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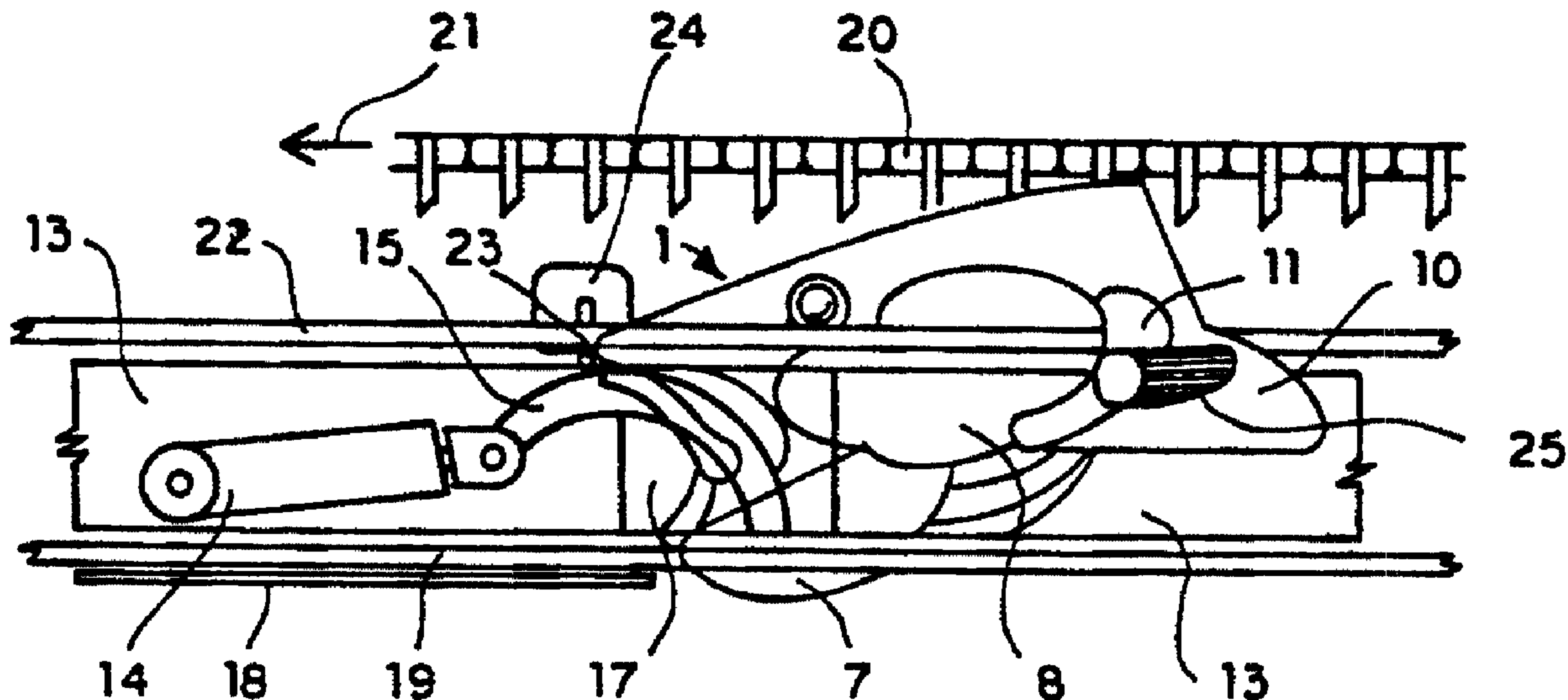
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(54) Title: METHOD AND APPARATUS FOR PROCESSING FISH HEADS



(57) Abrégé/Abstract:

A method and apparatus for cutting tongues, cheeks and belly flaps from fish heads and for cutting apart jaws of fish heads. The fish head is mounted on a reinforced beam beneath a spiked chain which moves the head along the beam, first towards horizontal knives which cut the tongue from the head, and then to vertical knives which cut the cheeks and the belly flaps from the head. Over the tongue knives are jaw rods which hold the jaw up to the beam adjacent the tongue knives. Inside the beam is a stick which can be driven down from the beam to locate the tongue in a cutting position below the tongue knives. The head hits a sensor which activates a power source for the stick. The belly flaps are held up by belly flap rods, which lie beneath the collar bones and keep the belly flaps from the tongue knives. The cheeks and belly flaps are cut off with two vertical cheek knives. Behind the cheek knives, there is a vertical step on the belly flap rods which support the belly flaps while the knives cut the cheeks and belly flaps. The jaw is then cut apart with a jaw knife located on the beam. One of the jaws then falls down a sliding chute which moves the head up and off the beam and then falls into a vat for bones.

## **ABSTRACT**

A method and apparatus for cutting tongues, cheeks and belly flaps from fish heads and for cutting apart jaws of fish heads. The fish head is mounted on a reinforced beam beneath a spiked chain which moves the head along the beam, first towards horizontal knives which cut the tongue from the head, and then to vertical knives which cut the cheeks and the belly flaps from the head. Over the tongue knives are jaw rods which hold the jaw up to the beam adjacent the tongue knives. Inside the beam is a stick which can be driven down from the beam to locate the tongue in a cutting position below the tongue knives. The head hits a sensor which activates a power source for the stick. The belly flaps are held up by belly flap rods, which lie beneath the collar bones and keep the belly flaps from the tongue knives. The cheeks and belly flaps are cut off with two vertical cheek knives. Behind the cheek knives, there is a vertical step on the belly flap rods which support the belly flaps while the knives cut the cheeks and belly flaps. The jaw is then cut apart with a jaw knife located on the beam. One of the jaws then falls down a sliding chute which moves the head up and off the beam and then falls into a vat for bones.

## Method and Apparatus for Processing Fish Heads

### FIELD OF THE INVENTION

This invention relates generally to a method and an apparatus for cutting tongues, cheeks and belly flaps off fish heads.

### 5 DESCRIPTION OF THE RELATED ART

Improved catching techniques and increased catch has led to diminished fish stocks and reduced catches which requires improved utilization of the catch. Icelandic inventors have since 1981 developed machines for processing of heads. In the year 1986 there appeared a machine compression reinforced beam in the mouth of the head beneath  
10 its gum with a transfer wheel above. This transfer device was named gum beam. In 1987 there was introduced a spiked chain above the gum beam, which lengthened the transfer track. Above the gum beam there were two knives which formed a 60 degree angle and cut the headbone from the head resulting in a product called "cheeks" or "faces" including the tongue, both cheeks, the jaw 6 and all adjacent bones. Thus it is  
15 known today to process large cod heads, heads of up to 5 kg, where a cut is made between the collar bones (belly flaps separated).

Salmon has a small head, at most 1 kg, the tongue is small and the cheeks are small, while the belly flaps of the front part are relatively large where a cut has not been made between the collar bones (belly flaps connected on the underside). In 1990 there were  
20 designed three machines for processing front parts of salmon, a machine for cutting and skinning fish from the nape, a machine for cleaning head bone, backbone, gills and organs from the front part, involving a U-shaped, reinforced beam, where the gills and organs were moved into the U-shape and along the beam, and a machine for processing belly flaps from the front part with an intact collar bone (collar bone tie not cut), where  
25 the beam is U-shaped with a knife at the tip that cuts its way through the head beneath the tongue. There the gill flaps and cheeks are elevated with sloping planes and the belly flaps cut off with horizontal knives at the topmost edge of the beam.

Further it is known to manually cut tongues and cheeks from a head. This however is a time consuming job that does not pay and is not worth the effort.

### SUMMARY OF THE INVENTION

5 An object of the invention is to provide a method and a machine for mechanically cutting tongue and cheeks especially from large cod heads and even belly flaps from front parts. Such machine has not existed heretofore.

10 The machine involves a transport track in which a transport guide beam or "gum" beam is located in the mouth of the head under its gum. Above the head is a transport mechanism, for example a spiked chain, which moves the head along the gum beam. This much of the mechanism is known.

15 The machine involves horizontal knives for cutting the tongue and vertical knives for cutting the cheeks and belly flaps. The jaw of the head is held up to the gum beam with the jaw rod and the tongue is pushed down below the tongue knives with a stick which is moved down from the gum beam. The belly flaps are held up and away from the tongue knives with the belly flap rods. A step on the belly flap rods supports the rear part of the belly flaps, while the collar bone is cut. The jaw is cut apart with jaw knife and it falls off the end of the gum beam. The machine as a whole is illustrated in general in FIG. 8, which shows the front part of the fish on its way through the machine.

20 More particularly, and in accordance with one aspect of the invention, there is provided a fish head processing machine for removing portions from a fish head having a mouth, wherein the portions include a tongue, cheeks, jaws, gill flaps and belly flaps, the fish head processing machine comprises:

- 25 a transport guide beam extending through said mouth of said fish head to guide the fish head during movement along the transport guide beam;
- a transport mechanism in the form of a spiked chain which presses a headbone

of the fish head against the transport guide beam and moves the fish head along the guide beam in a longitudinal direction of motion; and

a plurality of cutting knives, each of which lies in a plane parallel to the direction of motion of the fish head to cut the portions from the fish head;

5 the plurality of cutting knives including at least one horizontal tongue cutting knife located beneath the transport guide beam to cut the tongue from the fish head.

In accordance with another aspect of the invention, there is provided a method for removing a tongue, cheeks and belly flaps from a fish head and for cutting a jaw of the fish head comprising the steps of:

10 mounting a fish head on a transport guiding beam by inserting the transport guiding beam through the mouth of the fish head;

moving the fish head along the transport guiding beam in a direction to further insert the transport guiding beam through the mouth of the fish head;

15 providing a plurality of cutting knives each disposed in a plane parallel to the transport guide beam;

holding the belly flaps and collar bones up towards the transport guide beam with a resilient force;

pressing the tongue down below the transport guide beam; and

20 making a horizontal cut with at least one of the cutting knives while the fish head is moved along the transport guide beam; whereby

the tongue is cut from the fish head and falls into a vat for tongues.

The machine and its method of operation will now be described in greater detail with the following figures.

## 25 **BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1 is a side view of a cod head.

FIG. 2 is a side view of a head or front part on the beam.

FIG. 3 is a cross-section taken along line 3--3 in FIG. 2.

FIG. 4 shows a front part on the gum beam from the side.

FIG. 5 shows the tongue cutting knives from the side.

FIG. 6 shows the tongue cutting unit of FIG. 5 from above.

5 FIG. 7 shows the tongue cutting unit in the direction of motion.

FIG. 8 shows the sequential stations for cutting off the tongue, belly flaps and cheeks and for cutting apart the jaw of a fish head.

FIG. 9 is a front cross-section of the gum beam.

FIG. 10 is a front view of the head during jaw cutting in FIG. 8.

## 10 DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention involves a method and machinery for cutting tongues, cheeks and belly flaps from a fish head or the front part of the fish. The head 1 is put upright on a known reinforced beam 13 underneath a springy spiked chain 20 which moves the head 1 along the beam 13, first towards the horizontal knives 18 which cut the tongue 7 from  
 15 the head 1 and then to vertical knives 33 which cut the cheeks 8 and the belly flaps 10 from the head 1. Above the tongue knives 18 are jaw rods 19 which hold the jaw 6 up to the beam 13 adjacent to the tongue knives 18. Inside the beam 13 is a stick 15, which can be driven down from the beam 13 to the tongue 7 in a cutting position whereby the tongue 7 is pushed down below the tongue knives 18. The head 1 hits a sensor 23,  
 20 which activates the power source 14 of the stick 15. The belly flaps 10 of the front part 1 are held up by belly flap rods 22, which lie underneath the collar bones 11 and keep the belly flaps 10 from the tongue knives 18. Cheeks 8 and belly flaps 10 are cut off with two vertical cheek knives 33. Behind the cheek knives 33 on the belly flap rods 22 there is a vertical step 32 which supports the belly flap 10 while the knife 33 cuts. The jaw 6  
 25 is then cut apart with the jaw knife 34 which is foremost on the beam 13 and goes up into jaw 6 underneath. One of the jaws 6 then falls down a sliding chute 35 which moves the head 1 up and off the beam 13 and then falls into a vat for bones.

FIG. 1 shows cod head 1 with attached belly flaps 10, a so-called front part including, headbone 2, gum 3, the end of backbone 4, mouth 5, jaw 6, tongue 7, cheek 8, gill flaps 9, belly flaps 10, collar bone 11 and collar bone tie 12.

FIG. 2 shows the head 1 or the front part from the side on the beam 13. Inside the beam there is a pneumatic piston 14 which drives the stick 15 down through the opening 16 to the tongue 7 and presses tongue 7 down below the level of the tongue knives 18. The jaw 6 is held up to the beam 13 and away from the knife 18 with the jaw rods 19. The stick 15, which has a circular arc configuration, glides in circular arc channel guides 40 in symmetric Nylon™ blocks 17. Basically, this mechanism involves a stick 15 which is hidden inside the beam 13 or beside it and can be pressed or driven out of beam 13 to the tongue 7 to move tongue 7 below the tongue knives 18 to place the tongue 7 in a cutting position.

FIG. 3 shows a section along line 3--3 in FIG. 2. The gum 3 of the head 1 rests on the beam 13 and is pressed down towards beam 13 and is moved along beam 13 by the spiked chain 20. Reference numeral 5 indicates the mouth and numeral 8 indicates the cheeks. The jaw rods 19 keep the jaw 6 up to the beam 13 and away from the tongue knives 18.

FIG. 4 shows the front part or head 1 on the beam 13 from the side. The spiked chain 20 drives the front part 1 or head in direction 21. The head 1 hits the sensor 23, which is connected to the activator 24, which activates the power source of the piston 14 which drives the stick 15 down to the tongue 7. The belly flap 10 with the collar bone 11 and the earbone 25 is held up from the knives 18 by the belly flap rods 22 so that the belly flaps 10 and the collar bones 11 do not hit the knives 18.

FIG. 5 shows from the side the tongue knives 18 driven by bevel gear drive 26 and sprocket 30. The bevel gear drive 26 and jaw rods 19 are fastened to a plate 27, which is fastened to and can rotate around the axle 28 for moving the knives 18 to and from

the beam 13 depending on the size of the heads 1. The unit is connected to a spring 37 which holds its loose end up and presses the jaw rods 19 to the jaw 6. The front part of 29 of the rods 19 turn downwards and the the side (FIG. 6) for guiding the head 1 into the gap between the rods 19 and the middle of the head 1 under the spiked chain 20.

5 FIG. 6 shows the tongue cutting unit in FIG. 5 as seen from above and the tongue 7 in cutting position. Above the knives 18 are the jaw rods 19, and on them rests the jaw 6. The stick 15 drives the tongue 7 down between the jaw rods 19 and the knives 18 make the cuts 31 around the tongue. Reference numeral 38 indicates a portion of the tongue.

FIG. 7 shows the tongue cutting unit in the direction of motion 21.

10 FIG. 8 shows the front part or head 1 on its way through the machine along beam 13, where the belly flap rods 22 keep up the belly flaps 10.

The first station (right side) of FIG. 8 shows the front part or head 1 during the tongue cutting.

The next station of FIG. 8 shows the front part or head 1 after the tongue cutting.

15 The third station of FIG. 8 shows the front part or head 1 where the cheek 8 has been cut off with the cheek knife 33. The belly flap 10 and the collar bone 11 are held by a vertical step 32 on the belly flap rod 22, which prevents the collar bone 11 from falling back along with the belly flap 10 and thus avoids the knife 33. Beneath the head 1 adjacent to the cheek knives 33 there is a plane or horizontal table 39 with a slit for the  
20 knives 33, which restrains the lower side of the cheek 8 when it is cut, against the friction of the knives 33 with the cheek 8. The plane 39 is movable up and down to adjust for the size of heads 1 and cheeks 8. In the figure, the plane 39 is shown beneath the cheek 8.



The leftmost station in FIG. 8 shows the front parts or head 1 after the jaw 6 has been cut apart when the jaw knife 34, and the head 1 has moved up along the slide 35, from where the head 1 moves off the end of the beam 13 and falls into a vat (not shown) for offal.

5 FIG. 9 shows a cross section of beam 13 in front of the cheek knives 33 in FIG. 8. The step 32 holds against pressure of the knives 33 when cutting the collar bones 11.

FIG. 10 shows the head 1 during jaw cutting in FIG. 8. The jaw knife 34 cuts the jaw 6 apart and goes into the beam 13 through the opening 36 in the beam 13.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A fish head processing machine for removing portions from a fish head having a mouth, said portions including a tongue, cheeks, jaws, gill flaps and belly flaps, said fish head processing machine comprising:

a transport guide beam extending through said mouth of said fish head to guide said fish head during movement along said transport guide beam;

a transport mechanism in the form of a spiked chain which presses a headbone of said fish head against said transport guide beam and moves said fish head along said guide beam in a longitudinal direction of motion; and

a plurality of cutting knives, each of which lies in a plane parallel to the direction of motion of said fish head to cut said portions from said fish head;

said plurality of cutting knives including at least one horizontal tongue cutting knife located beneath said transport guide beam to cut the tongue from the fish head.

2. A fish head processing machine as claimed in claim 1, further comprising:

at least one jaw rod disposed parallel to said direction of motion beneath said jaw of the fish head to hold said jaw of said fish head up against the beam, and away from said at least one horizontal tongue cutting knife, by force of a spring.

3. A fish head processing machine as claimed in claim 1 or 2, further comprising:

a stick disposed within said transport guide beam and engageable with said tongue through an opening in said beam; and

a driving means disposed internally of said beam and connected to said stick to drive said stick downwardly to press said tongue below the cutting plane of said at least one tongue cutting knife; whereby

said tongue is cut by said at least one tongue cutting knife.

4. A fish head processing machine as in claim 3, wherein:  
said stick has the configuration of a circular arc guided in a circular arc channel formed in symmetrical cooperating guide blocks located within said guide beam; and  
said driving means comprising a pneumatic piston pivotally connected to said stick.
5. A fish head processing machine as in claim 4, further comprising:  
a sensor located on said guide beam for sensing when said tongue is in cutting position, and  
a starter which cooperates with said sensor to activate said driving means.
6. A fish head processing machine as claimed in one of claims 1 to 5, further comprising:  
a pair of belly flap rods disposed in the direction of motion of said fish head beneath said belly flaps and beneath collar bones on a front part of said fish head to keep said belly flaps and collar bones up and away from said at least one horizontal tongue cutting knife.
7. A fish head processing machine as claimed in one of claims 1 to 6, further comprising:  
at least two horizontal tongue cutting knives driven by a bevel gear drive;  
said bevel gear drive and said at least two horizontal tongue cutting knives being mounted on a horizontal base plate pivotally mounted below said transport guide beam on a horizontal axle;  
at least two jaw rods mounted on said horizontal base plate in said direction of motion of said fish head beneath said jaw of said fish head to hold said jaw up to said transport guide beam and away from said at least two horizontal tongue cutting knives;  
and  
a spring biasing said horizontal plate towards said transport guide beam; whereby  
said at least two horizontal tongue cutting knives and said at least two jaw rods form a fixed tongue cutting unit which is spring biased to swing around said axle.

8. A fish head processing machine as in claim 7, said at least two jaw rods each include a slide portion for guiding the tongue between said at least two jaw rods and a central portion of the tongue beneath a stick disposed within said transport guide beam operable to depress said tongue to engage and be cut by said at least two horizontal tongue cutting knives.

9. A fish head processing machine as claimed in one of claims 1 to 8, said plurality of cutting knives further including two vertical cheek knives disposed one on each side of said transport guide beam for cutting the cheeks of the fish head from the fish head.

10. A fish head processing machine as claimed in one of claims 1 to 9, said plurality of cutting knives further including at least one vertical jaw knife disposed beneath said transport guide beam and extending into a slot on the bottom of said transport guide beam, whereby said jaw is split apart enabling said fish head to move to the end of said transport guide beam.

11. A fish head processing machine as claimed in claim 6, said plurality of cutting knives further including two vertical cheek knives disposed one on each side of said transport guide beam for cutting the cheeks of the fish head from the fish head, and further comprising:

a step on each of said belly flap rods disposed adjacent the rearmost part of the belly flaps and collar bones when said vertical cheek knives are at the front limit of said collar bones; whereby

said steps restrain said belly flaps from falling back on said transport guide beam enabling said cheek knives to cut off said belly flaps with said cheeks from said fish head.

12. A method for removing a tongue, cheeks and belly flaps from a fish head and for cutting a jaw of said fish head comprising the steps of:

mounting a fish head on a transport guiding beam by inserting said transport guiding beam through a mouth of said fish head;

moving said fish head along said transport guiding beam in a direction to further insert said transport guiding beam through said mouth of said fish head;

providing a plurality of cutting knives each disposed in a plane parallel to said transport guide beam;

holding the belly flaps and collar bones up towards said transport guide beam with a resilient force;

pressing said tongue down below said transport guide beam; and

making a horizontal cut with at least one of said cutting knives while said fish head is moved along said transport guide beam; whereby

said tongue is cut from the fish head and falls into a vat for tongues.

13. A method as set forth in claim 12, further comprising the further step of cutting off said cheeks from said fish head as said fish head is moved along said transport guide beam by at least two of said plurality of cutting knives, whereby said cheeks fall into a vat for cheeks.

14. A method as in claim 13, further including the step of cutting off said belly flaps from said fish head as said fish head is moved along said transport guide beam by at least two of said plurality of cutting knives, whereby said belly flaps fall into a vat for belly flaps.

15. A method as in claim 14 whereby said cheeks and said belly flaps are cut off by the same cutting knives and fall into the same vat.

16. A method as in claim 15, further including the step of cutting said jaw by at least one of said plurality of cutting knives to enable said fish head to move off an end of said transport guide beam in said direction of movement, whereby said fish head falls into a vat for offal.

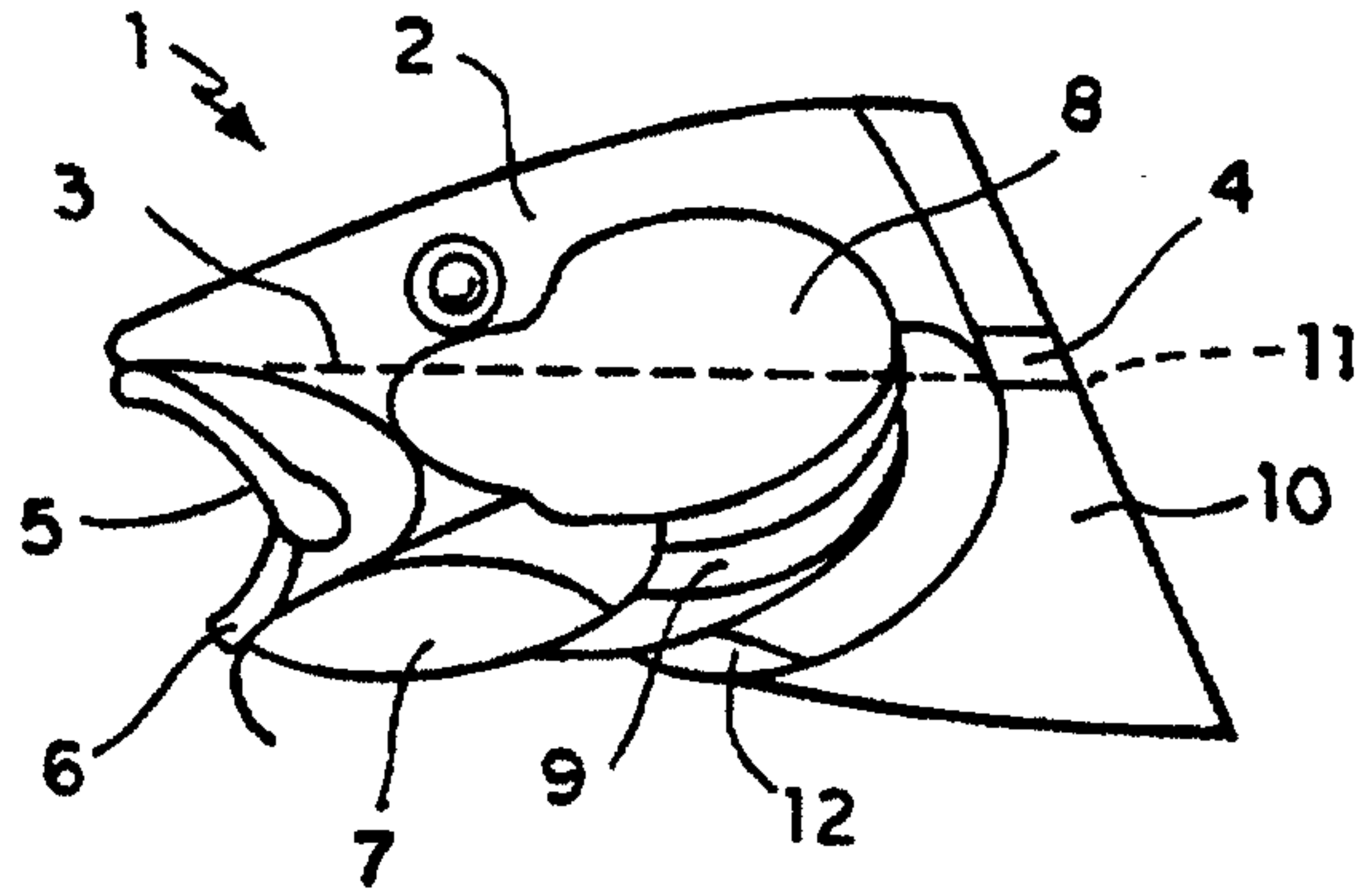


FIG. 1

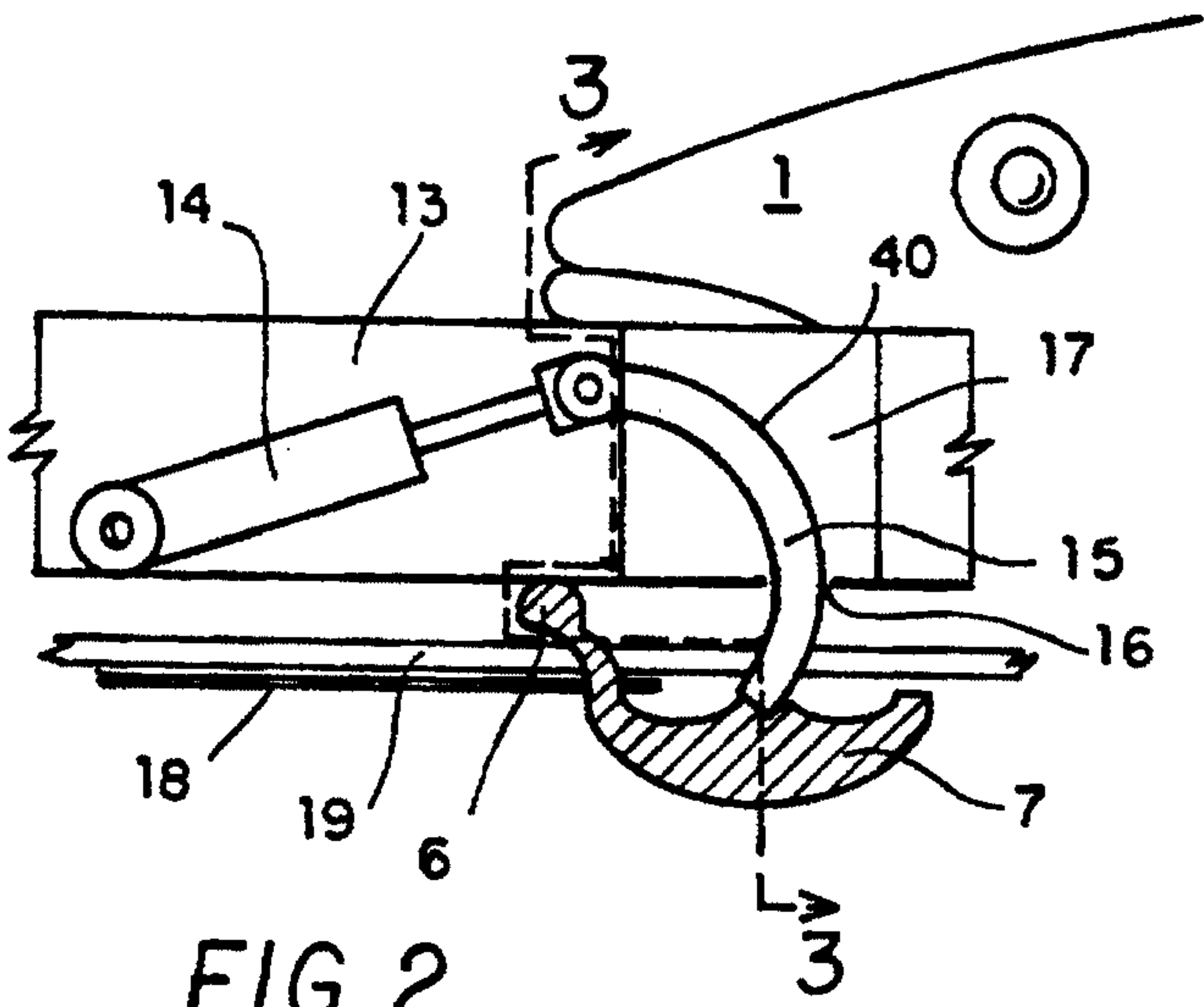


FIG. 2

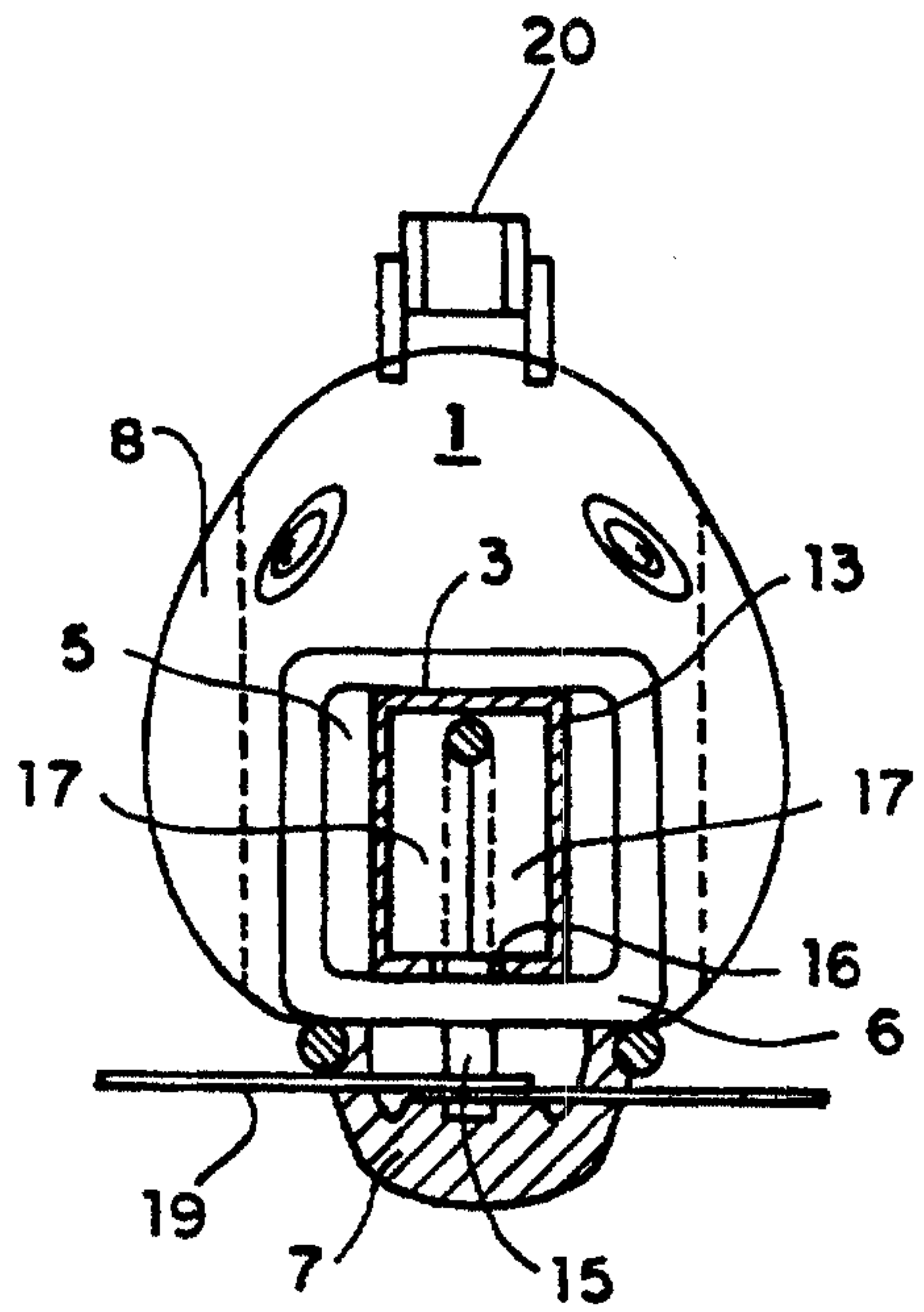


FIG. 3

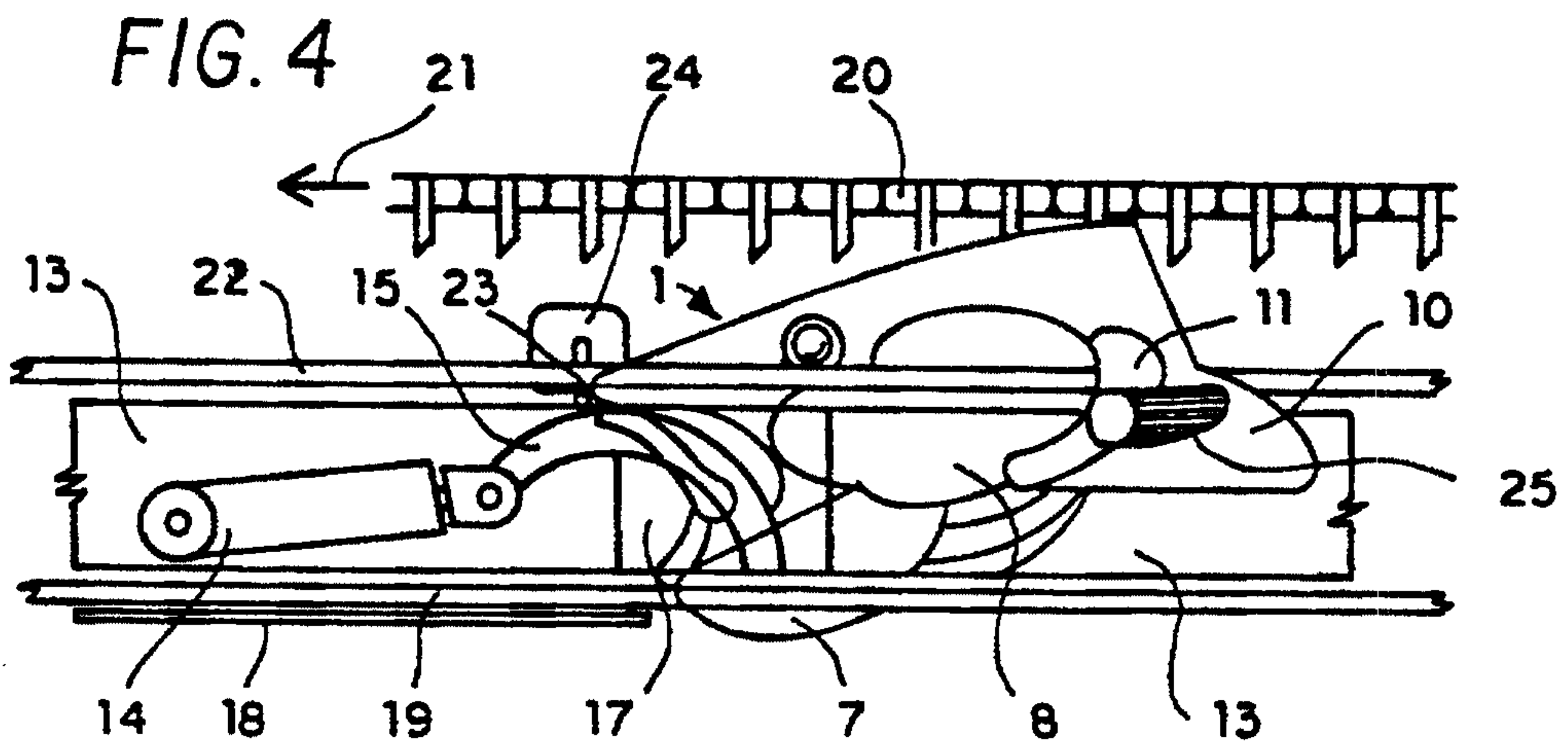


FIG. 4

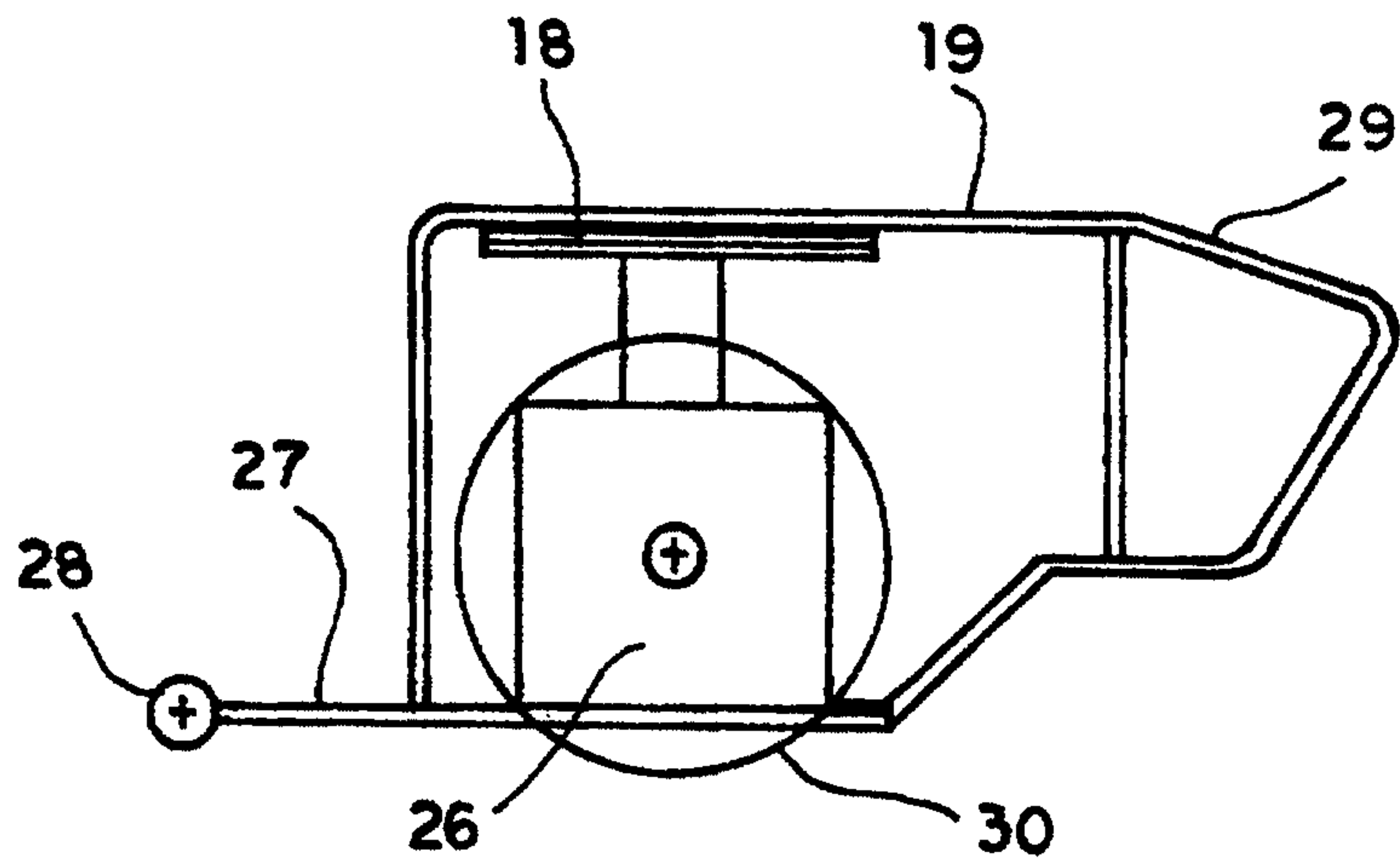


FIG. 5

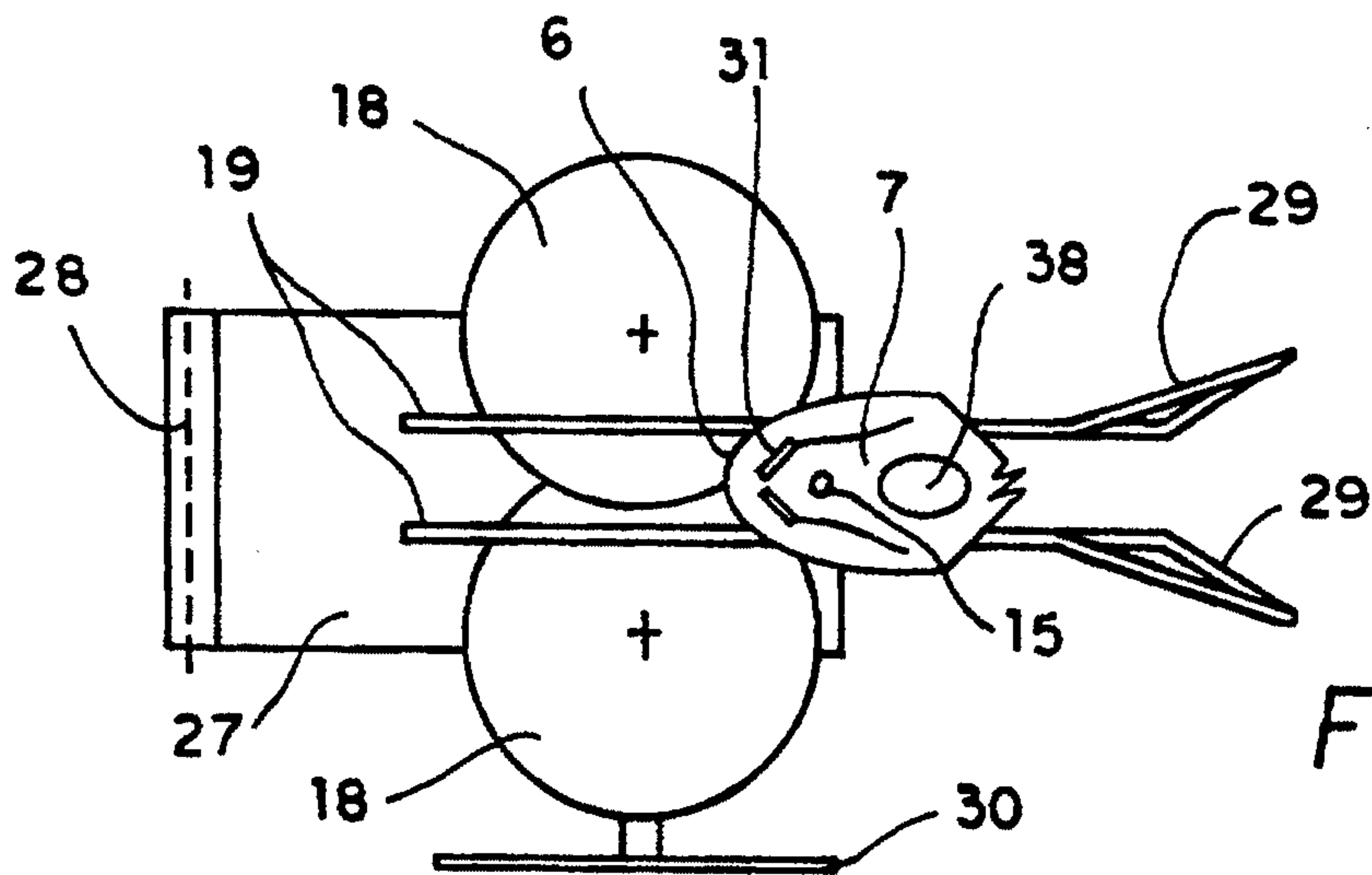


FIG. 6

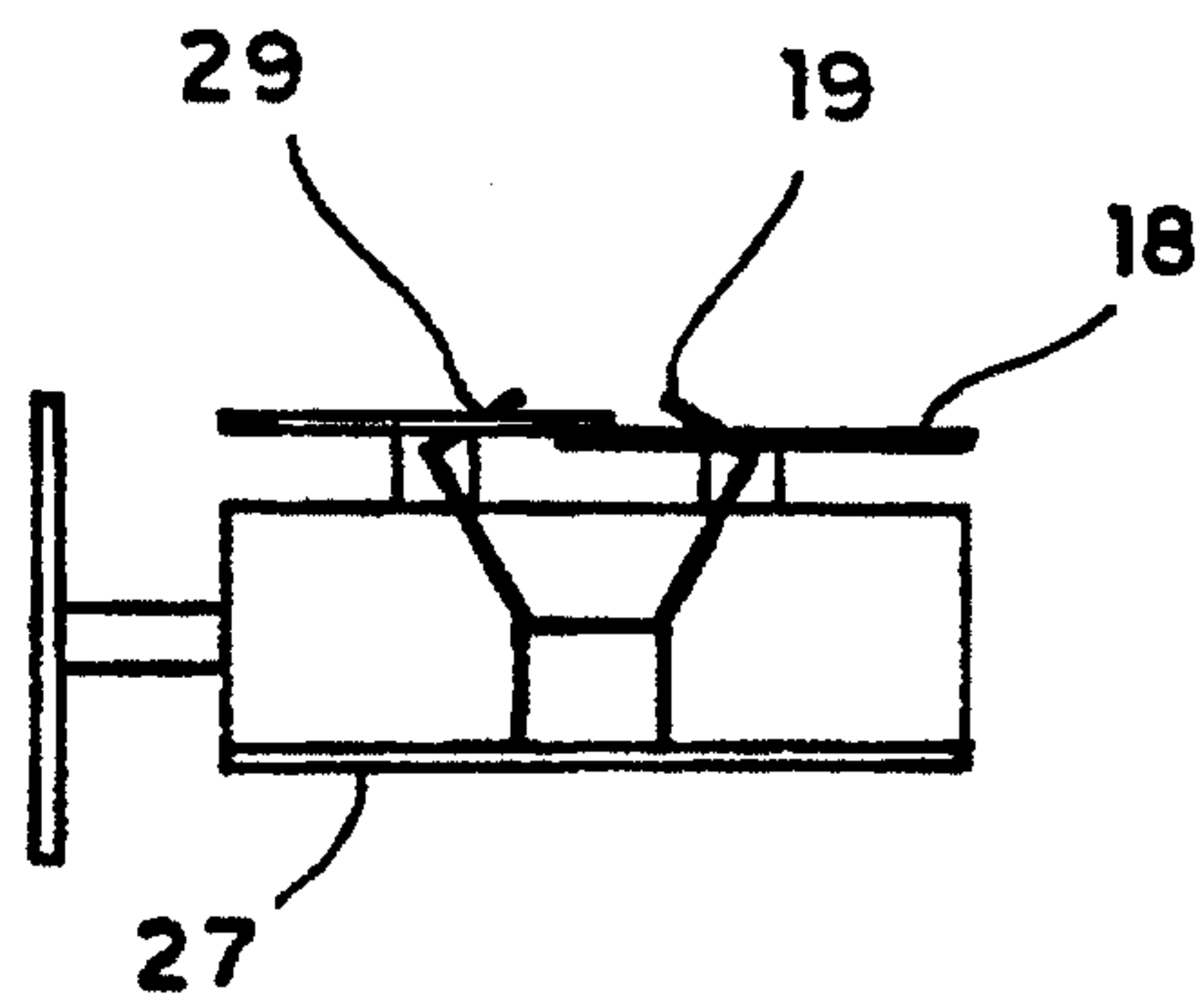


FIG. 7



FIG. 8

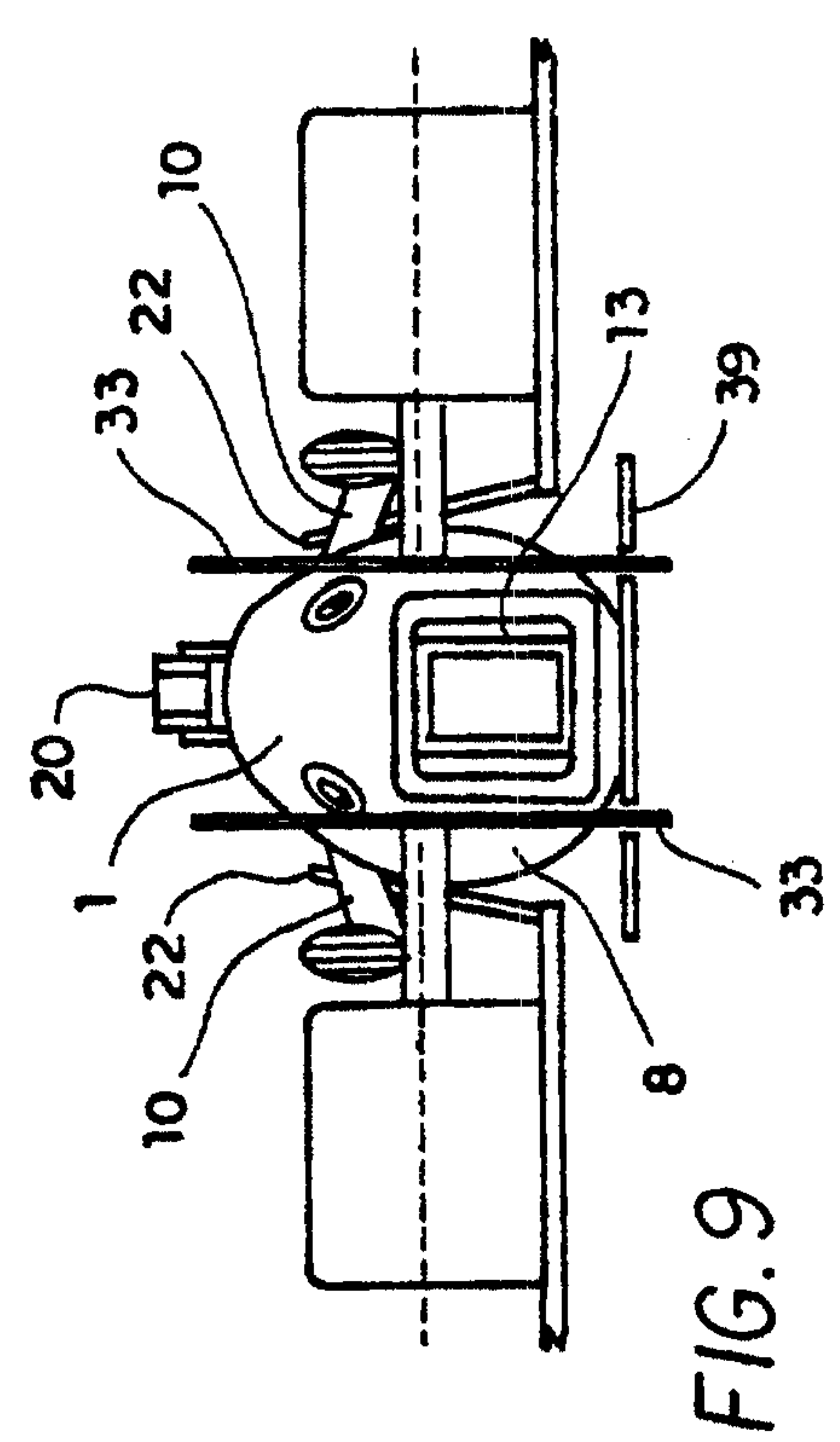
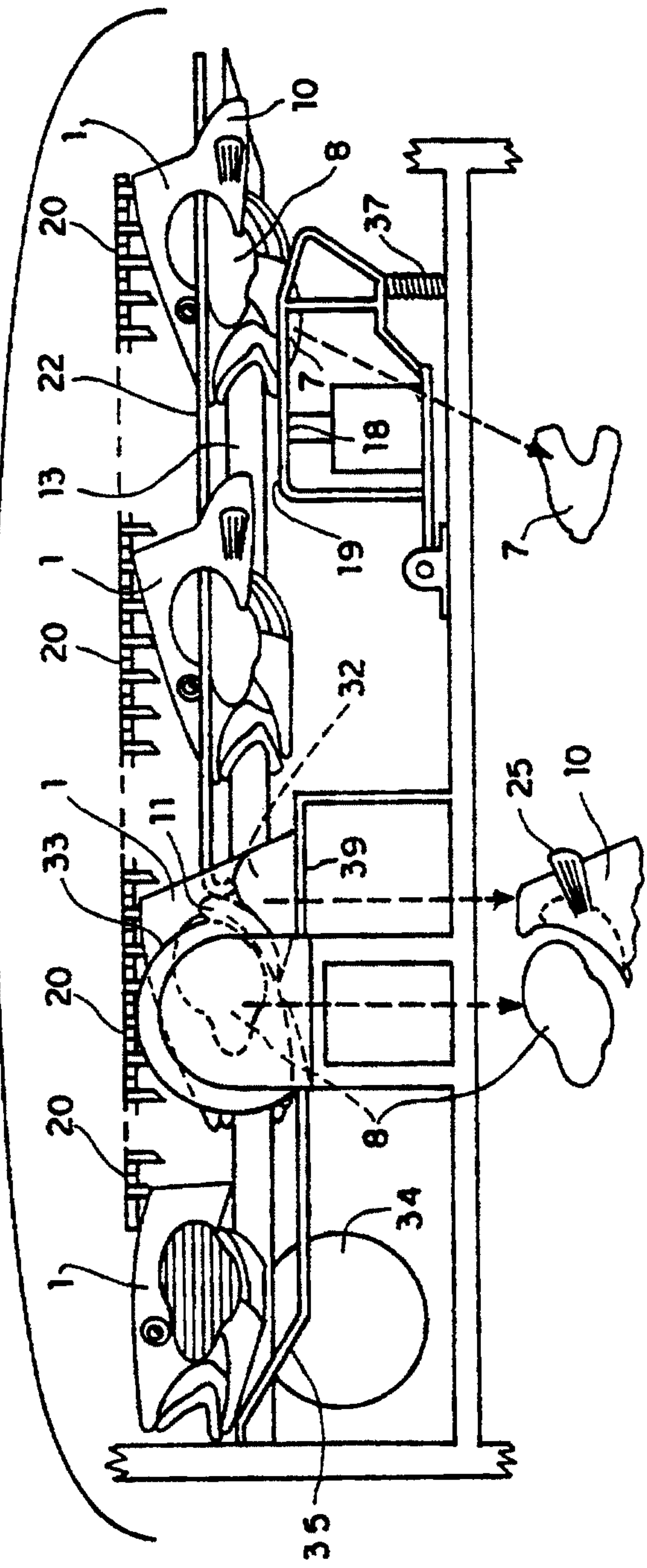


FIG. 9

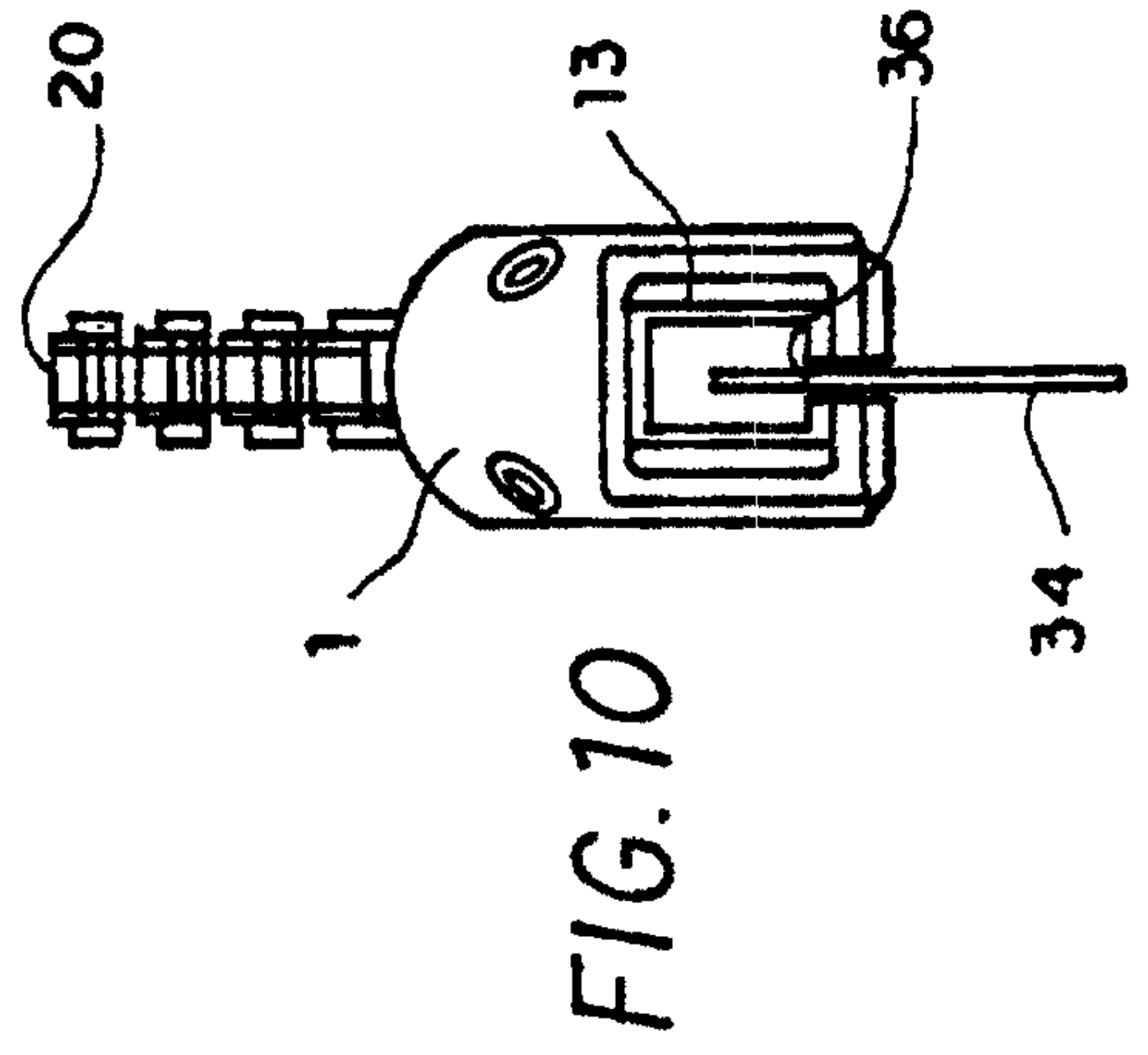


FIG. 10

