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(54) Title: CIGARETTE MAKING METHOD AND APPARATUS

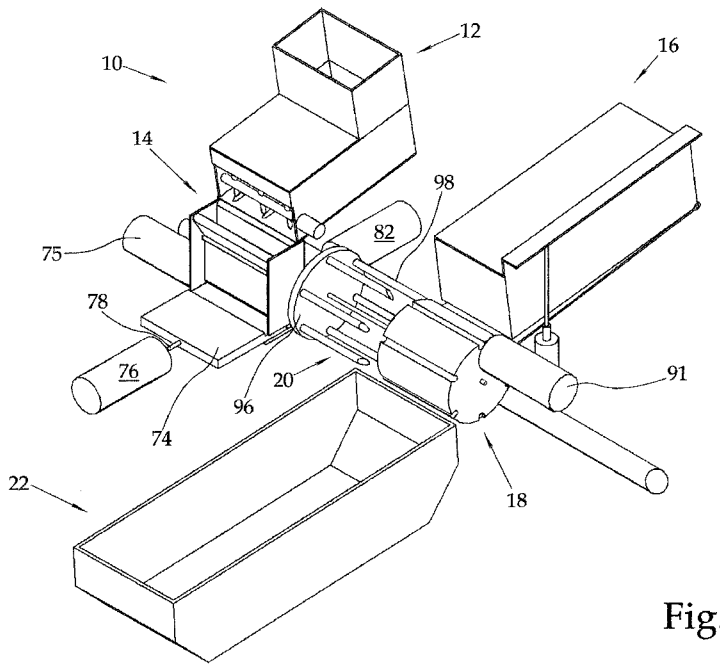


Fig. 1

(57) Abstract: A traditional do-it-yourself cigarette making machine operates at a relatively slow throughput There is provided a method and apparatus for rolling your own cigarettes wherein pre-cut tobacco of a desired humidity is molded in a mold (74, 80) to form a tobacco plug (79), subsequently the plug is advanced into a cylindrical shell (98), the empty cigarette tube (94) is then placed about the shell (98) and the cigarette tube is expelled leaving a complete cigarette The apparatus is ideally placed in a retail outlet where a person may go in and purchase the tobacco and cigarette tubes and insert them in an apparatus to roll the cigarettes.

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CIGARETTE MAKING METHOD AND APPARATUS

FIELD OF THE INVENTION

The present invention relates to a method and apparatus, and more particularly relates to a method of fabricating cigarettes and to an apparatus for producing cigarettes.

BACKGROUND OF THE INVENTION

The manufacture of cigarettes is well known in the art and naturally, specialized equipment is utilized by large cigarette manufacturers. However, there also exists a niche of "roll your own" which is popular with some smokers as the separate purchase of the tobacco and cigarette tube is substantially cheaper than the purchase of pre-manufactured cigarettes.

Smaller machines for filling prepared cigarette papers also known. With this type of machine, it is necessary to form a strand or plug which is inserted into the preformed paper cigarette paper shell or tube. The bulk tobacco has to be separated and then reformed into a continuous thin strand or skein in order to prevent the burning tobacco from crumbling when the cigarette is smoked.

An example of a manual cigarette filling device is shown in U.S. Patent 3,509,887 in which the tobacco supply is first collected by hand and then the amount needed for one cigarette inserted in an elongated forming device. Subsequently, a contact pressure dish is pressed onto the preformed tobacco strand and the tobacco pressed together to form a rounded tobacco strand. By means of a manual lever device, the preformed tobacco strand is then pressed into a cigarette paper tube which is positioned on a mounting device and held by a contact pressure device. Other types of manual cigarette filling devices have also been known in the art and are generally directed to filling a single tobacco tube when required.

There is also a market for cigarette smokers who do not wish to use a small do it yourself machine to roll their own cigarettes, but would rather have a machine which could

roll cigarettes at a relatively fast throughput. Also, some cigarette smokers prefer to utilize a specific type of tobacco and tube while at the same time not wanting to revert to the traditional roll your own cigarettes.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a method for smokers to have a roll your own cigarette which is of a commercial quality.

It is a further object of the present invention to provided an apparatus which can throughput a high number of cigarettes and which may be utilized by a number of users.

According to one aspect of the present invention there is provided an apparatus for manufacturing cigarettes, the apparatus comprising a hopper for receiving pre-cut tobacco, a compactor for compacting the pre-cut tobacco into a cylindrical tobacco plug, a first transfer mechanism for transferring the pre-cut tobacco from the hopper to the compactor; a transition section having at least one hollow cylindrical transition tube designed to receive an empty tobacco tube thereabout, a second transfer mechanism to transfer the tobacco plug to the hollow cylindrical transition tube, and a pushing mechanism to push the tobacco plug into the cigarette tube and thereby discharge the cigarette tube from the transition tube.

According to a further aspect of the present invention there is provided a method of filling a tobacco tube with pre-cut tobacco to form a cigarette comprising the steps of compacting the tobacco to form a cylindrical plug, placing the cylindrical plug in a transition tube; placing a cigarette tube over the transition tube, and pushing on the cylindrical plug of tobacco while in the transition tube to thereby fill the cigarette tube with tobacco as the cigarette tube is discharged from the transition tube.

According to a further aspect of the present invention there is provided a method of

filling a cigarette tube with pre-cut tobacco, the method comprising the steps of providing a transition tube having a cylindrical configuration with an external diameter slightly less than the internal diameter of a cigarette tube, inserting a guide tube within the transition tube to extend through the free end of the transition tube, placing an open end of the cigarette tube over the guide and over the transition tube, withdrawing the guide member while continuing to place the cigarette tube on the transition tube, and pushing a pre formed plug of tobacco into the transition tube and continuing to push until the cigarette tube is discharged from the transition tube with the pre cut tobacco therein.

The present invention is directed to a market wherein a smoker may go into a store and purchase a supply of precut tobacco and preformed cigarette papers or tubes. The user would then be able to insert the tobacco and tubes into a machine which would produce a predefined number of cigarettes.

The apparatus according to the present invention will preferably include means for supplying cigarette tubes to the apparatus. While a number of different storage devices may be utilized, a preferred embodiment will utilize canisters of a desired capacity which may then be inserted into the machine. Naturally, different numbers and types of tubes may be utilized depending upon the requirements of the user.

The apparatus will also include an input hopper into which cut tobacco strands may be placed. The precut tobacco is hermetically stored in a suitable container. As such, the tobacco hopper will have an input and an output with the tobacco preferably being transferred by a conveyor between the input and output. During the transfer, a combing or dethatching device is provided for helping in the separation of the tobacco strands. A suitable device may comprise a rotating shaft having teeth extending outwardly therefrom.

The tobacco is then compacted and formed into a tobacco plug. Although there are many known ways of doing so, a preferred arrangement utilizes two conveyors which may include a converging section. The conveyors advance in the same direction to move the tobacco between half molds wherein it is formed into a plug. Alternatively, the conveyors may each converge to a final discharge point. Preferably, the conveyors are vertically aligned.

From the conveyors, the tobacco is preferably placed between two half molds, at least one of which is moveable and which are arranged to form a plug of tobacco in a cylindrical configuration.

Meanwhile, the arrangement for the tobacco tubes will involve singulating them and advancing them to a desired position. According to the preferred aspect of the present invention, a tobacco tube is placed over a transition tube which is sized to have an exterior diameter which is substantially equal or slightly less than the inner diameter of the cigarette tube.

In one arrangement, a moveable guide is utilized and which moveable guide has a conical end which is substantially smaller than the diameter of the cigarette tube. The guide member may extend through the transition tube such that when a cigarette tube is to be placed on the transition tube, the guide will function to properly guide the cigarette tube and allows for out of round cigarette tubes to be utilized. Once the cigarette tube has started to be placed on the transition tube, the guide member is withdrawn until the cigarette is firmly abutted against the transition tube.

As an alternative to the above, the transition cylinder may have a tapered end to provide some guiding to the cigarette tube when it is placed thereon.

In one embodiment, the cigarette tubes are singulated from the canister and placed on a rotating turret which has a plurality of recesses on the exterior surface thereof. Each recess is sized to receive a single cigarette tube and the turret is advanced sequentially through a number of stations as will be described in greater detail hereinbelow. Alternatively, the turret can be eliminated as will be shown in the drawings.

The apparatus will include suitable sensing means at every step of the operation to ensure that this particular operation is properly carried out. Also, one may incorporate means for adjusting both the length of the cigarette and the compactness of the tobacco plug.

BRIEF DESCRIPTION OF THE DRAWINGS

Having thus generally described the invention, reference will be made to the drawings illustrating an embodiment thereof, in which:

Figure 1 is an exploded view of an apparatus according to the present invention;

Figure 2 is a perspective view of the input hopper;

Figure 3 is a perspective view of a storage device for the cigarette tubes;

Figure 4 is a view of the cigarette tube storage device in an open position;

Figure 5 is an exploded view of the transfer device for transferring tobacco from the input hopper to form a tobacco plug;

Figure 6 is a perspective view thereof;

Figure 7 is a perspective view of the turret for singulating and receiving the individual cigarette tubes; and

Figure 8 is a perspective view of the device holding the cigarette tube when the tobacco is inserted therein; and,

Figures 9 to 14 are perspective views of a slightly modified apparatus illustrating operation of the same;

Figure 15 is a perspective view of a modified embodiment of the present invention;

Figure 16 is a perspective of a further modified embodiment of the present invention;

Figure 17 is a side view, partially in section, of a guiding mechanism which can be incorporated in the present invention; and

Figure 18 A to 18F illustrate the sequence for placing a cigarette tube on a transition tube and filling the same with tobacco.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings in greater detail and by reference characters thereto, there is illustrated in Figure 1 a cigarette making apparatus which is generally designated by reference numeral 10. Apparatus 10 includes an input hopper generally designated by reference numeral 12, a compactor generally designated by reference numeral 14, a cigarette tube storage container generally designated by reference numeral 16, a tube separator generally designated by reference numeral 18, a transfer device for inserting a cigarette plug into a cigarette tube generally designated by reference numeral 20, and a discharge container generally designated by reference numeral 22.

Input hopper 12, as may be best seen in Figure 2, has a main body 26 with an upper inlet 28. Mounted at the bottom of main body 26 is a conveyor 30. Mounted proximate to the outlet of input hopper 12 is a strand separator generally designated by reference numeral 32 and which comprises a shaft 34 having a plurality of pins or combs 36 extending outwardly therefrom. Shaft 34 is rotatably driven by an electric motor 38.

Compactor 14 as seen in Figures 1, 5 and 6, has first and second side walls 42 and 44 which enclose a first conveyor 46 and a second conveyor 48. As best seen in Figure 5, first conveyor 46 includes an upper converging section 50 following which the

conveyors 46 and 48 may be parallel or have a slight converging configuration. An electric motor acts to drive first and second conveyors 46 and 48. Preferably, the conveyors are driven for a preset period of time. Thus, the conveyors would be designed to discharge a predetermined amount of tobacco which has been received from the input hopper. In other words, preferably the operations are incremental.

Cigarette storage container 16 is illustrated in Figure 4 and reference will now be had thereto. Container 16 has a pair of side walls 56 and 58 and it will be noted that side wall 56 has a greater height and also has a flange 60 extending outwardly from a peripheral edge thereof. End walls 62 and 64 define the rectangular configuration while a bottom wall 66 is secured to end wall 62 by means of a hinge 68. Associated with container 16 is a motor 70 to operate a piston 72 to move the body of the container with respect to bottom wall 66.

The tobacco compaction occurs at the output of conveyors 46 and 48 and to this end, there is provided a first half mold member 74 having a semi cylindrical recess 75 at the end thereof and which half mold 74 is driven by a motor 76 having a piston 78 associated therewith.

A second mold 80 likewise has a semi cylindrical recess 81 and is moveable by means of motor 82 having piston 84 secured to half mold 80. A cylinder 75 having a piston 79 is provided for reasons which will become apparent herein below. Preferably, one of the molds 74, 80 will have a cutting edge associated therewith to sever any tobacco strands extending beyond the mold recess.

As may be seen in Figure 1, cigarette tube storage container 16 is positioned such that the container can be lifted while maintaining hinged bottom wall 66 in position such that cigarette tubes may be loaded onto a rotatably driven turret 88 which has recesses 90 formed

therein. The recesses 90 are sized to receive a single cigarette tube. A cylinder 91 is provided to transfer the cigarette tubes. Alternatively, a rotating cam could be utilized to open the container sufficiently for a cigarette tube to be discharged.

As may be seen in the drawings, there is provided a tube receiving device currently designated by reference numeral 24 in which has a base 96 with a plurality of transition cylinders 98 extending therefrom. It will be noted that each transition cylinder 98 preferably has an end which is diagonally cut to ease insertion of the empty cigarette tube thereabout.

In operation, turret 88 preferably has six stations or recesses for receiving the cigarette tubes. At a first station, a cigarette tube 94 is loaded thereon and it is then advanced through two more stations before the tobacco is inserted in the tube. At a fifth station, the tubes are unloaded while at a sixth station, a cleaning operation is carried out.

At the tobacco station, the tube is transferred from the turret to the transition cylinder. A piston will push the tobacco plug into a transition cylinder 98 which has a cigarette tube thereabout. The cigarette tube is also filled with tobacco while a continuing push will cause the tube to retract from the transition cylinder. The filled cigarette is then discharged.

A further station will verify that the tube has been fully fed; if not, it will be rejected at a subsequent station. It will be noted that after a predefined number of consecutive rejects, the machine will stop as the machine is probably missing either tobacco or tubes.

In the embodiment of Figures 9 to 14, it will be noted that transition cylinders 198 have a tapered end 199. This arrangement ensures the easy placement of an empty tube thereon.

In operation, and as shown in Figure 9, a cigarette tube 94 is loaded on turret 88. The turret 88 is advanced through one station where cigarette tube 94 is aligned with cylinder 91.

As shown in Figure 10, cylinder 91 is operative to move cigarette tube 94 on to transition cylinder 98. After being placed on the transition cylinder 98 as is shown in Figure 11, turret 88 is advanced. Subsequently, as may be seen Figure 12, piston 77 of cylinder 75 is operative to push a tobacco plug 79 into a transition cylinder 98. The motion is continued, as may be seen in Figure 13, to exert a force on the now filled cigarette tube, as a completed cigarette.

The remaining stations of the turret may be used for cleaning of the same. As previously mentioned, after the cigarette tube has been placed on the transition cylinder, an inspection may be conducted using sensors to determine that the cigarette tube is properly placed and that there is a full load of tobacco to insert therein.

In the embodiment of Figure 15, similar reference numerals have been utilized for similar components. The main difference between this embodiment and previous embodiments is in the use of a receiving member 22' which allows the cigarette to enter therein from where it slides to a further container.

Turning to the embodiment of Figure 16, the prime differences are the elimination of the turret and instead, the substitution of a member 93 having a single recess 95 therein to receive an empty tobacco tube. Also, it will be noted that transition tubes 98 in this embodiment have a tapered end to allow placement of the cigarette tubes thereon.

In the arrangement of Figure 17, there is provided a guide wheel 100 which has a plurality of conically shaped openings 102 formed therein. Guide wheel 100 is secured to base 96 by means of members 104. It will be noted that there is a conical shaped opening 102 for each transition tube 98.

In the embodiment of Figure 18, there is provided a guide tube 104 positioned at one

of the stations and being sized to fit within transition cylinder 98. As seen in Figure 18A, guide member 104 is driven in the direction indicated by arrow 106 so as to enter a transition cylinder and pass therethrough as shown in Figure 17B. Guide member 104 has a tapered end and when extended through transition cylinder 98, acts as a guide for cigarette tube 94 to extend thereover and then onto transition tube 98 as shown in Figure 17C. As the cigarette tube is placed about transition cylinder 98, guide member 104 withdraws.

At the next location, the tobacco from molds 74, 80 is pushed into tobacco tube 94 by cylinder 86. Once the cigarette tube 94 has been filled with tobacco, continued movement of rod 86 will cause the cigarette to be discharged. The arrangement of Figure 18 can be incorporated in any of the previous embodiments with the elimination of the turret.

It will be understood that the drive systems utilized in the present invention may be any suitable including pneumatic, electric, hydraulic, or combinations thereof.

I CLAIM:

1. An apparatus for manufacturing cigarettes, the apparatus comprising:

a hopper (12) for receiving pre-cut tobacco;

a compactor (14) for compacting said pre-cut tobacco into a cylindrical tobacco plug (79);

a first transfer mechanism (46, 48) for transferring said pre-cut tobacco from said hopper to said compactor;

a transition section having at least one hollow cylindrical transition tube (98) designed to receive an empty tobacco tube (94) thereabout;

a second transfer mechanism (75) to transfer said tobacco plug to said hollow cylindrical transition tube; and

a pushing mechanism (91) to push said tobacco plug (79) into said cigarette tube (94) and thereby discharge said cigarette tube (94) from said transition tube.

2. The apparatus of Claim 1 wherein said hopper (22) has a conveyor belt (30) to move said pre-cut tobacco to said first transfer device.

3. The apparatus of Claim 2 wherein said hopper (22) further includes a dethatching device (32) for said pre-cut tobacco.

4. The apparatus of Claim 3 wherein said dethatching device (32) comprises a rotating shaft (34) having fingers (36) extending outwardly therefrom.

5. The apparatus of Claim 1 wherein said first transfer mechanism comprises a pair of generally vertically oriented conveyor belts (46, 48).

6. The apparatus of Claim 5 wherein at least one of said conveyor belts (46, 48) has an angled converging section with respect to the other of said conveyor belts.

7. The apparatus of Claim 1 wherein said compactor comprises a pair of half molds (74, 80), at least one of said half molds (74) being moveable to thereby compact said pre-cut tobacco placed therebetween.

8. The apparatus of Claim 1 wherein said transition section comprises a base (96) having a plurality of said hollow cylindrical transition tubes (98) extending outwardly therefrom.

9. The apparatus of Claim 8 wherein each of said transition cylinders (98) is tapered at an end remote from said base.

10. The apparatus of Claim 1 further including a rotatable turret (88) having a plurality of elongated recesses therein, each of said elongated recesses being sized to receive and retain a single cigarette tube (94).

11. The apparatus of Claim 10 further including a cigarette tube dispenser (16) located adjacent said rotatable turret (88).

12. The apparatus of Claim 11 wherein said tube dispenser has a hinged wall (56) and a cylinder (70) to move said hinged wall to permit dispensing of a single cigarette tube on said rotatable turret.

13. The apparatus of Claim 1 wherein said pushing mechanism to push said tobacco plug into said cigarette tube comprises a pneumatic cylinder (70).

14. A method of filling a tobacco tube (94) with pre-cut tobacco to form a cigarette comprising the steps of:

compacting said tobacco to form a cylindrical plug (79);

placing said cylindrical plug (79) in a transition tube (98);

placing a cigarette tube (94) over said transition tube (98); and

pushing on said cylindrical plug of tobacco (79) while in said transition tube to

thereby fill said cigarette tube with tobacco as said cigarette tube is discharged from said transition tube.

15. The method of Claim 14 wherein the step of compacting said tobacco to form a cylindrical plug comprises the steps of placing said pre-cut tobacco between a pair of conveyor belts (46, 48), and transporting said pre-cut tobacco to a compacting mechanism comprised of two half molds (74, 80).

16. A method of filling a cigarette tube with pre-cut tobacco, the method comprising the steps of:

providing a transition tube (98) having a cylindrical configuration with an external diameter slightly less than the internal diameter of a cigarette tube (94);

inserting a guide tube within said transition tube to extend through the free end of the transition tube;

placing an open end of said cigarette tube (94) over said guide and over said transition tube, withdrawing said guide member while continuing to place said cigarette tube on said transition tube; and

pushing a pre formed plug (79) of tobacco into said transition tube and continuing to push until said cigarette tube is discharged from said transition tube with said pre-cut tobacco therein.

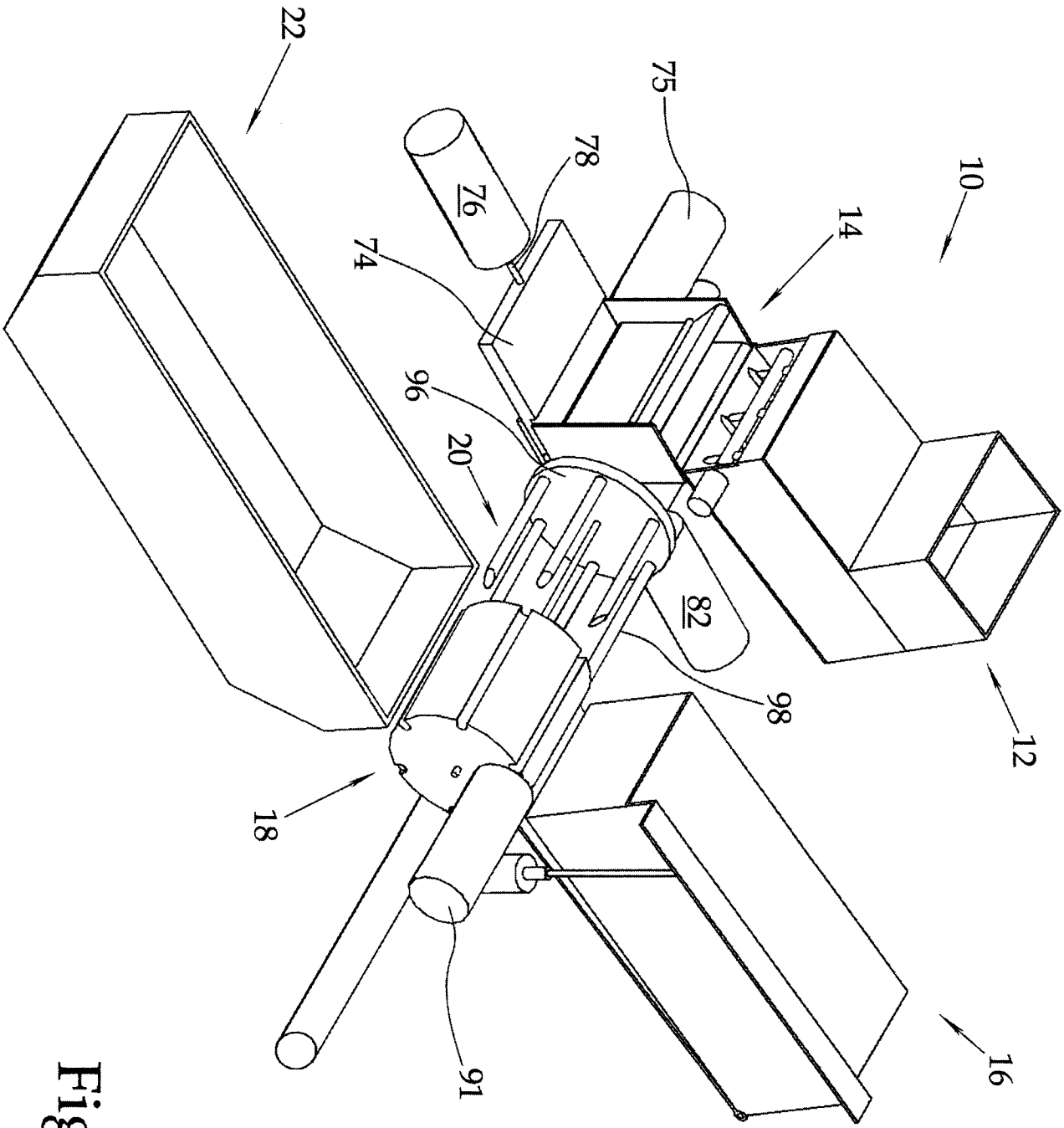


Fig. 1

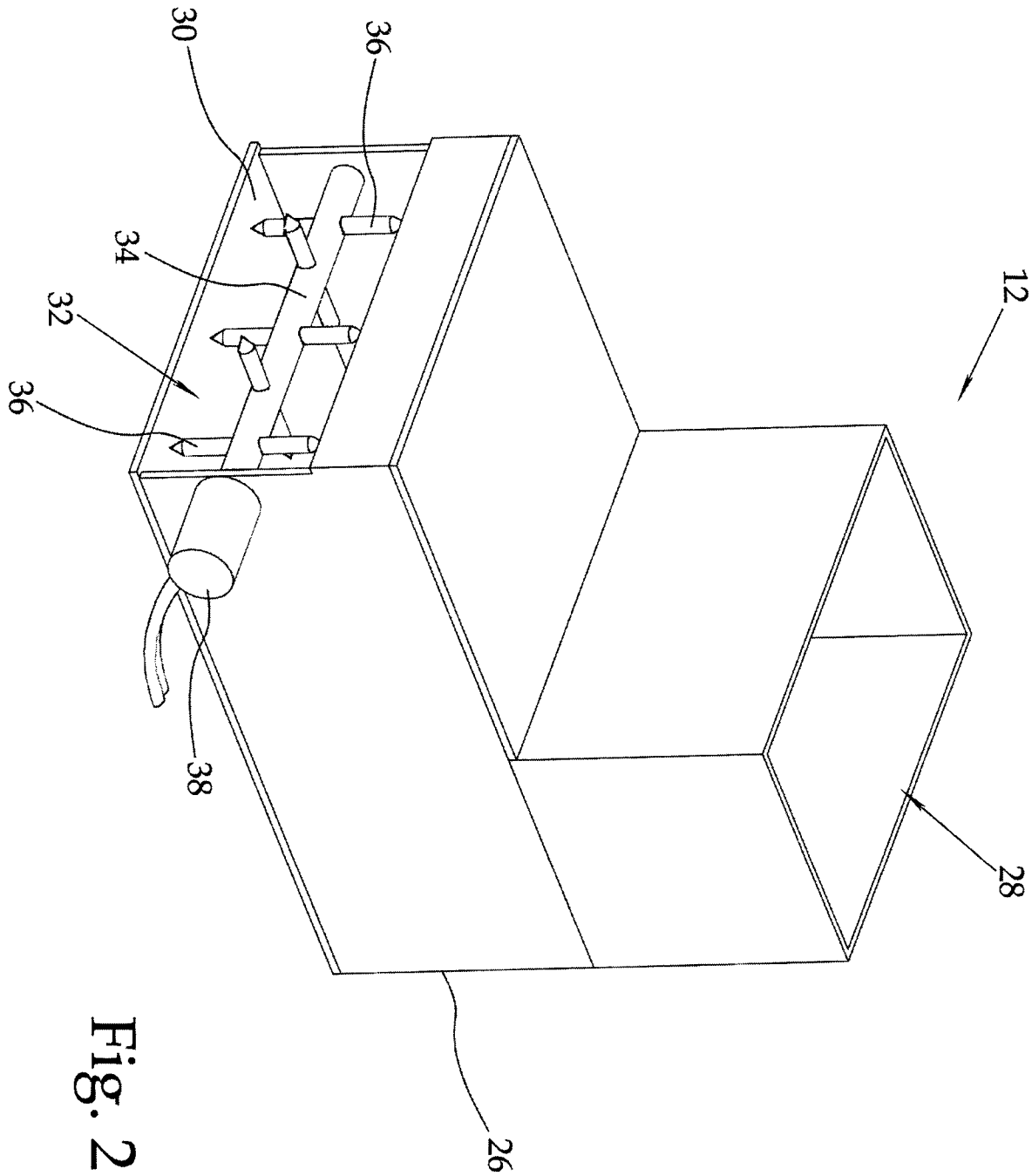


Fig. 2

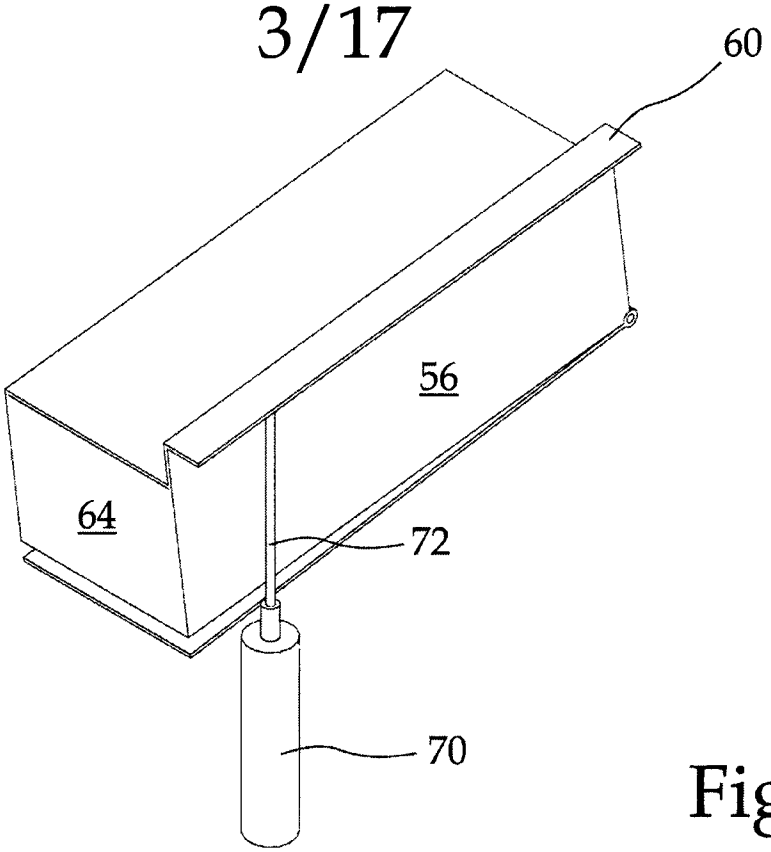


Fig. 3

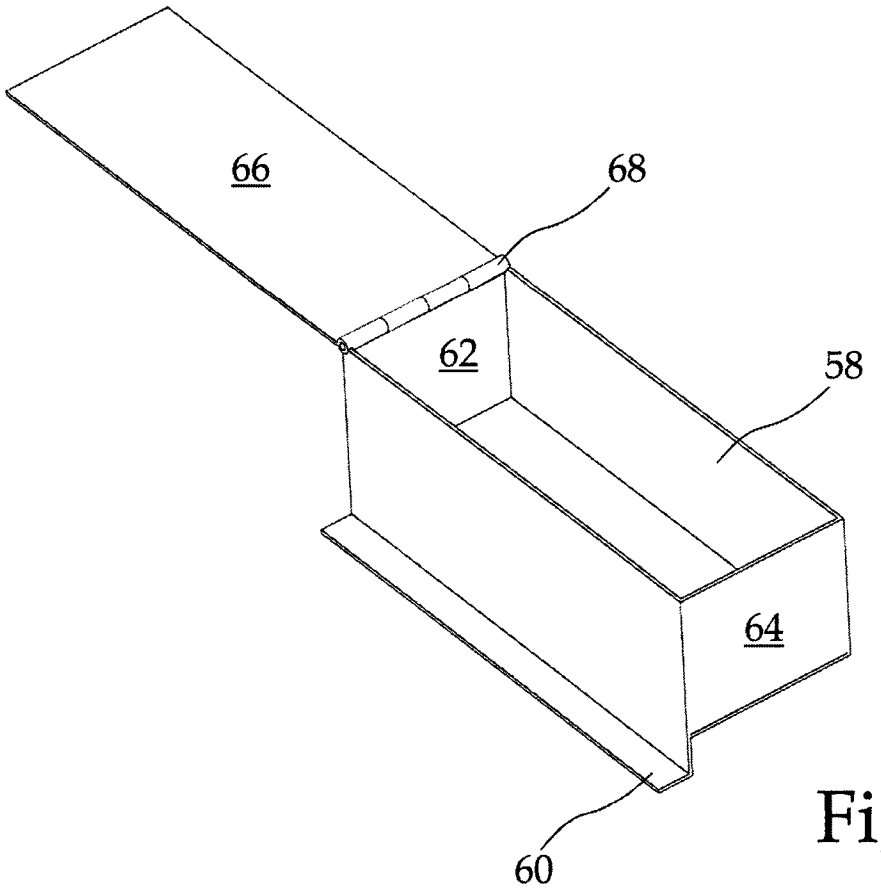


Fig. 4

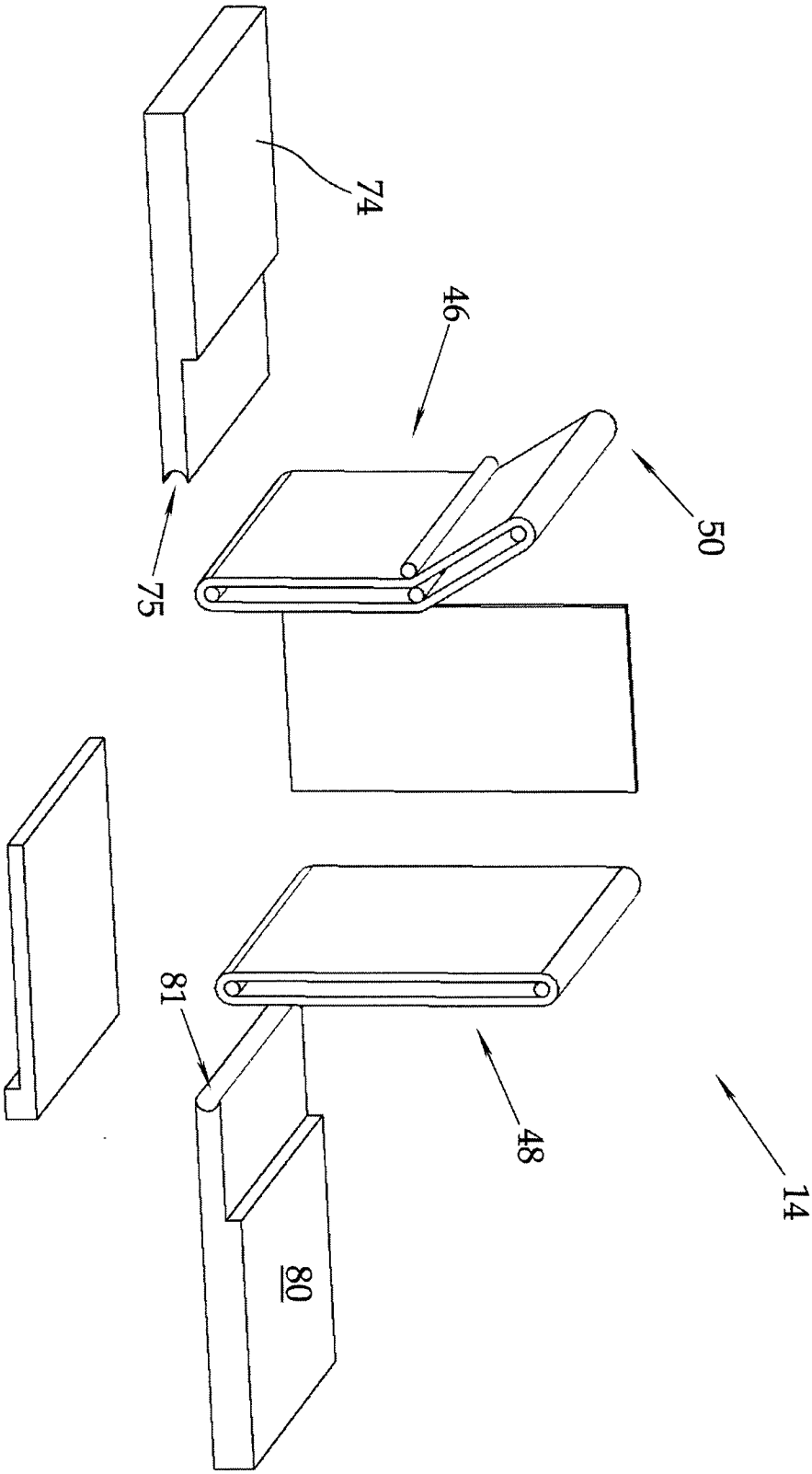


Fig. 5

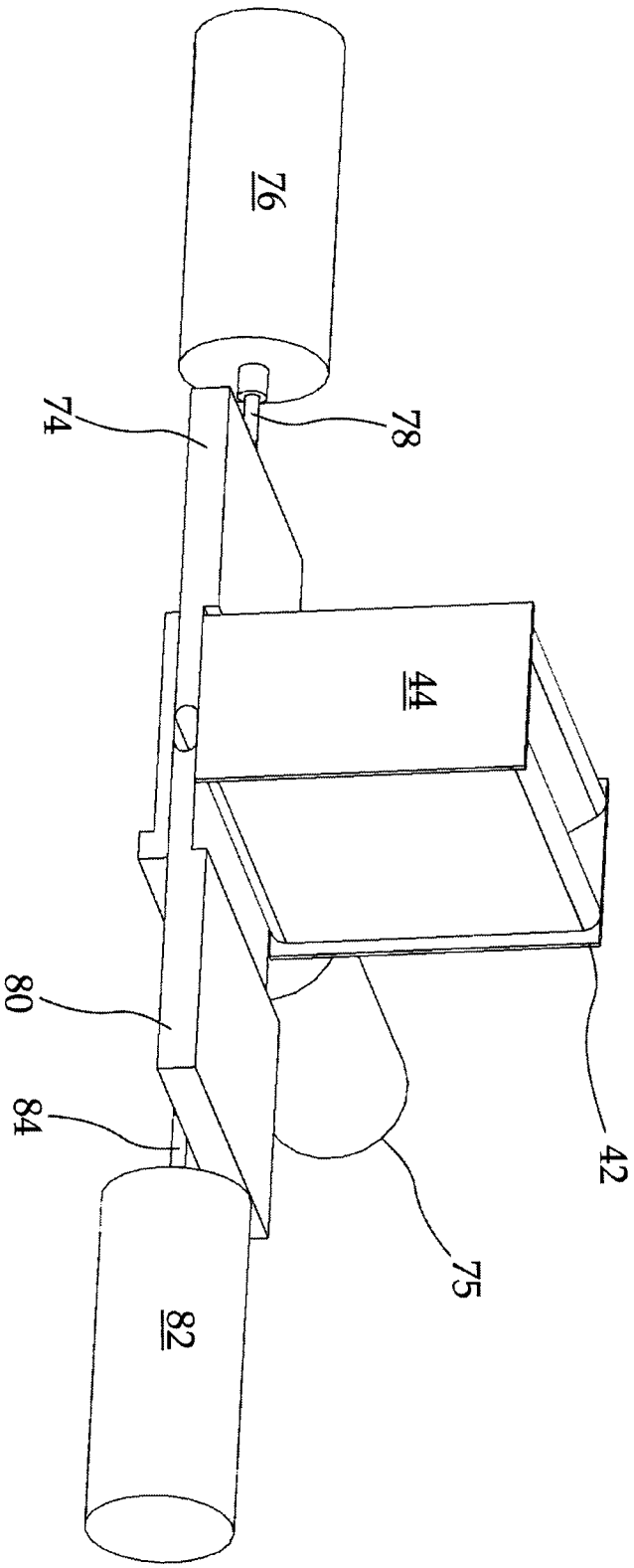


Fig. 6

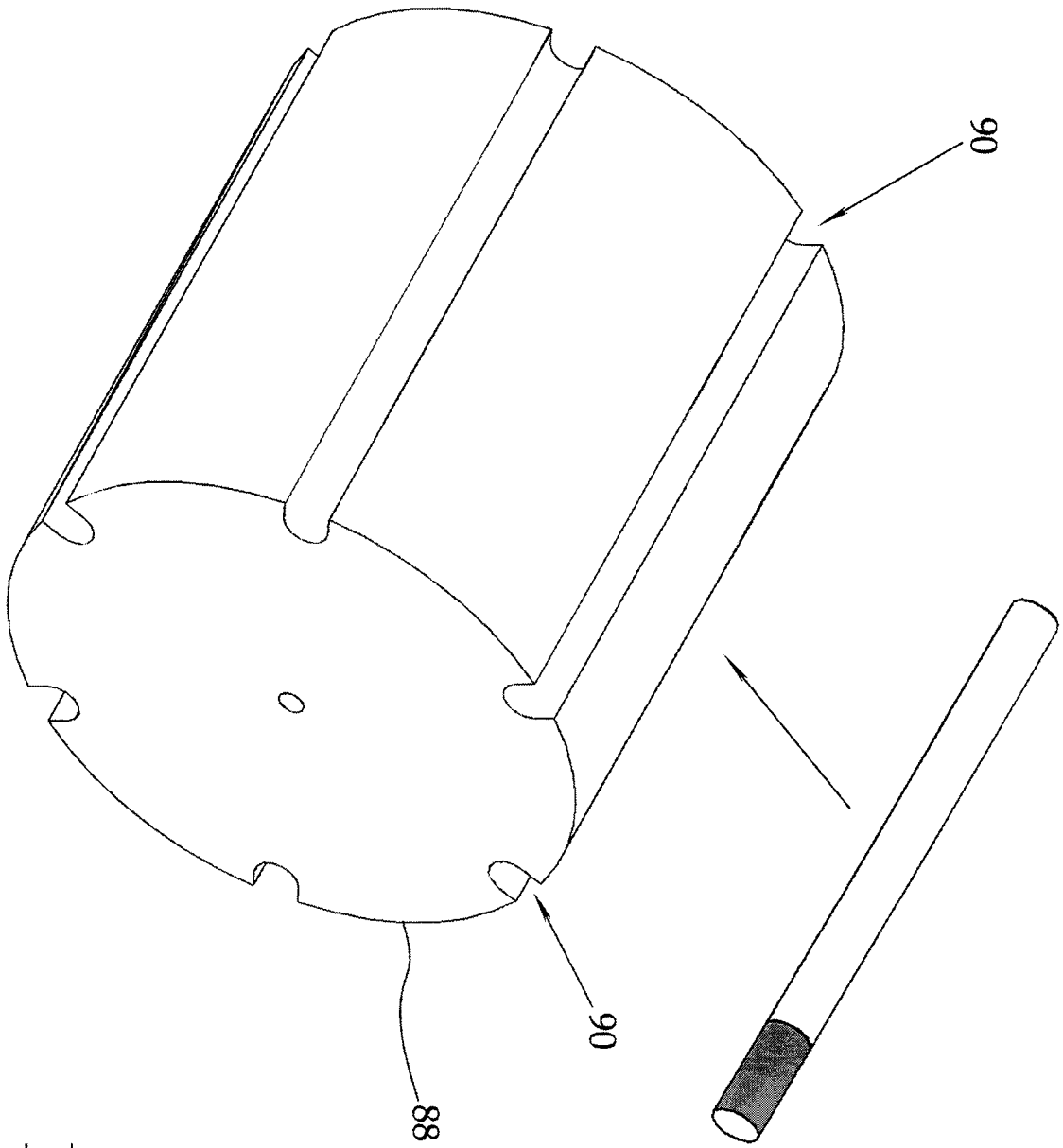


Fig. 7

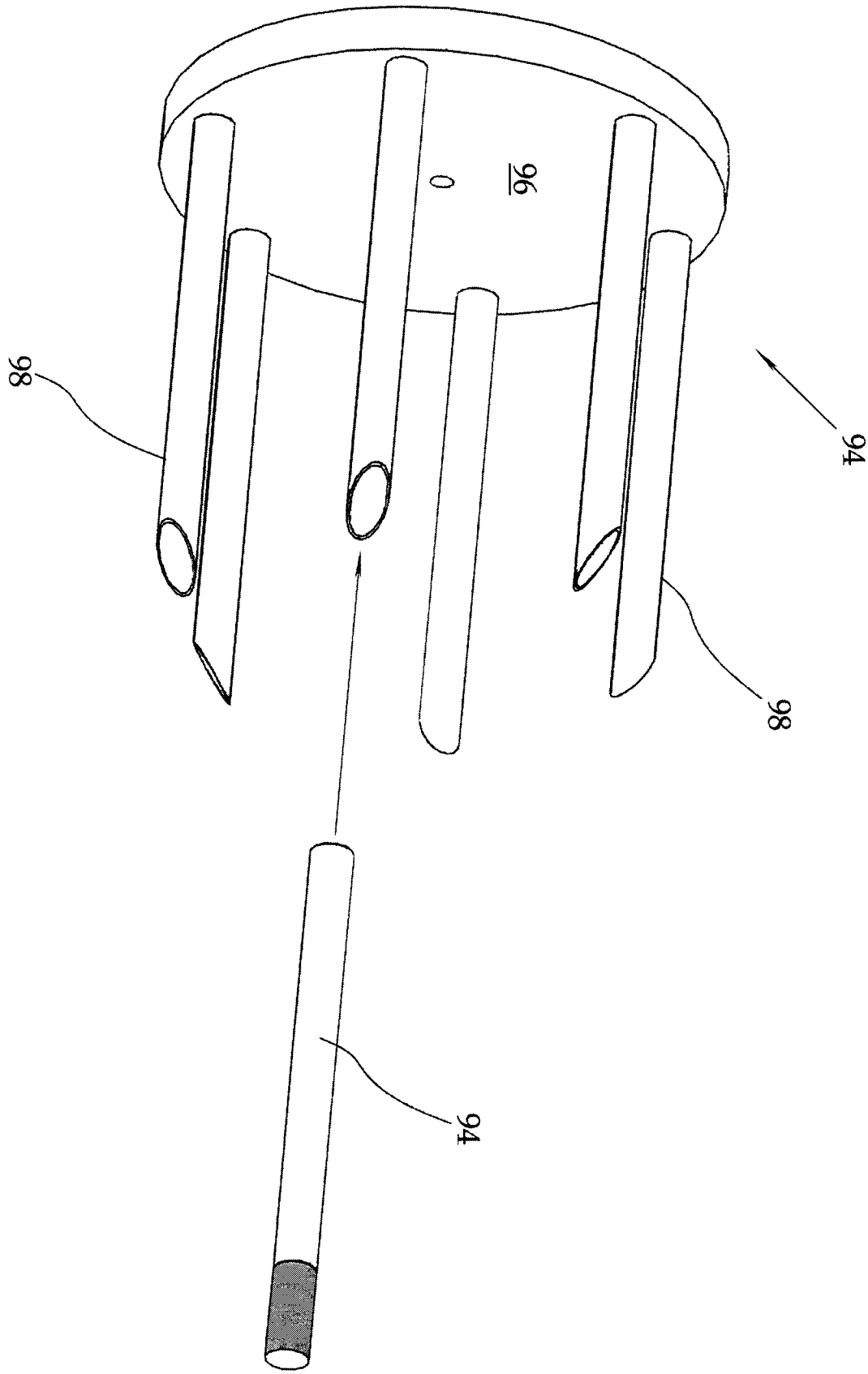


Fig. 8

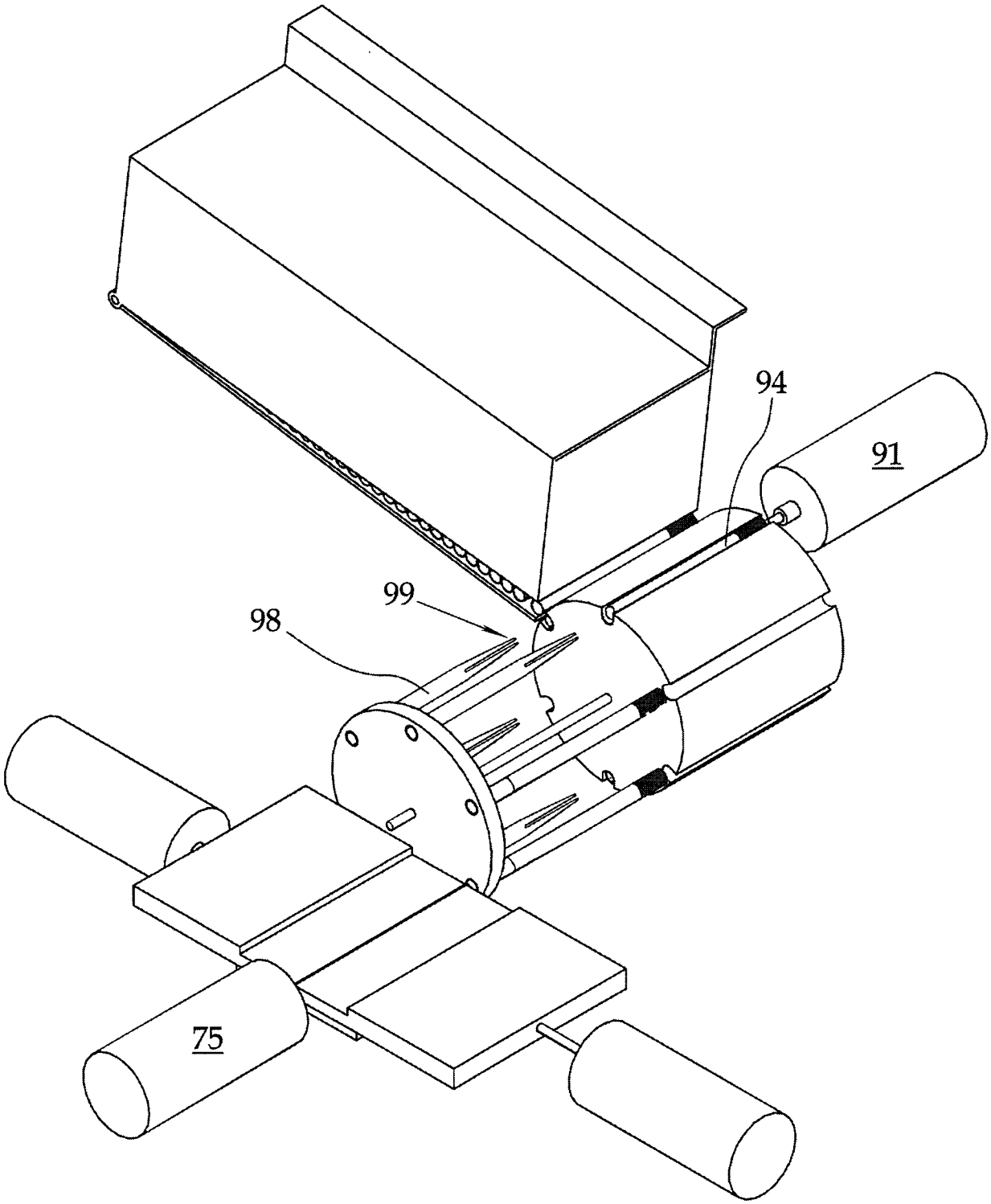


Fig. 9

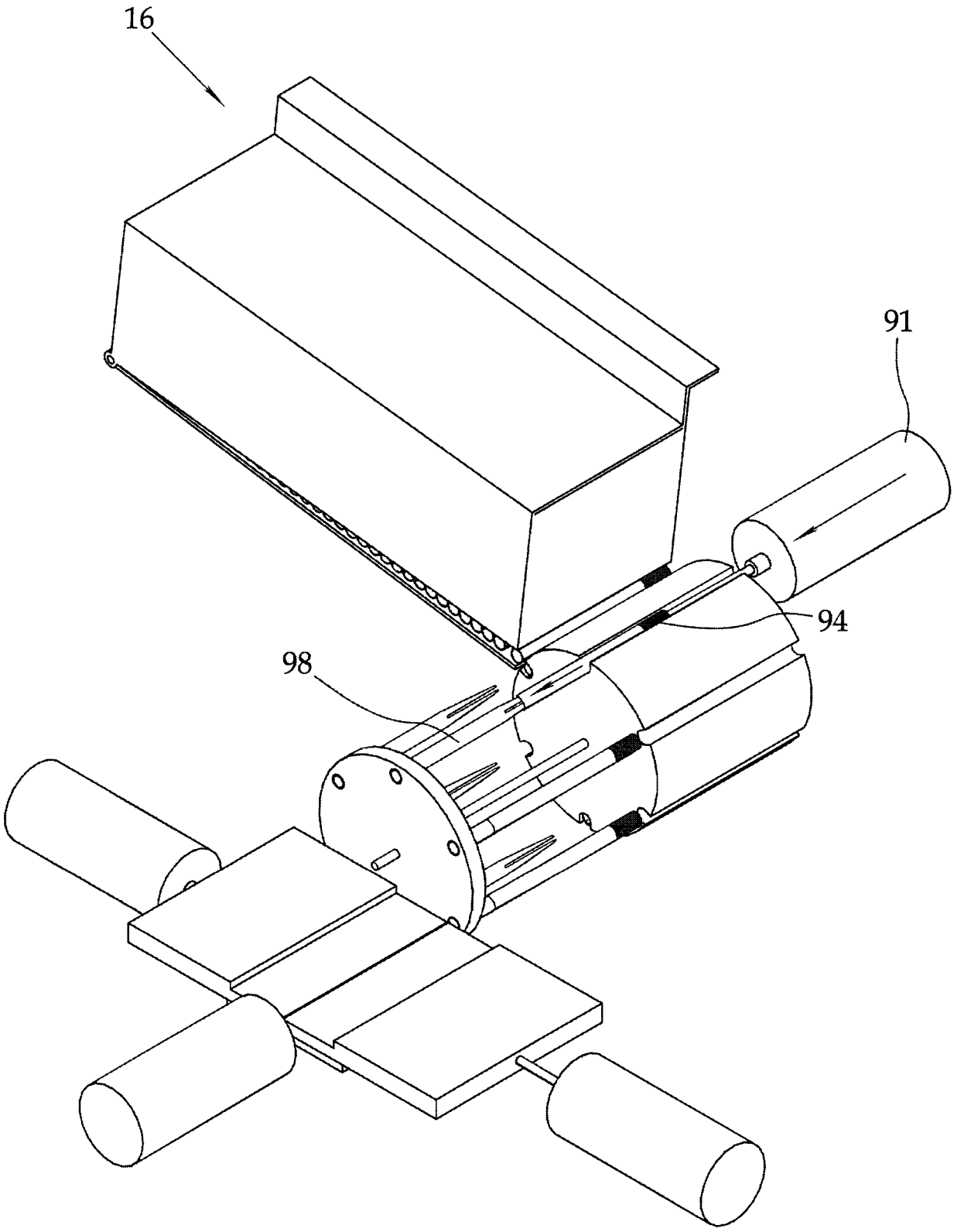


Fig. 10

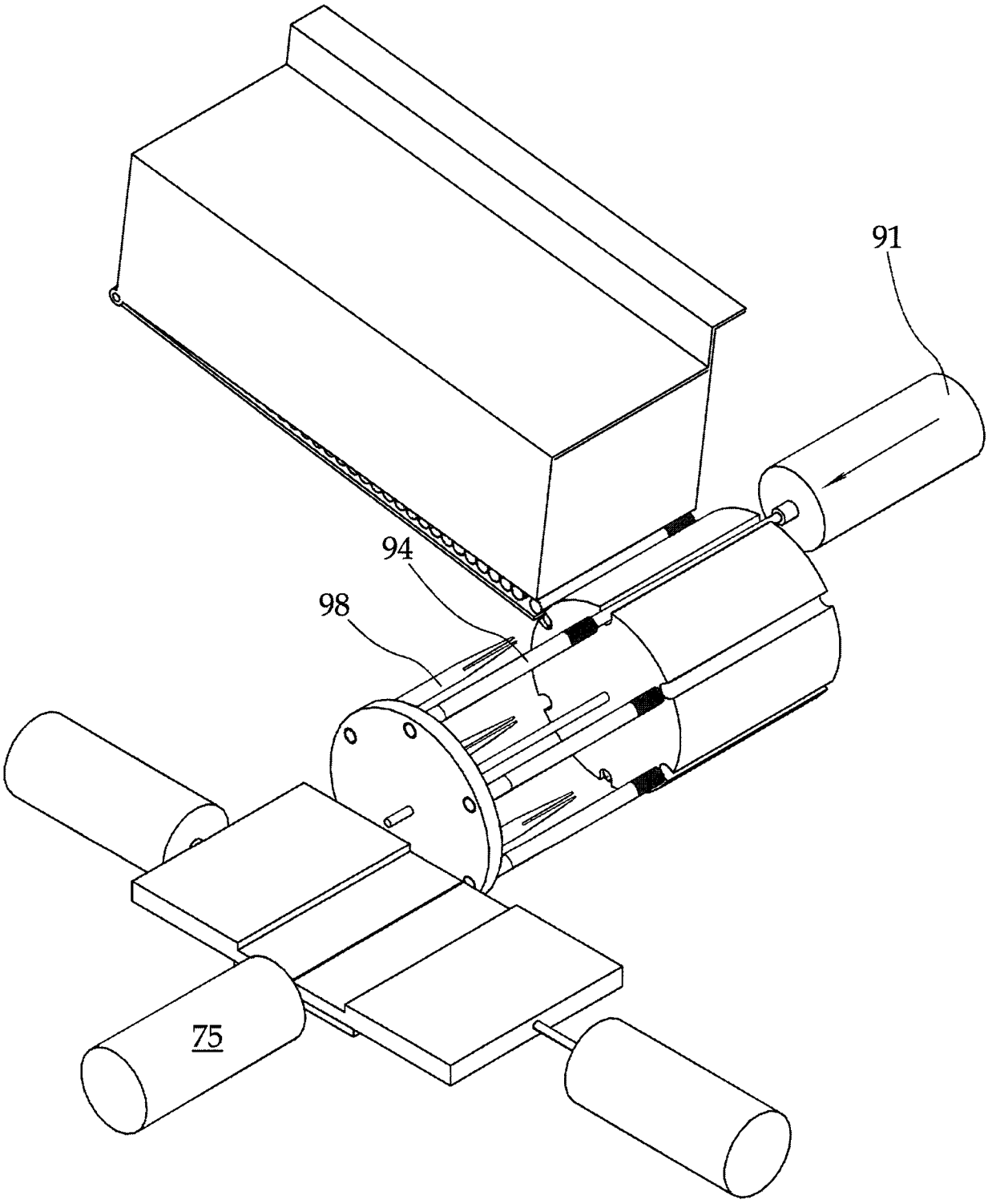


Fig. 11

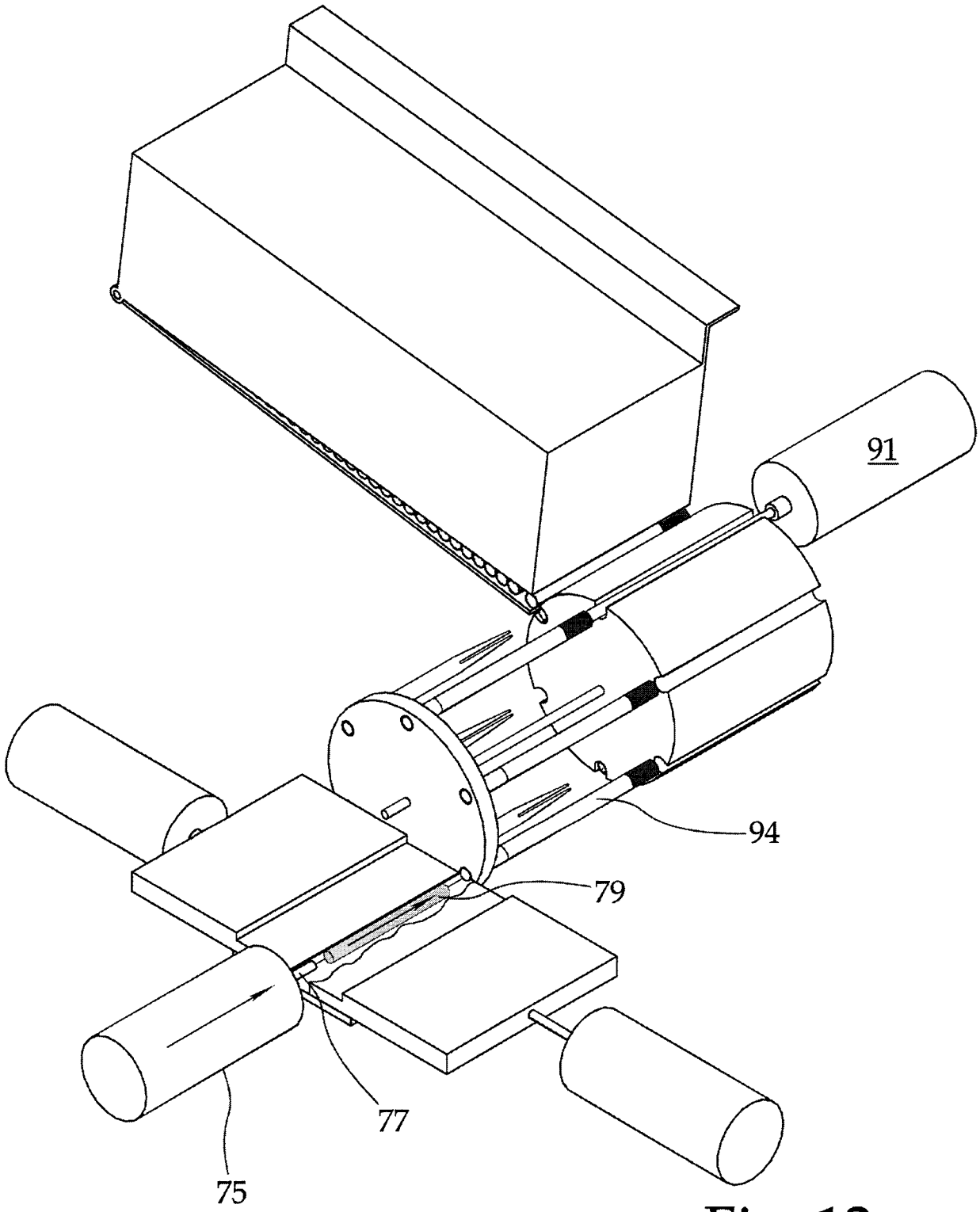


Fig. 12

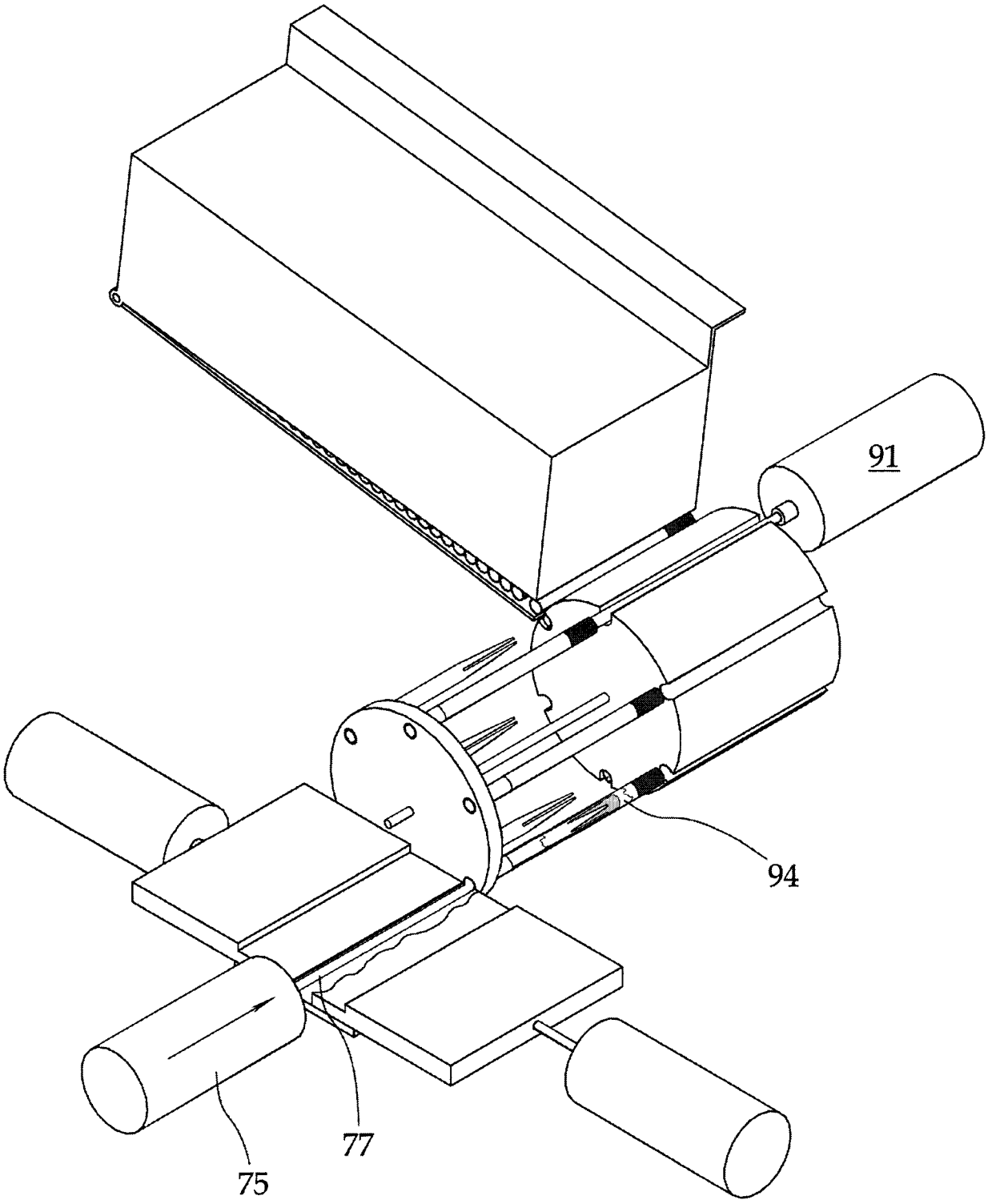


Fig. 13

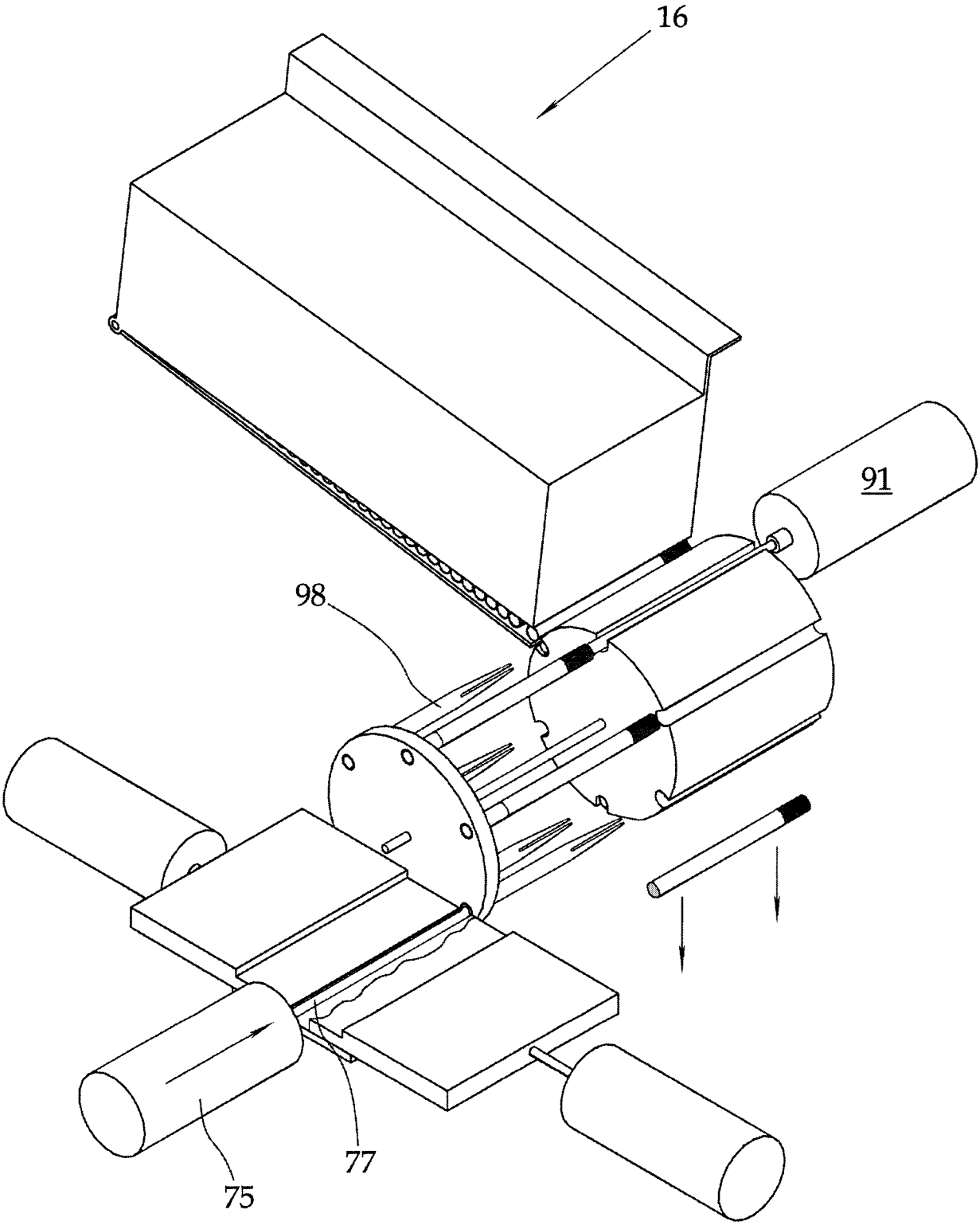


Fig. 14

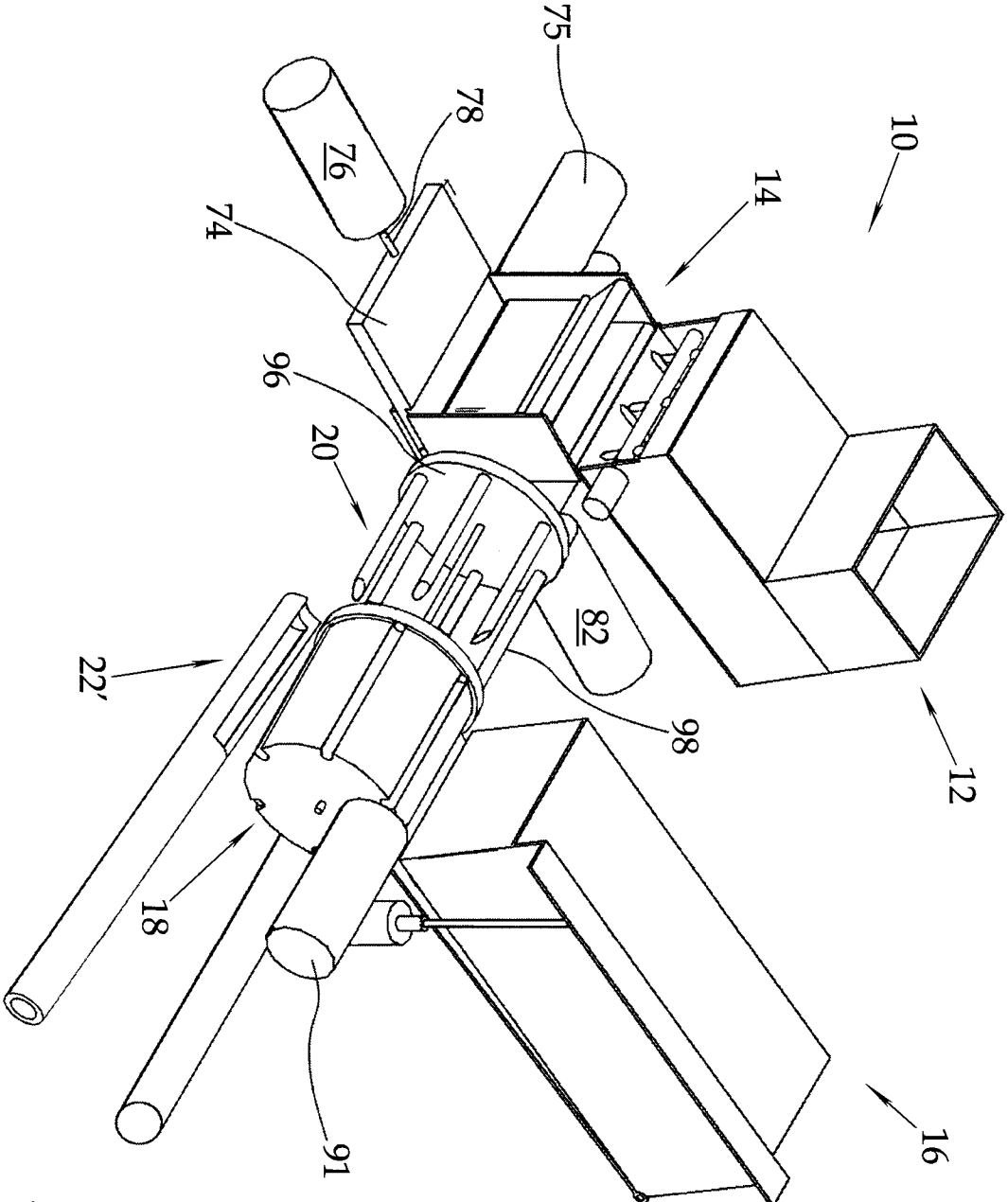


Fig. 15

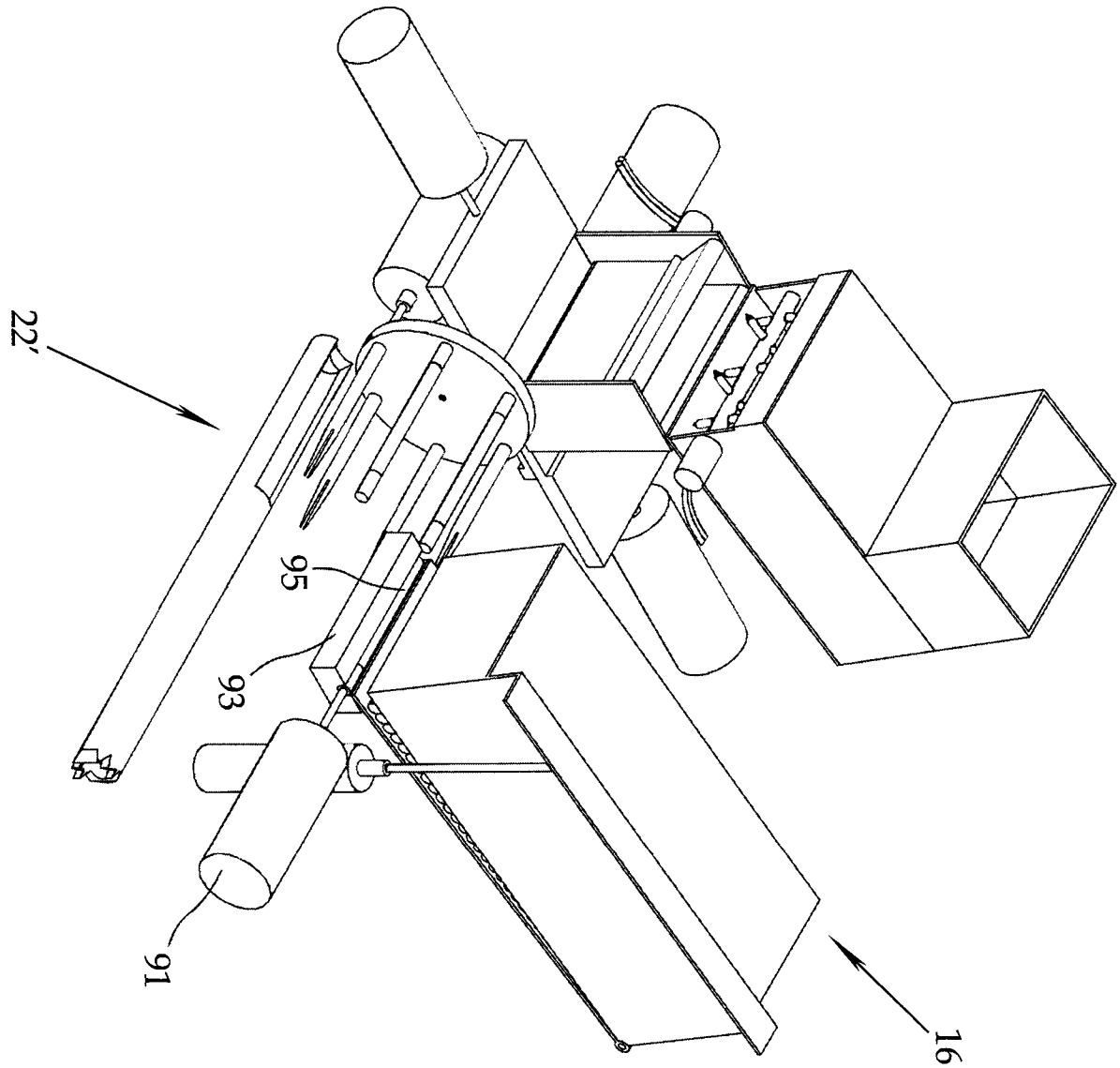


Fig. 16

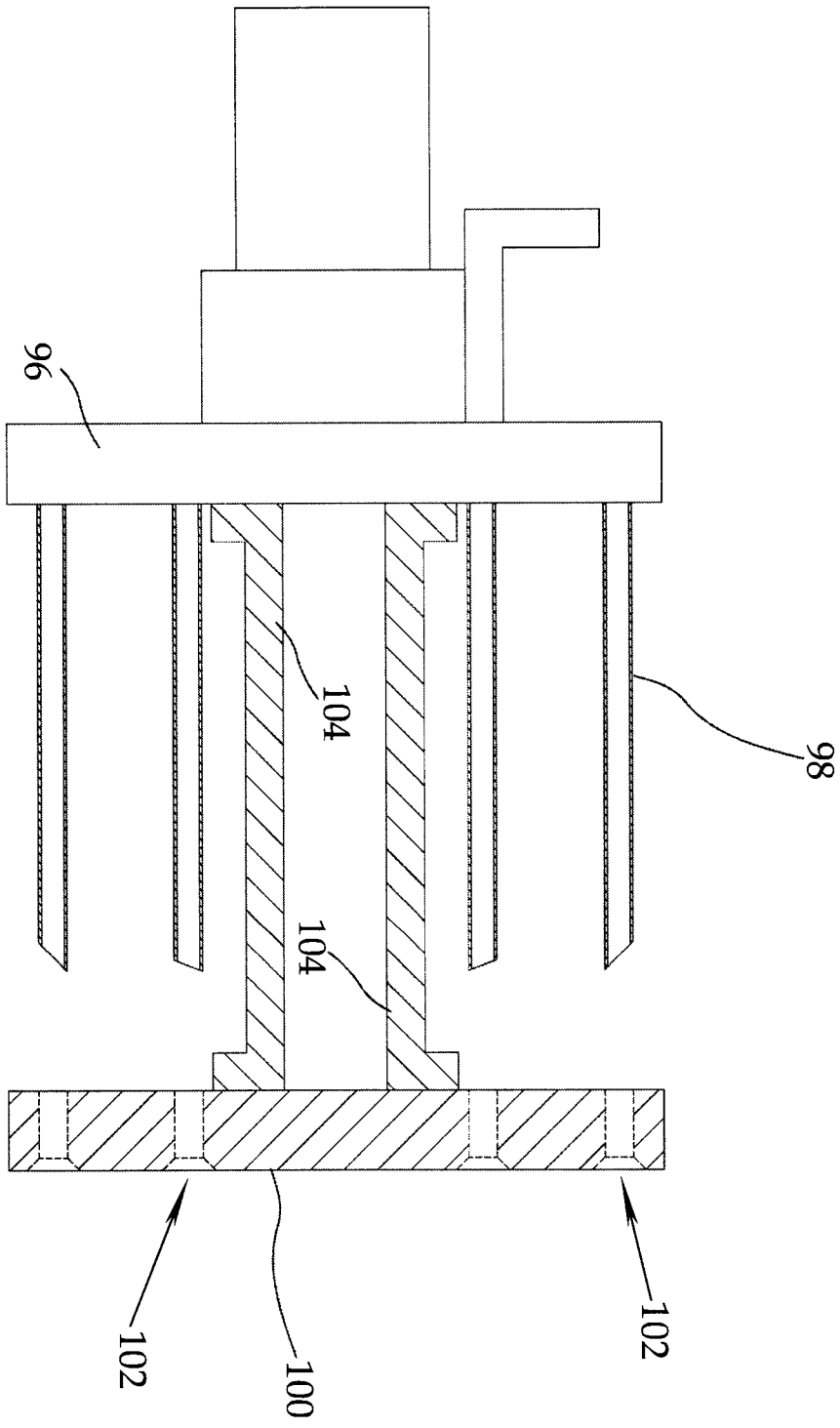


Fig. 17

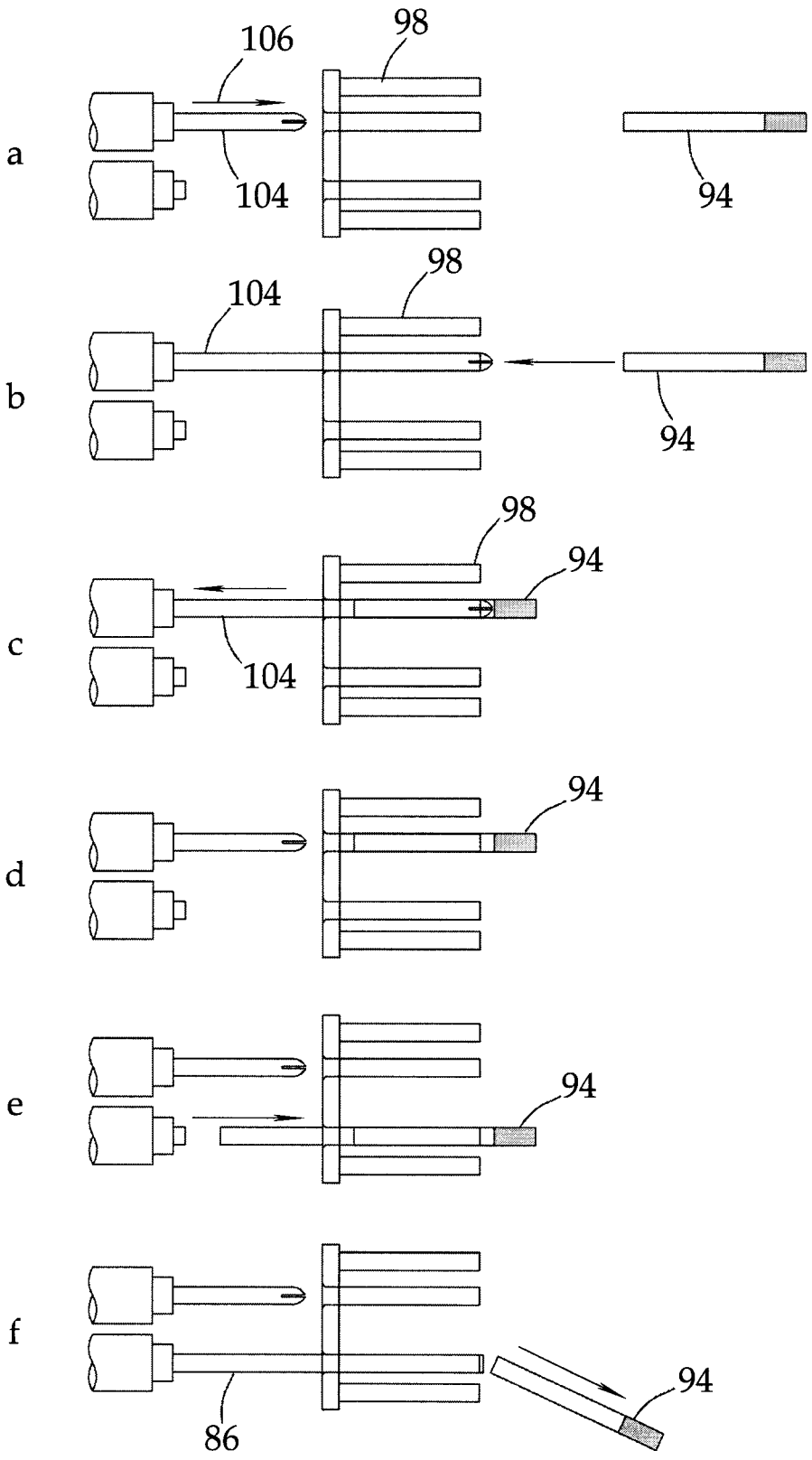


Fig. 18

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2009/000788

A. CLASSIFICATION OF SUBJECT MATTER
IPC: ***A24C 5/02*** (2006.01) , ***A24C 5/42*** (2006.01)
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC: ***A24C 5/02*** (2006.01) , ***A24C 5/42*** (2006.01)
USPC: 131/280, 131/70, 131/72, 131/74

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)
Delphion (all collections), QPat, Esp@cenet, Canadian Patent Database
keywords: apparatus, machine, cigarette, hopper, tube, belt, conveyor

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2006/0272655 A1 (THOMAS ET AL.) 7 December 2006 (07-12-2006) see: paragraphs 48-71 Figures 1, 7	1-16
A	US 6,557,560 B2 (CTC CANADA INC.) 6 May 2003 (06-05-2003) see: col. 2, line 41 - col. 3, line 24 Figures 1-3 Abstract	1-16
A	US 6,345,624 B1 (CTC CANADA INC.) 12 February 2002 (12-02-2002) see: Abstract Figures	1-16
A	US 3,509,887 A (ELKA WERKE FRITZ KIEHN GMBH) 5 May 1970 (05-05-1970) see: col. 2, line 53 - col. 3, line 2 col. 3, line 66 - col. 4, line 7 Figures 2, 3	1-16

[ ] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"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

Date of the actual completion of the international search	Date of mailing of the international search report
17 September 2009 (17-09-2009)	7 October 2009 (07-10-2009)

Name and mailing address of the ISA/CA	Authorized officer
Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001-819-953-2476	Julien Daigle (819) 934-4273

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CA2009/000788

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