for example with a bone sequence of about thirty bones over the course of 1/2 to 1 minute. Such combined pinch, pull and bend movements in rapid succession and partially with significant power in each pulling operation, exerts a big strain on the operator. It is not usual that an operator can undertake the work over a longer period of time, precisely as a consequence of the big strain the operator recives in the work situation.

Special problems arise in the handling of fresh fish, since in such cases an extra large pulling force is required in order to be able to draw the nerve bones out of the fish flesh are extracted together with the nerve bone and leave behind cuts in the flesh of the fish. In practice therefore matters are arranged to pull out the nerve bones from the fish fillet first after the fish fillet has hardened, for example after a prior treatment, such as freezing, curing, marinating, "graving", etc.. However there is a need to be able to effect the extraction of the nerve bones in the same production line as the filleting operation and the like, that is to say with the fish in fresh condition, the bone extraction then being able to effected in an efficient manner and so that the fish fillet is thereby made ready to a greater extent than hitherto normal in connection with the fish filleting itself.

With the present invention the objective is to procure a tool which can replace the otherwise conventional pincers which are employd for the extraction of nerve bones and where first and foremost the aim is to reduce the strain of the operator in connection with the extraction operation, but where there is also the possibility to achieve in a ready manner great efficiency even with relatively unfamiliar labour power. The aim is also to increase the work efficiency of the operator far above that which is normal for å particularly fast working operator, by way of simple means.

The tool according to the invention is characterised in that the movement mechanism comprises a wire, which is axially moveably received in a wire stocking, and a cooperating compression spring, one end of the wire stocking being fastened to a remotely disposed support arrangement having an associated power means received in the same and its opposite end being fastened to the rear end of the holder, while one end of the wire is connected to the power means and its other end is connected to the jaw members or to the second jaw member via an associated guide member in the support head, and the compression spring ensures a two step movement of the jaw members, that is to say a first movement of the jaw members relative to each other and a subsequent second movement of the jaw members jointly, and vice versa.

By employing according to the invention a remotely disposed drive source (power means), one has the possibility of considerably reducing the noice of the tool at the work location and by transmitting the drive force via a wire and associated guide-forming stocking a simple tool construction can be ensured which has low weight and small volume and which is thereby well suited to manual operation. One can also relieve the weight of the tool by allowing the weight of the tool to be carried by the wire stocking and achieve a simple operation of the tool by a cooperation between the power-driven, axially moveable wire and its guide-forming stocking.

According to the present invention it is possible to effect a simple and effective cleaning, by submerging the appliance in cleaning fluid, without danger of damaging the tool by such cleaning. The cleaning can if necessary comprise sterilisation of the appliance.

According to the invention it is possible by simple means to effect the gripping movement, the pulling movement and the return positioning movement of the jaw members and the release of the extracted fish bone from the jaw members in rapid succession by means of a simple, self-controlling work cycle with the aid of simple means. In particular it is possible, by exerting a momentary acting force against the fish bone, after the latter is gripped by the jaw members, to effect the extraction with a rapid jerk, something which makes it easier to release the fish bone from the fish fillet than by conventional manual extraction. This last-mentioned situation is particularly advantageous in the extraction of fish bones from fresh fish.

According to the invention is has been made possible for one and the same operator to practise the extraction of nerve bones as fulltime work, without substantial work strain, since the work functions of the operator have become essentially reduced and simplified.

Further features of the invention will be evident from the following description having regard to a pair of embodiments, which are described as follows with reference to the accompanying drawings, in which:

Fig. 1 shows a schematic arrangement of tool and associated power-driven movement mechanism.

Fig. 2 shows a longitudinal section through the tool, illustrated in an inactive condition and seen from the rear side of the tool.

Fig. 2a shows a section of Fig. 2 on a larger scale.

Fig. 3 shows the same as in Fig. 2, seen from one side of the tool.

Fig. 4-8 show in four successive positions correspondingly four successive working steps of the tool in connection with a fish bone which is extracted from a fish fillet.

Fig. 9 shows in perspective the tool in connection with a support foot.

Fig. 10 shows an alternative design of the tool as shown in Fig. 9, equipped with a handle for one-handed operation.

Fig. 11 shows in a perspective view an alternative design of the one jaw member.

Fig. 12 shows in a perspective view an alternative design of the second jaw member.

Fig. 13 and 14 show in end view the two jaw members, as illustrated in Figs. 11 and 12, shown in an open working position, in broken lines, and in a closed position in full lines.

Fig. 1 there is shown a work table 11 with a fish fillet 12 which is supported on the latter. A series of nerve bones 13 are indicated in the fish fillet. Furthermore there is shown a tool 14 according to the invention for extraction of the nerve bones 13 one after the other from the fish fillet 12.

The tool 14, which is shown in detail in Figs. 2 og 3, is equipped with two jaw members 15 and 16 which shall grip around the outer end of a nerve bone 13 (see Figs. 4 and 5). The jaw members 15, 16 are fastened to a support head 17 which can be moved axially backwards and forwards in turn to the starting position in a holder 18. The folder 18 is connected at its rear end to a power-driven, double-acting movement mechanism 19 which provides for movement of the jaw members 15, 16 forwards and backwards in relation to each other and

which in addition provides for movement of the jaw members together with the support head in a forwards and backwards movement axially relative to the holder.

In the illustrated embodiment there is employed a movement mechanism (see Figs. 1-3), which comprises a pulling wire 20 which is axially moveable in a surrounding wire stocking 21. One end 21a of the wire stocking 21 is connected to a support-forming coupling box 22, while its opposite end 21b is connected to rear end 18a of the holder 18. The wire 20 itself is connected at its one end 20a to drive piston in a pneumatically driven cylinder (not shown further) received in the coupling box 22 and is connected at its opposite end 20b to moveable parts of the tool, as will be described in detail below. On the coupling box there is shown an intake nipple 23 for compressed air and an outlet nipple 24 for connection to an additional coupling box for a corresponding tool. On the coupling box there is shown an on/off switch 25 and a stroke control valve 26 for regulating the frequency of stroke in the pneumatically driven cylinder. The operative speed (the frequency of stroke) of the tool 14 can be regulated directly via the valve 26 in the coupling box 22 or via a valve or other regulating arrangement in the holder of the tool. Correspondingly one can have an on/off switch 25 in the coupling box and an additional on/off switch (not shown further) on the tool itself. For example with a push button function, which is activated when the operator grips around the grip portion of the tool, a simple start and stop can be achieved as required.

The coupling box 22 is fastened to a roof fastening 27 via an upper, telescopically extendable support arm 28, whereby the height position of the coupling box 22 can be adjusted relative to the work position and also thereby the level of movement of the tool 14 itself which is connected to the coupling box via the wire 20 and associated wire stocking 21.

As shown in Figs. 2 and 3 the holder 18 is designed with a substantially cylindrical pipe-shaped housing member 29, the rear end of which is provided with an external screw thread 30 which cooperates with an equivalent internal screw

thread 31 in an end cover 32 which covers the rear end of the holder and which forms a fastening for the wire stocking 21 via a fastening nipple 33. Internally in the housing member 29 a first pipe-shaped piston member 34 is axially displaceably received, which at the one end is provided with a support head 17 having the associated jaw members 15, 16. The support head 17 is shown with a cylindrical shape and is followed by a middle and rear, cylindrical shaft portion 35. The shaft portion 35 is provided rearmost with a radially outwardly projecting annular flange 38. In the starting position, as shown in Figs. 2 and 3, the stop flange 38 is led into abutment with an abutment-forming shoulder portion 39 at the front end of rear, radially expanded guide in the housing member 29. The stop flange 38 can be guided along internal guide 40 of the housing member 29 over towards the rear end of the holder 18. The lenght of movement of the piston member 34 in the housing member 29 is defined by means of a guide groove 41 in the middle and rear cylindrical shaft portion 35 of the piston member and a guide pin 42 fastened in the housing member 29. By means of the guide groove 41 and the guide pin 42 unintentional rotation of the piston member 34 in the housing member 29 can be simultaneously counteracted. At 43 and 44 there are shown annular seals between the piston member 34 and the housing member 29.

In the illustrated embodiment a first jaw member 15 is shown, stationarily fastened to the support head 17, which is fastened to one side of the support head 17 relative to a axial plane through longitudinal axis 34a of the piston member 34, while on the other side of the support head relative to said axial plane, a second jaw member 16 is pivotably mounted on the support head about a transverse axis 17a. The jaw member 15, which extends radially from outside and obliquely inwards towards said axial plane at the longitudinal axis 34a, has an outer, inwardly facing jaw face 15a extending parallel to the longitudinal axis 34a and tightly up to the latter. The jaw member 16 on the other hand, which in its starting position extends substantially parallel to the axial plane through the longitudinal axis 34a, has the jaw face 16a arranged at a certain distance from the axial plane through

the longitudinal axis 34a. In the inwardly swung postition (see Fig. 5) of the jaw member 16 the jaw face 16a is arranged substantially parallel to the jaw face 15a, tightly up to said axial plane through the longitudinal axis 34a.

The pivotable jaw member 16 is designed as an L-shaped, two-branched pivot arm which carries the jaw face 16a at the one branch end and which at the opposite branch end forms a ball head fastening 45 for a ball head 46 on a bar-shaped second piston member 47, the jaw member 16 approximately at the middle portion, that is to say at the angle point of the L shape, being pivotably mounted about a transverse axle pin 48. The opposite end of the second piston member 47 is secured to said other end 20b of the wire 20 by means of a screw fastening 49. The piston member 47 carries a guide member 50 which is displaceably received in a guide 51 internally in the outer end of the first piston member (axially just within the support head 17). Axially just within the guide 51 there is formed by means of a shoulder portion 52 a first stop 53 for a compression spring 54, the opposite end of which forms an abutment against a stop 55 internally in the end cover 32. The spring 54 forms a part of the double acting movement mechanism 19. The spring surrounds the second piston member 47, while the first piston member 34 surrounds the front end of the spring and the rear portion of the housing member surrounds the rear end of the spring.

On exerting a pull in the wire 20 from the starting position as shown in Fig. 1 or Fig. 4, the jaw member 16 is pivoted from the position shown in Fig. 4 to that in Fig. 5, until the jaw members 15, 16 jointly clamp the outer end of a fish bone 13 between them, as is shown in Fig. 5. By exerting an additional pull in the wire 20 the piston member 34 with associated jaw members 15, 16 and intermediate leg 13 is drawn axially inwards into the housing member 29, as is shown in Fig. 6, during compression of the spring 54.

In practice the spring 54 is placed in between the stops 53, 55 with a certain prestressing, so that a gripping engagement is ensured between the jaw members 15, 16 and the leg 13, before the piston member 34 is drawn inwardly into the housing member 29. That is to say one provides for a short "dead" time

for or a certain time delay for the drawing operation, in order ensure the gripping engagement before the drawings is set in motion. A double acting pneumatic cylinder is employed for movement of the movement mechanism 19 forwards and backwards. At the first pressure stroke the wire 20 is drawn during the pulling action against the force of the spring 54. In the subsequent, oppositely directed pressure stroke the wire 20 is pushed back in order to return the piston member 34 to the starting position as shown in Fig. 7. Simultaneously with this the force of the spring 54 is released and the spring thereby assists in returning the wire to the starting position and thereby the jaw member 16 to the starting position, as shown in Fig. 8. Simultaneously with this the fish bone is released from the grip between the jaw members 15 and 16.

In the described embodiment the objective is that the operator shall hold the appliance in a fixed position relative to the fish fillet from the engagement with the fish bone being finally extracted from the fish fillet, thereafter the appliance (during the return positioning of the tool and the release of the extracted fish bone) being displaced along the fish fillet for fresh engagement with a subsequent fish bone. Immediately the extracted fish bone is released from the appliance the appliance can be adjusted into a new position in readiness for extraction by the latter. The aim is to secure the fish fillet with the one hand and guide the tool in relation to the fish fillet with the other hand and then with minimal movements for and with minimal exertion of force by the operator.

According to an alternative embodiment, as shown in fig. 9, one hand of the operator, which is guided towards the fish fillet, can be released, and instead the tool is allowed to be guided in a sliding abutment directly against the fish fillet via a support foot 60 which is fastened to the holder 18 an which surrounds the first, stationarily fastened jaw member in a substantially bow-shaped contour. The support foot 60 is fastened to the tool via a ferrule 61 which can be fixed with fastening screws 62 in a particular axial position relative to the tool. By means of support arms 63, 64 and associated

fastening screws 65, 66 the support foot 60 is fixable in various angular positions about an axis through the fastening screws 65, 66 relative to the tool. The support foot is itself provided with a lower, preferably substantially plane support surface 67, which forms an abutment directly against the fish flesh side of the fish fillet on opposite sides of and behind the series of fish bones 13, while a front V-shaped groove 68 (which ?) is defined between a pair of forwardly and outwardly diverging guide faces 69, 70. On displacement of the support foot along the series of bones 13 an effective, easily controlled guidance of the tool can be ensured from bone to bone in the series of bones with an accurate engagement between the jaw members and free upwardly projecting bone ends of the subsequent bones.

By employing a tool which is fastened to and connected with an elongate and flexible movement mechanism (wire with associated stocking) for the tool and by arranging the power-producing means to lie remotely, one has a great operative possibility for the tool with relatively small weight strain on the operator. By employing according to the design of Fig. 9 an extra support foot on the tool the operator achieves an additional weight relief of the tool from the hand to the base. It can also be appropriate to load the support foot with a light pressure in order to press the support foot to a support layer on the fish fillet and with this ensure that the fish flesh with associated nerve bones is pressed locally upwards into the groove between guide faces of the support foot.

In the illustrated embodiment the tool is considered employed as a hand tool, but it will also be possible to allow the tool to form a part of a machine for mechanically extracting nerve bones from the fish fillet, without a concrete embodiment of the latter being illustrated and described.

Fig. 10 shows a tool 114 corresponding to the tool 14, as shown in Fig. 9, but provided in addition with a special handle 120, which projects obliquely upwards and backwards from the lower portion of the tool. The handle 120 is equipped with extra control button 121 for the supply of pressurised water or compressed air via a separate feed conduit 122

through the handle 120 to a nozzle outlet 123 just by jaw members 115, 116 of the tool on the upper side of a plane support surface 167 of a support foot 160. By means of compressed air one can readily achieve by blow power removal of the bone, which is extracted from the fish fillet, from jaw members 115, 116 of the appliance by leading the compressed air axially along the jaw members.

In Fig. 10 a right-handed design of the appliance is shown where the one, most remotely disposed jaw member 115 in Fig. 10 is stationarily arranged in the associated holder member 117 and arranged flush with and along the inner portion of one guide edge 170 of the support foot 160, while the other, closest disposed jaw member 116 in Fig. 10 is moveable towards and from the stationarily arranged jaw member 115. The jaw members 115, 116 are shown with an approximately L-shaped outline, that is to say with an obliquely downwardly extending shaft portion 115a, 116a and a horizontally outwardly directed jaw portion 115b, 116b. By this means the operator has a visual general view over the engagement between the jaw members and the object which is to be gripped by allowing the object to form a support abutment against the one, stationarily arranged jaw member. For the operator who prefers a left-handed design of the appliance the jaw members can be arranged in a mirror image-formed manner (not shown further).

Fig. 11 shows an alternative design of the one, stationarily arranged jaw member 215. The jaw member 215 is shown with an obliquely downwardly extending shaft portion 215a and relative to the latter a horizontally angled jaw portion 215b. The shaft portion 215a is adapted during use to extend obliquely downwards towards the base at an angle of for example 75 degrees, while the shaft portion 215b is adapted to extend substantially horizontally, that is to say parallel to the base. An upper jaw face 215c and a lower jaw face 215d are shown together with an intemediate groove 215e. The jaw faces 215c and 215d are provided with mutually parallel extending grooves 200 which run parallel to the main axis of the shaft portion 215a and consequently somewhat obliquely positioned relative to the main axis of the shaft portion 215b. The jaw portion 215b is shown with a relatively elongate dimension in

a horizontal direction, so that one can simultaneously grip several objects in series between two parallel extending jaw members.

It is of interest in a first embodiment to employ two cooperating jaw members which are designed in mutual mirror image form, corresponding to the jaw member as shown in Fig. 11. In a case where both jaw members are separately pivotable relative to a common holder, the objective is to move the jaw members towards and from each other about a common pivotal axis which extends across a plane through the main axes of the shaft portions, so that the cooperating shaft portions can be moved towards and from each other in a mutually substantially parallel path.

In a second, preferred case where the one jaw member is stationary in relation to the second jaw member, this stationary jaw member can form the "controlling" member for engagement with the object which is to be gripped. In such a case only the second jaw member will be moved, that is to say swung towards and from the stationary jaw member. In the preferred case there are employed in practice two different designs, that is to say a left-handed design and a right-handed design of tool, that is to say with the one, left jaw member stationary in the case of a left-handed tool and with the one, right jaw member stationary in the case of a right-handed tool. The operator can in such instances have a better general view over the engagement between the object/the objects which is/are to be gripped and the "controlling" jaw member. Consequently the object/the objects can be gripped in a relatively accurate engagement immediately the second jaw member is swung towards the stationary, "controlling" jaw member.

In Fig. 12 a second jaw member 216 is shown, of similar design to the jaw member 215 as illustrated in Fig. 11 and provided with a shaft portion 216a and a jaw portion 216b. The most significant difference consists in the jaw portion 216b being provided with a rib-shaped projection 216e between an upper jaw face 216c and a lower face 216d.

In Fig. 13 the two jaw member 215 and 216 are shown in an open operative position with a fish bone (nerve bone) projecting outwardly from a fish fillet with lateral support

against the jaw member 215. In Fig. 14 the two jaw members 215, 216 are shown in a closed operative position, with the fish bone clamped between the jaw members 215, 216 and at the same time intermittent elastic deformation of the fish bone in an arcuate outline between equivalent pairs of jaw surfaces 215c, 216c and 215d, 216d of the jaw members and between the groove 215e and the projection 216e. By this means an effective gripping engagement is obtained with the fish bone for subsequent extraction of the latter from the fish fillet. Thereafter on the subsequent outward swinging of the jaw member 216 back to the opened starting postition, as shown in Fig. 13, the fish bone can as a result of an inherent elasticity bounce back to the original outline at the same time as it is released from the jaw members. In this connection a nozzle correspondingly as shown in Fig. 10 can empty out in the end of the groove 215e in a manner not shown further. The nozzle can for example be coupled to a supply of compressed air, for example from the same source of compressed air which controls the opening and closing of the jaw members. By means of compressed air which is fed axially through the groove 215e one can ensure that the extracted, uncovered fish bone is blown away from the jaw members 215, 216.

CLAIMS

1. Tool (14, 114) for clamping, lifting and releasing of one or more specific parts from a base, for example for the plucking of bones (nerve bones) (13) from fish fillets (12), comprising an elongate holder (18) having a support head (17, 117) axially moveable in the latter, which at the one end is coupled to a power-driven, double-acting movement mechanism (19) and which at the other end is provided with a combined gripping and pulling arrangement having associated jaw members (15, 16; 115, 116: 215, 216) directed outwards substantially axially, where the jaw members are pivotable relative to each other about a common or each about its respective transverse axis on the support head (17, 117), or where a first jaw member (15, 115, 215) is stationarily arranged on the support head (17, 117), with an associated jaw face (15a; 215c, 215d) projecting endways freely outwards form one side of the support head, while a second jaw member (16, 116, 216) is pivotably mounted about a transverse axis (17a) on the support head (17, 117), whith an associated jaw face (16a; 216c, 216d) projecting endways freely outwards from the other side of the support head, for swinging of the second jaw face towards and from the equivalent jaw face of the first jaw member, characterised in that the movement mechanism (19) comprises a wire (20), which is axially moveably received in a wire stocking (21), and a cooperating compression spring (54), one end (20a) of the wire stocking being fastened to a remotely disposed support arrangement (22, 27, 28) having an associated power means received in the same (coupling box 22) and its opposite end being fastened to the rear end (18a) of the

holder (18), while one end (20a) of the wire (20) is connected to the power means and its other end (20b) is connected to the jaw members or to the second jaw member (16; 116, 216) via an associated guide member (47) in the support head, and the compression spring (54) ensures a two step movement of the jaw members, that is to say a first movement of the jaw members relative to each other and a subsequent second movement of the jaw members jointly, and vice versa.

2. Tool in accordance with claim 1, characterised in that the support head (17) is formed at the outer end of a pipe-shaped, first piston member (34), which is axially moveable in an equivalently pipe-shaped housing member (29), which constitutes the main part of the holder (18), the compression spring (54) being arranged between a first stop (53) in the axial inner end of the housing member (29) and a second stop (55) in the axial outer end of the first piston member (34), the wire (20) being connected to the one end of a preferably bar-shaped, second piston member (47), which is axially moveable in the first piston member (34) radially within the compression spring (54) and which is connected at the opposite end to the second, pivotable jaw member (16), for pivoting of same relative to the first jaw member (15).

3. Tool in accordance with claim 2, characterised in that the compression spring (54) is set up between the first and second stops (53, 55) with a certain prestressing, in order thereby to allow in the starting position of the support head (17) a separate pivoting of the second jaw member (16) relative to the support head (17) and the first jaw member (15).

4. Tool in accordance with one of the claims 1-3, characterised in that the movement mechanism (19), which comprises a double-acting, pneumatic drive cylinder, is driven intermittently with pneumatic drive medium in the one direction and with pneumatic drive medium and spring force in the opposite direction, the movement stroke being regulated with a stroke regulating switch (26).

5. Tool in accordance with one of the claims 1-4, characterised in that a support foot (60), for pushing the tool (14, 114) against the base (the fish fillet 12), is arranged just by the first jaw member (15, 115, 215), with jaw face (15a; 215c, 215d) of the latter uncovered relative to the support foot.

6. Tool in accordance with claim 5, characterised in that the support foot (60, 160) has a bow-shaped or U-shaped outline outside jaw face (15a) of the first jaw member (15, 115), the support foot projecting a distance beyond jaw face (15a) of the first jaw member (15, 115) with a pair of oppositely disposed bow legs, which between their respective forwardly diverging lead faces (69, 70; 169, 170) define a U-shaped guide groove (68) for centering of the support foot relative to an object (a fish bone on a fish fillet) which is to be gripped.

7. Tool in accordance with one of the preceding claims 5-6, characterised in that the support foot (60, 160) just by the first and second jaw member (15, 16; 115, 116) carries a pressurised water or compressed air flushing arrangement (121-123) which has a nozzle mouth (123) directed towards the object which is to be received between the jaw members.

8. Tool in accordance with claim 7, characterised in that the nozzle mouth (123) empties directly in at least jaw face (215c, 215d) of the one jaw member (215) into a groove (215e) extending axially in the latter, opening laterally relative to the latter.

9. Tool in accordance with one of the claims 1-7, characterised in that the jaw face of the one jaw member (215), which is formed by an upper face portion (215c) and a lower face portion (215d), has a middle, axially extending, laterally opening groove (215e), while jaw face (216) of the

second jaw member, which is correspondingly formed by an upper face portion (216c) and a lower face portion (216d), has an equivalent middle, axially extending projection (216e) projecting laterally outwards.

FIG.1

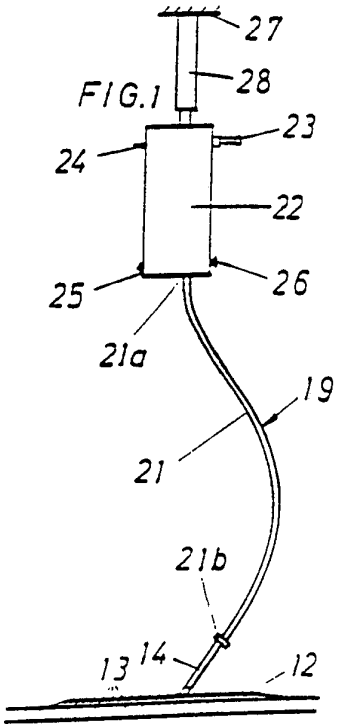


FIG.2

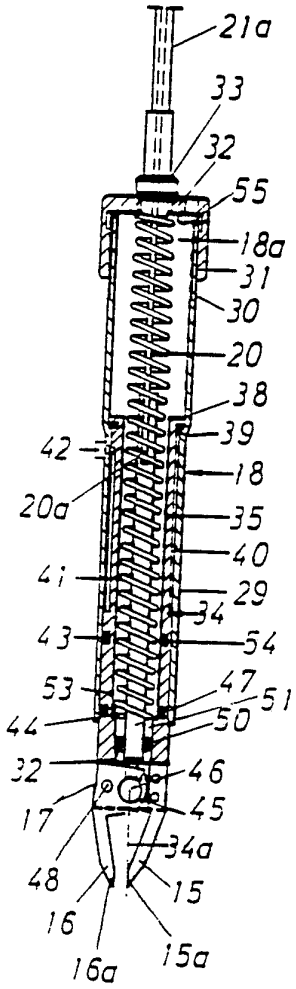


FIG.3

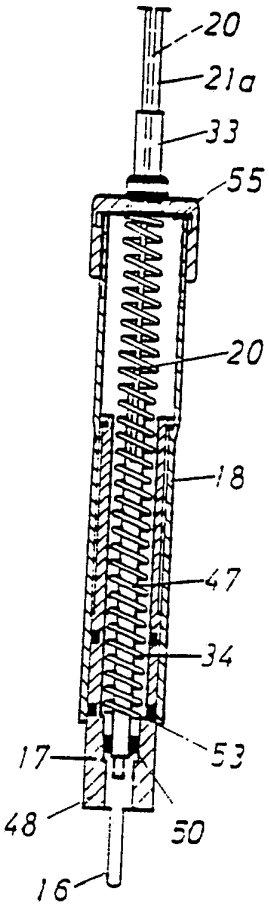


FIG.2a

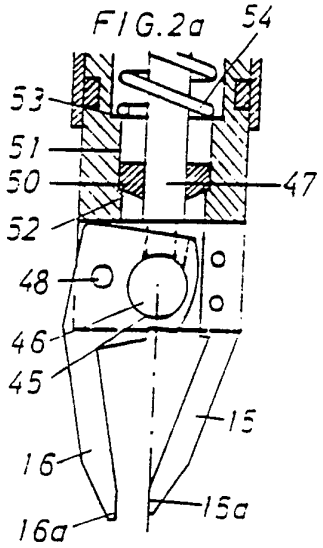


FIG.9

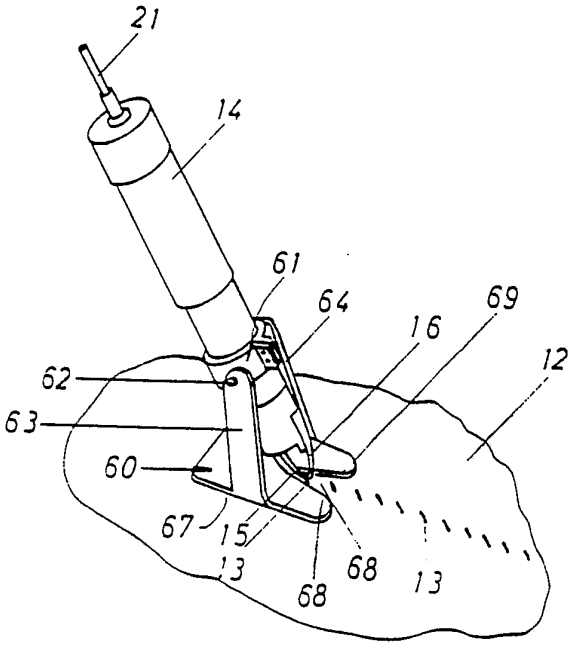


FIG. 4

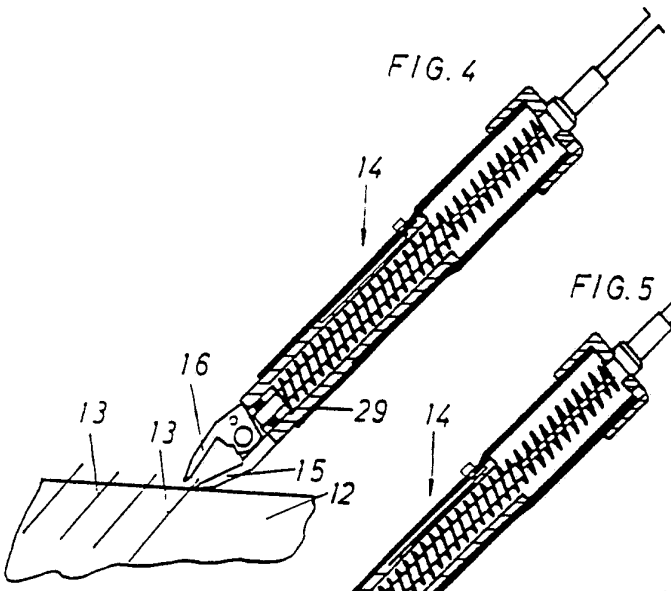


FIG. 5

FIG. 6

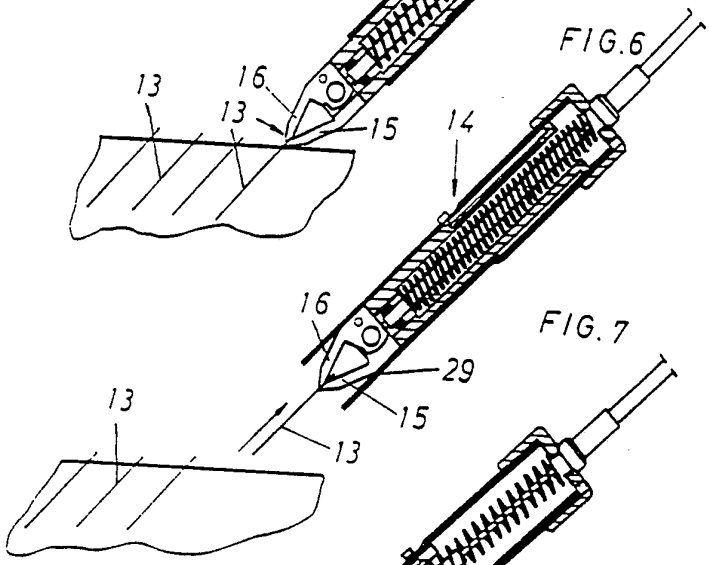


FIG. 7

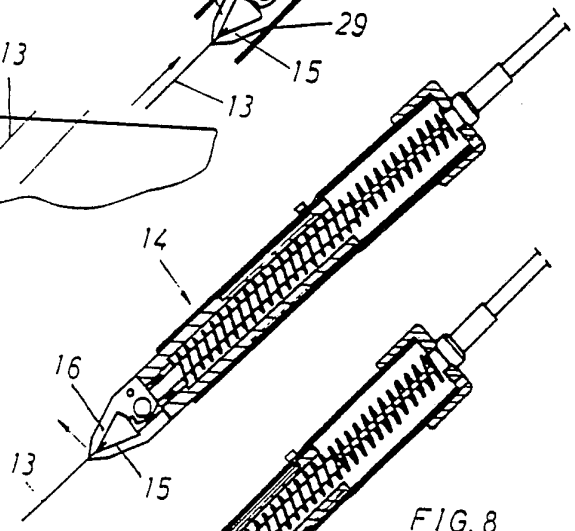


FIG. 8

FIG. 10

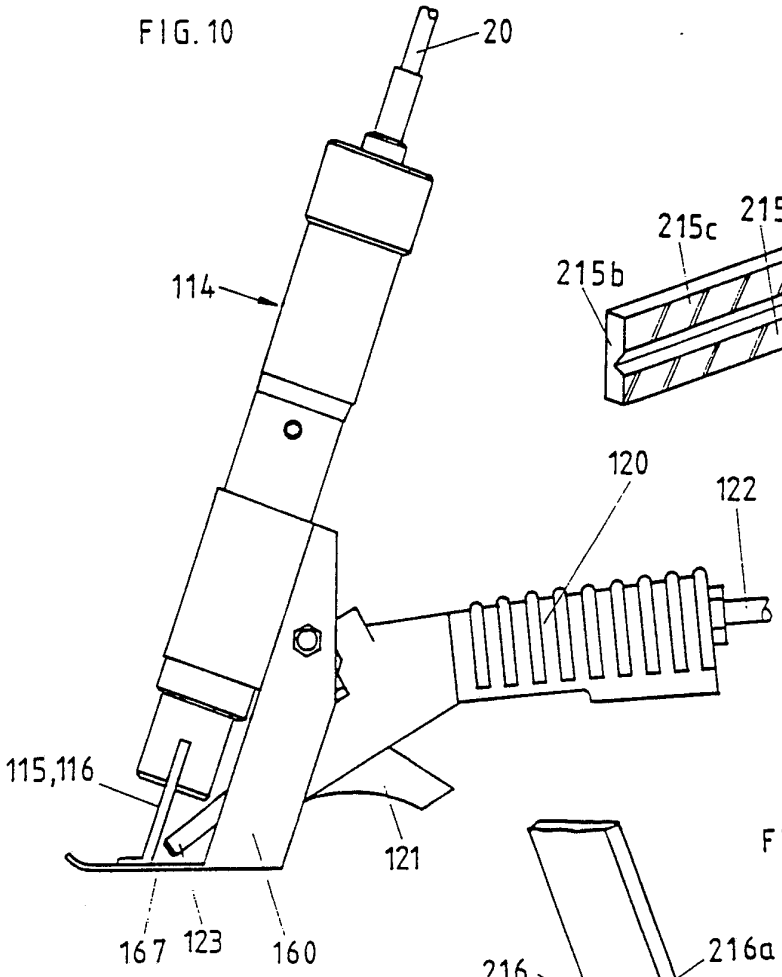


FIG. 11

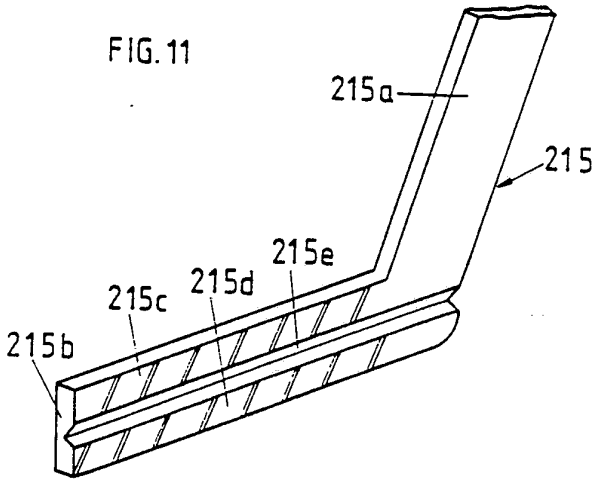


FIG. 12

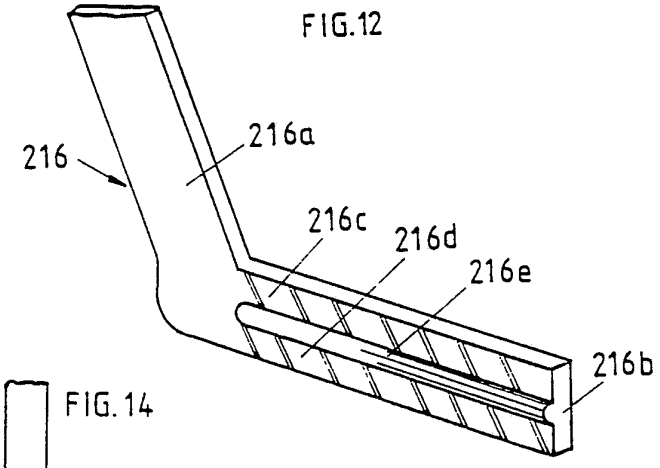


FIG. 13

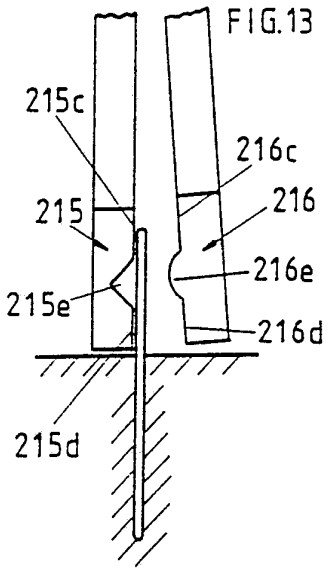
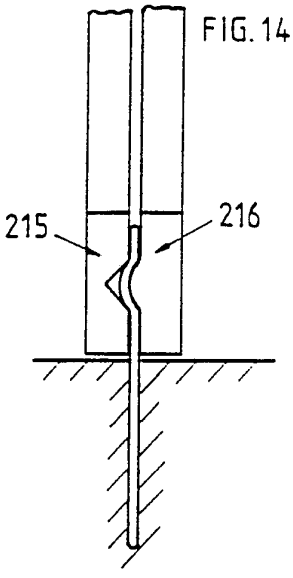


FIG. 14



INTERNATIONAL SEARCH REPORT

International Application No PCT/NO 92/00004

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC5: A 22 C 25/16

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
IPC5	A 22 C

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched[8]

SE,DK,FI,NO classes as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category *	Citation of Document,[11] with indication, where appropriate, of the relevant passages[12]	Relevant to Claim No.[13]
X	US, A, 2082263 (FLOYD V. SCHLEIMER) 1 June 1937, see the whole document --	1-4
X	EP, A1, 0341335 (FRISCO-FINDUS AG) 15 November 1989, see figures 1,3; claims 1-13 --	1-3
X	US, A, 3943600 (CRAMER) 16 March 1976, see column 5, line 44 - column 6, line 61 --	1-3
X	GB, A, 412444 (THE NESTLE-LEMUR COMPANY) 28 June 1934, see the whole document --	1-3

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* **Special categories of cited documents:** [10]

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
26th August 1992	1992 -08- 28
International Searching Authority	**Signature of Authorized Officer**
SWEDISH PATENT OFFICE	Agneta Änggård

Form PCT/ISA/210 (second sheet) (January 1985)

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. PCT/NO 92/00004

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the Swedish Patent Office EDP file on 31/07/92 The Swedish Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US-A- 2082263	37-06-01	NONE		
EP-A1- 0341335	89-11-15	AU-B-	616958	91-11-14
		AU-D-	3328989	89-11-16
		US-A-	4945607	90-08-07
US-A- 3943600	76-03-16	NONE		
GB-A- 412444	34-06-28	NONE		