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(71) Applicant: **MOY INSULATION HOLDINGS LIMITED, Franklin House Pembroke Road, Dublin 4 (IE)**

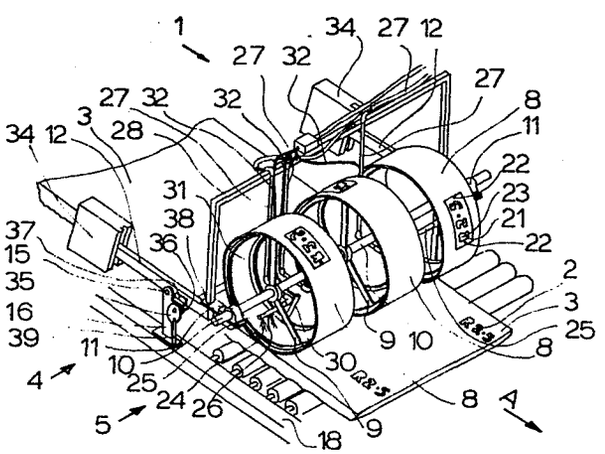
(72) Inventor: **Fitzsimons, Jocelyn, Mothel, Carrick-on-Suir, Co. Tipperary (IE)**
Inventor: **Gallagher, Anthony Joseph, 34 Willow Park Clonmel, Co. Tipperary (IE)**

(74) Representative: **Bowman, Paul Alan et al, LLOYD WISE, TREGEAR & CO. Norman House 105-109 Strand, London WC2R OAE (GB)**

(54) **Method and apparatus for marking an article.**

(57) The invention provides a method for marking an article by scorching the mark onto the article, and when the mark is applied to a fibrous material, for example, fiber glass heat insulating material, the surface fibers in the area of the mark are scorched, and fibers beneath the surface fibers are also scorched.

Apparatus according to the invention comprises at least one drum (8), having a stencil plate (21) mounted thereon. The drum is rotatable on a shaft 10 by friction of the batt passing under the drum (8). A manifold (25) with a plurality of gas jets (26) provide a flame (24) directed towards the batt (3) of material, and as the stencil plate (21) passes beneath the flames, the mark (2) is scorched onto the batt (4).



METHOD AND APPARATUS FOR MARKING AN ARTICLE

The present invention relates to a method and apparatus for marking an article, and in particular, for marking a batt of fibrous material, for example, fiber glass heat insulating material, or other non woven fibrous materials.

Fiber glass heat insulating material of the type used, for example, in insulating attics, in general, is provided in long batts of material formed from non woven randomly distributed and loosely arranged fibers. The fibers are coated with a water based resin binder and baked. The binder polymerizes, and thus each fiber is loosely bonded to its adjacent fibers by the binder.

It is desirable that the "R" value, size, thickness, and other relevant information, should be marked on the batts. This is generally done by ink printing. Unfortunately, such printing is not successful. Because of the nature of the fiber glass material in that the fibers are relatively loosely held together, normal handling of the material causes shedding of the surface fibers, and in turn, any print, which may be applied, falls off with the fibers.

There is therefore a need for a method and apparatus for marking fiber glass heat insulating material, and indeed, any other fibrous materials. Indeed, there is also a need for a method and apparatus for marking other articles.

The present invention is directed towards providing such a method and appartus which overcomes the problems of known methods and apparatus.

The present invention overcomes the problem of known methods, which comprise the step of marking a local area of the batt in the shape of the mark, in that according to the invention the method comprises the step of marking fibers adjacent the surface of the batt, and some of the fibers beneath the surface fibers, by applying a marking means to the fibers.

The advantages of the invention are many, however, the main advantage of the invention is that because the mark or marks, as well as being applied to the surface fibers, are also applied to the fibers beneath the surface, and accordingly, even if the surface fibers which are marked are rubbed off or worn off, fresh marked fibers beneath the rubbed off fibers, still remain. Thus, irrespective of rubbing or wearing, the mark still remains on the batt. Needless to say, the

more layers of fibers beneath the surface layer which are marked, the better.

Preferably, the marking means is a flame.

The advantage of this feature of the invention, is that the flame can penetrate between the surface fibers down through the layers of fibers, thus readily easily marking fibers beneath the surface layer. The flame, thus scorches, sears, singes, or burns the surface, or in certain cases portions of the fibers, thus carbonising or changing the colour of the fibers, to leave a clear permanent mark.

In one embodiment of the invention, the surface of the fibers are scorched.

The advantage of this feature of the invention, is that the surface of the fibers changes colour, to a brown scorched colour or black, in the case where the surface has been carbonised.

Advantageously, the temperature of the flame is not less than $300^{o}C$.

The advantage of this feature of the invention is that it ensures good surface scorching, with no damage to

the fibers. Needless to say, depending on the material to be marked, a flame of higher or lower temperature could be used. However, in the case of marking heat insulating fiber glass, a flame temperature of not less than 300°C has been found to be acceptable. Indeed, in the cases of heat insulating fiber glass material, a flame temperature of up to 500°C may be used.

Preferably, the flame plays on the local area for not more than two seconds. This ensures good surface scorching in the area of the mark. In fact, in certain cases, it has been found preferable to have the flame playing on the surface for approximately 0.4 seconds.

In another embodiment of the invention, the method includes the step of marking a batt of fiber glass heat insulating material, having loosely, randomly distributed fibers coated with a binding agent, and the surface of the binding agent of the fibers is scorched.

The advantage of this feature of the invention is that it avoids any damage to the actual fiber glass fibers.

Advantageously, the method includes the step of passing the marking means through an opening substantially in the shape of the marking stencil.

The advantage of this feature of the invention, is that it provides a mark on the material which is clearly and sharply defined, and furthermore, it also provides a relatively simple and inexpensive method of marking.

Further, the invention overcomes the problem of marking an article, by virtue of the fact that the method comprises the step of scorching a local area of the article in the shape of the mark, by applying heat from a heat source to the local area, through a stencil, having an opening of substantially the shape of the mark.

The advantage of this feature of the invention is that it provides a clearly and sharply defined mark on the article, and also provides a relatively simple and inexpensive method for marking an article.

Advantageously, the heat source is a flame, and the flame is applied to the article.

The advantage of this feature of the invention, is that the mark can be readily quickly scorched, seared, singed or burned onto the surface of the article, thus a relatively fast method of marking an article permanently, is provided.

Furthermore, the invention overcomes the problem of prior art apparatus for marking an article, by virtue of the fact that the apparatus according to the invention, comprises a heat source and a stencil with openings therein, which substantially define the mark, heat being passed from the heat source through the stencil opening to mark the article.

The advantage you achieve from the apparatus of the invention, is that it provides a means for effectively marking articles with a relatively permanent mark, and in particular, it provides apparatus for marking fibrous materials with a mark which will remain relatively permanently. It also provides a relatively inexpensive and simple effective apparatus for marking an article.

In one embodiment of the invention, the heat source is a flame.

The advantage of this feature of the invention, is that the flame readily quickly scorches the mark onto the article, thereby providing a relatively fast and effective means of permanently marking an article. In the case where a fibrous material is being marked, the flame can readily easily pass through the surface fibers to mark fibers beneath the surface layer of

fibers, thus, the advantage achieved here is that even if the surface layer of fibers rub or wear off, fresh marked fibers are beneath the rubbed off layers.

Advantageously, the stencil is mounted in the cylindrical wall of a rotatable hollow drum, the heat source being mounted within the drum.

The advantage of this feature of the invention is that it is particularly suited to marking articles of fibrous materials which are being produced from a continuous process machine. Further, it provides a relatively simple and effective, while at the same time being relatively inexpensive, apparatus.

The invention will be more clearly understood from the following description of some preferred embodiments thereof, given by way of example only, with reference to the accompanying drawings, in which:

Fig. 1 is a perspective view of apparatus according to the invention, for marking an article,

Fig. 2 is a rear perspective view of the apparatus

of Fig. 1,

Fig. 3 is a side elevational view of the apparatus of Fig. 1,

Fig. 4 is a partly sectional front elevational view of portion of the apparatus of Fig. 1 on the line IV-IV of Fig. 3,

Fig. 5 is a perspective view of a detail of the apparatus of Fig. 1,

Fig. 6 is a perspective view of another detail of the apparatus of Fig. 1,

Fig. 7 is a perspective view of a further detail of the apparatus of Fig. 1, and

Fig. 8 is a perspective view of apparatus according to another embodiment of the invention, for marking an article.

Referring to the drawings, and initially to Figs. 1 to 7, there is provided apparatus according to the invention, indicated generally by the reference numeral 1, for marking fibrous material. In this case, the apparatus 1 is for marking the "R" value 2 of a batt 3

of fiber glass heat insulating material, onto the batt 3. The batt of material is formed from non woven randomly distributed and loosely arranged fibers. The fibers are coated with a water based resin binder and baked. The binder polymerizes on baking, and thus each fiber is loosely bonded to its adjacent fibers by the binder. The apparatus 1 operates by scorching the mark 2 onto the batt 3. The surface of the binder coating on each of the surface fibers in the area of the mark, is scorched. In this case, a flame is used for scorching, and the flame penetrates through the surface fibers to impinge on fibers beneath the surface fibers, thereby similarly scorching the binder coating on the lower fibers.

The apparatus 1 is mounted on the end of a process machine 5 for producing the fiber glass batt 3. The batt 3 as it is delivered from the machine in the direction of the arrow A, is normally cut to length and stacked. This is not illustrated in the drawings. For convenience, only the end portion 4 of the machine 5 is illustrated.

The apparatus 1 comprises three hollow drums 8 supported by spokes 9 fast on a shaft 10. Plumber block bearings 11 rotatably support the shaft 10 on a pair of counter-balanced support arms 12. The arms 12 are pivotally

mounted at 15 on support brackets 16, which are in turn mounted on a pair of side rails 18 of the machine 5. An opening 20 is provided on each drum 8, and stencil plates 21 cover the openings 20. The plates 21 are releasably secured to the drums 8 by screws 22. As can be seen, openings 23 in the stencil plate 21 include the "R" value of the particular batt of fiber glass material being produced. In this case, the "R" value is given as "R 2.5". A marking means for marking the fibers of the batt, in this case is a heat source provided by three tubular manifolds 25, with a plurality of gas jets 26, which extend into each drum 8, to direct flames 24 downwardly towards the fiber glass batt 3. The flames 24 are illustrated by broken lines in the drawings. Gas supply lines 27 deliver gas to the manifolds 25, and are supported on a framework 28 mounted on the support arms 12. Flame sensors 30 are mounted within each drum 8 adjacent the manifold 25 to detect the presence of flame. The sensors 30 are connected by cables 32 to control apparatus (not shown) to isolate the gas to the manifold should the flame fail for any reason. A spark ignition device (not shown) is mounted in each drum 8 for igniting the gas jets at start up. A heat insulating asbestos coating 31 is provided on the interior of each drum to protect the drums 8 from excessive heat from the flames.

The support arms 12 are held rigidly together by the framework 28. Counterbalance weights 34 on the ends of the support arms 12, counterbalance the weight of the drums. A pair of cams 35 on a shaft 38 rotatable in brackets 36 which extend from the support brackets 16, engage follower plates 37 on the support arms 12 for raising and lowering the drums 8 to accommodate varying thicknesses of batt.

In use, the drums 8 are set by means of the cams 35, so that the drums 8 lightly engage the batt of material 3. As the batt 3 passes along the machine 5 beneath the drums 8, the drums 8 are frictionally driven by the batt 4. The gas is ignited and flames are directed downwardly within the drums 8 towards the batt 3. As the stencil openings 23 pass beneath the flames, the batt is marked with the "R" number 2, and any other desired information which is provided on the stencil plates 21. The flames pass through the stencil opening 23 and impinge on the surface fibers, thereby scorching the binder coating on the fibers, and turning it black by carbonisation. The flames also pass through the surface fibers and impinge on fibers beneath the surface, similarly scorching the surface binder coating on the lower fibers.

It has been found in practice, that by regulating the

machine 5 so that the output of the batt 4 is at the rate of approximately ten metres per minute, the flame plays on the batt through the stencil openings 23 for a dwell time of approximately 0.4 secs. With the flame temperature at approximately 500°C, and preferably not less than 300°C, adequate scorching of the mark onto the surface of the fibers of the batt is achieved. In fact, it has been found that with the flame temperature at 500°C and a dwell time of 0.4 secs, the surface fibers in the area of the mark, and fibers to a considerable depth below the surface are scorched. This has the particular advantage that even if the surface fibers in the area of the mark rub or wear off, further scorched fibers remain, thus clearly defining the mark.

Referring now to Fig. 8, there is illustrated apparatus according to another embodiment of the invention. This apparatus is substantially similar to that just described, and similar components are identified by the same reference numerals. In this case, two drums 8 are provided and driven by an electric motor 40. The motor 40 is mounted on a base plate 41, extending from one of the support arms 12 and drive the shaft 10. The stencil plates 21 slidably engage the openings 20 of each drum 8. Wings 42 on each stencil plate 21 engage corresponding grooves 43 on the edges of the openings 20.

This, it will be appreciated, permits the stencil plates to be readily easily changed when the machine is being changed over to produce a batt of fiber glass material of different "R" value, to that previously produced.

The advantage of driving the drums 8 is that it avoids any possibility of slip between the batt and the drums. Further, it permits the drums to be driven at a faster or slower speed to the batt of fiber glass material, which in certain cases may be advantageous.

While the apparatus has been described as comprising in one case three drums, and in the other case two drums, any number of drums may be used, indeed, in many cases it is envisaged that only one drum may be required.

Additionally, it will be appreciated that while the drums have been described as comprising replaceable stencil plates, this is not necessary, in fact, the stencil openings could be formed in the cylindrical surface of the drum, although needless to say, having replaceable stencil plates has considerable advantages, when it is desired to produce batts of different "R" value. It will of course be appreciated that while the apparatus and method have been described for marking fiber glass heat insulating material with an "R" value,

any other desired marks could be marked on the material, for example, length, width, thickness, indeed, the trade mark of the producer or any other relevant marks could also be marked on the material. In fact, it is envisaged that the apparatus and method may be used for marking many other fibrous materials besides fiber glass. Further, it is envisaged that the apparatus and method according to the invention, may be used for marking any type of articles, whether of a fibrous material, or indeed, non fibrous materials, for example, timber or other non fibrous plastics materials or the like. Where the apparatus is used for marking a non fibrous material, for example timber, the surface of the timber would be scorched.

Additionally, while the apparatus has been described as having hollow drums supported on spokes on a shaft, any other suitable configuration of drum and support could be used, and it will be appreciated that in many cases the drum may be dispensed with. Indeed, it will be appreciated that all that is necessary for carrying out the method of the invention is a stencil with holes in the shape of the desired mark. It is envisaged that the stencil may be provided on a flat plate, rather than on a drum. In which case, it is envisaged that the plate may be moved towards and away from the material, as it is desired to mark the material. The method in

this case, in general, would include the step of passing the flame through the openings of the flat stencil. Additionally, it will be appreciated that while the heat source has been described in both embodiments of the invention as being provided by a gas powered flame, any other suitable flame could be used. Indeed, it will also be appreciated that any other suitable heat source could be used. For example, a radiant heat source or the like. Further, it is envisaged that it will not always be necessary to pass the flame through the openings of the stencil; in many cases radiant heat from the flame through the openings will be adequate.

It will also of course be appreciated that the method and apparatus could be used for marking a static article or material. In other words, an article or material which is not moving. In which case, it is envisaged that the heat source and the stencil would be raised and lowered relative to the article for marking. In fact, in such cases, it is envisaged that a jig would be provided to receive the article or material, and when the article is positioned in the jig, then the apparatus could be lowered down to mark it.

Needless to say, while the apparatus has been described as including a flame sensor, this is not necessary,

although, for safety reasons it is preferable. Further, it will be appreciated that it is not necessary that the interior of the drums need be coated with a heat resistant material, and where they are coated materials other than asbestos could be used. Other means for igniting the gas besides spark ignition may be used.

Needless to say, it will be appreciated that it is not necessary for the drums to be supported on a counter balanced arm, the drum shaft could be mounted directly onto brackets extending from the process machine or in any other fashion.

It will also be appreciated that while in both embodiments of the invention just described, the marking means has been described as a flame, any other suitable marking means could be used, for example, it is envisaged in certain cases that ink may be used, in which case, the ink would be sprayed through the stencil openings onto the fibrous material, and it would penetrate through the surface fibers to mark both the surface fibers and fibers beneath the surface fibers, and lower fibers as well.

CLAIMS

1. A method for marking a batt (3) of fibrous material, the method being of the type which comprises the step of marking a local area of the batt (3) in the shape of the mark (2), characterised in that the method comprises the step of marking fibers adjacent the surface of the batt (3), and some of the fibers beneath the surface fibers, by applying a marking means to the fibers.

2. A method as claimed in claim 1, characterised in that the marking means is a flame (24).

3. A method as claimed in claim 1 or 2, characterised in that the surface of the fibers are scorched.

4. A method as claimed in claim 2 or 3, characterised in that the temperature of the flame (24) is not less than $300^{o}C$.

5. A method as claimed in any of claims 2 to 4, characterised in that the flame (24) plays on the local area (2) for not more than two seconds.

6. A method as claimed in any preceding claim for

marking a batt (3) of fiber glass heat insulating material, having loosely, randomly distributed fibers coated with a binding agent, characterised in that the surface of the binding agent of the fibers is scorched.

7. A method as claimed in any preceding claim, characterised in that the method includes the step of passing the marking means through an opening (23) substantially in the shape of the mark (2) in a stencil (21).

8. A method for marking an article (3) characterised in that the method comprises the step of scorching a local area (2) of the article (3) in the shape of the mark (2), by applying heat from a heat source (26) to the local area through a stencil (21) having an opening (23) of substantially the shape of the mark (2).

9. A method as claimed in claim 8, characterised in that the heat source (26) is a flame, and the flame is applied to the article (3).

10. Apparatus for marking an article, characterised in that the apparatus comprises a heat source (26) and a stencil (21) with an opening (23) therethrough, which

substantially defines the mark (2), heat being passed from the heat source (26) through the stencil opening (23) to mark the article (3).

11. Apparatus as claimed in claim 10, characterised in that the heat source (26) is a flame (24).

12. Apparatus as claimed in claim 10 or 11, characterised in that the stencil (21) is mounted in the cylindrical wall of a rotatable hollow drum (8), the heat source (26) being mounted within the drum (8).

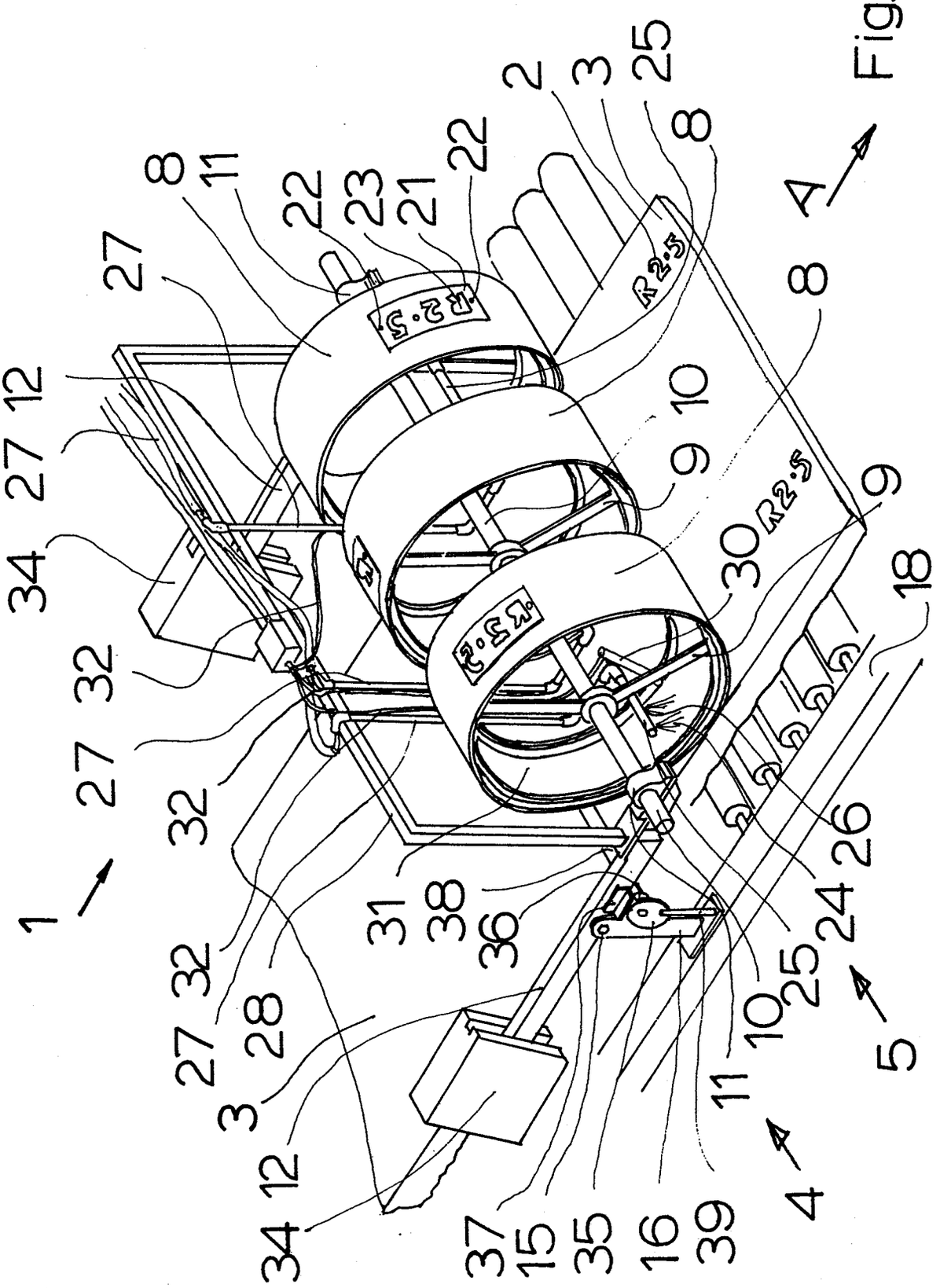

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Fig.1

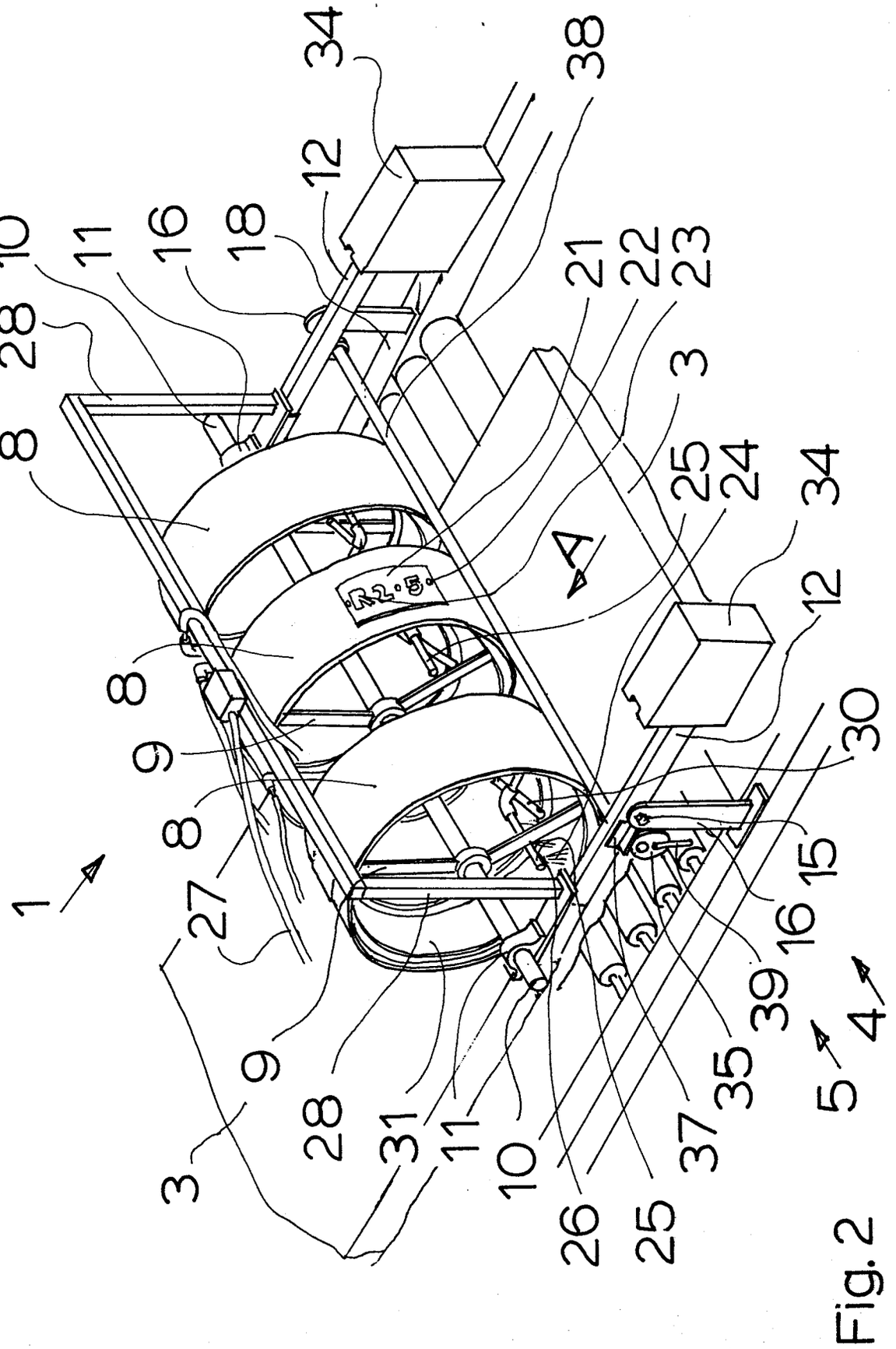
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Fig. 2

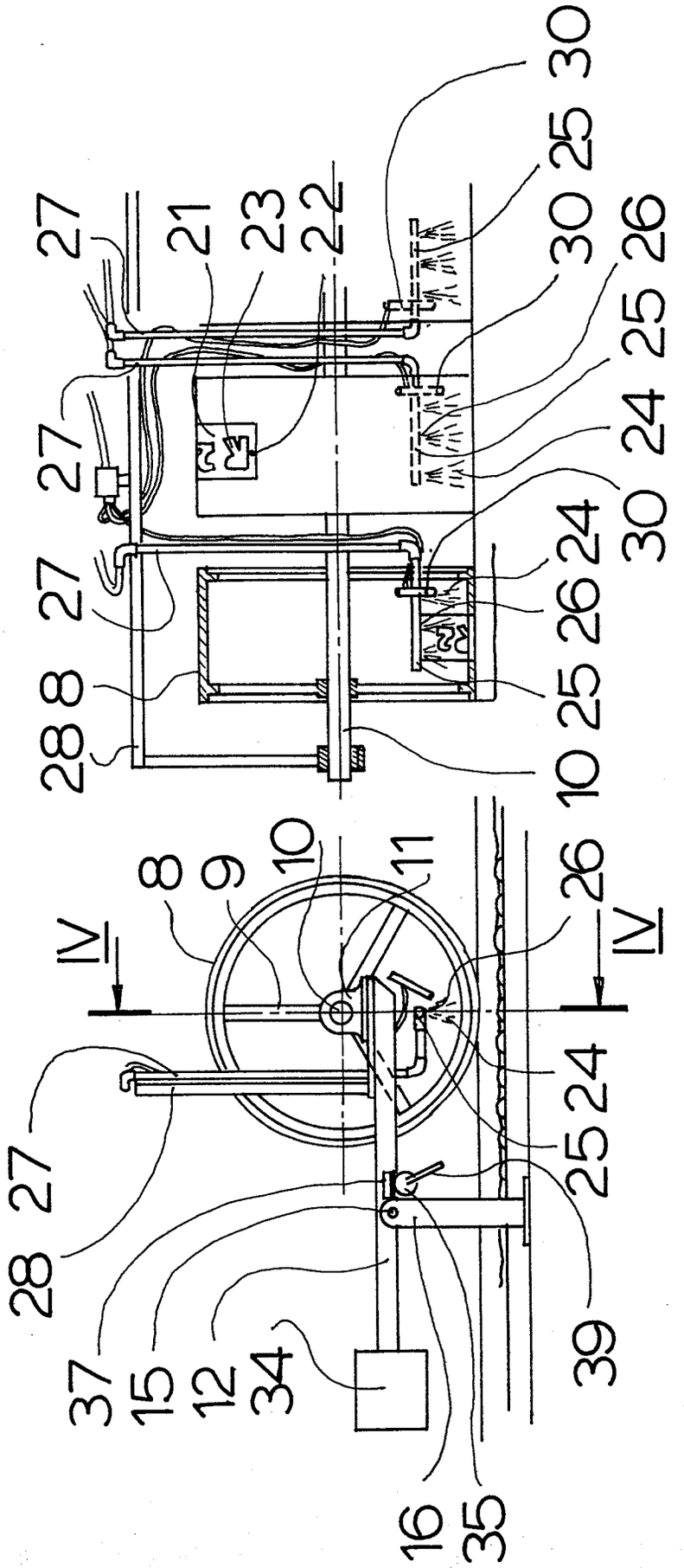
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Fig.4

Fig.3

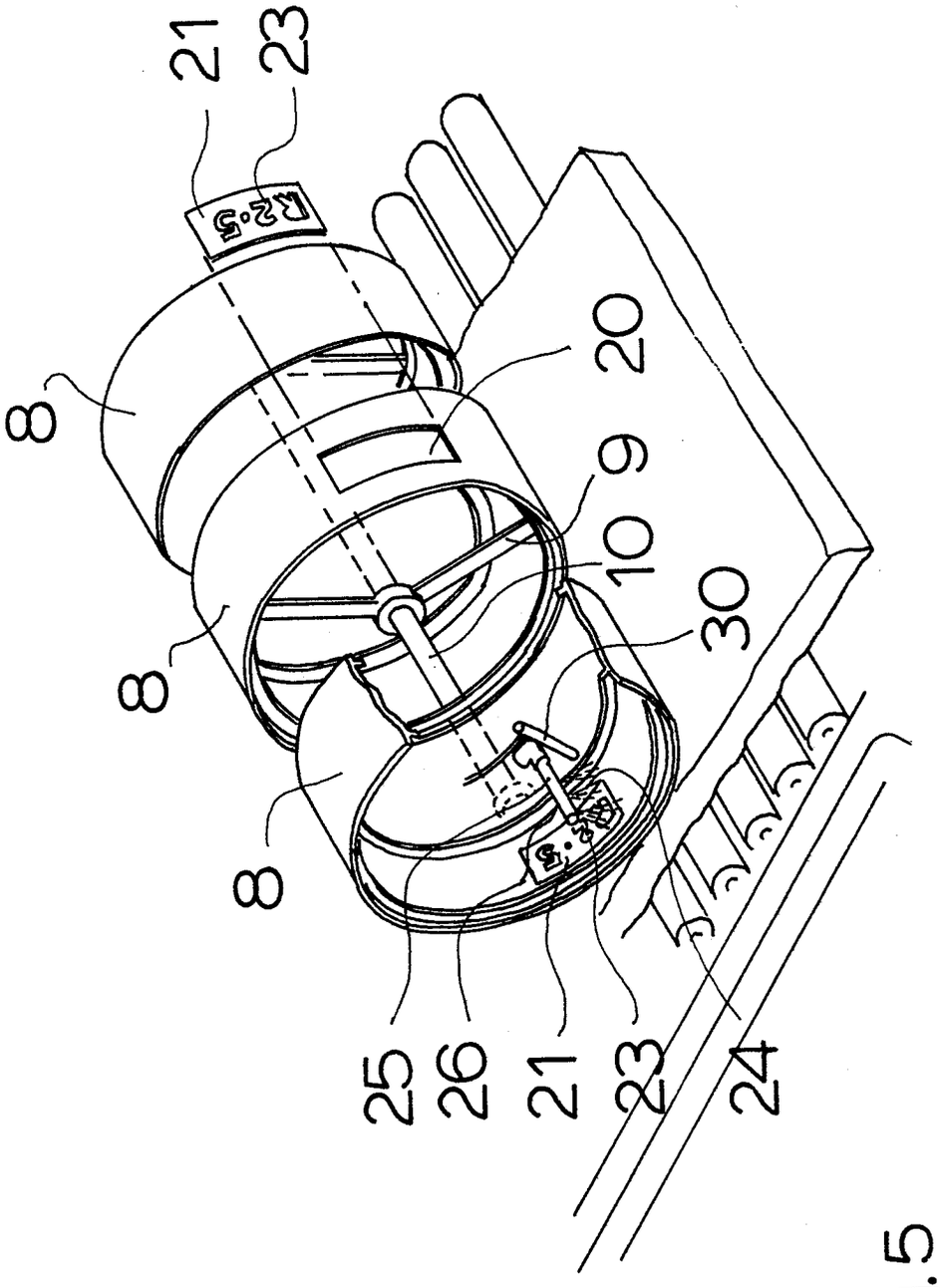

Fig.5

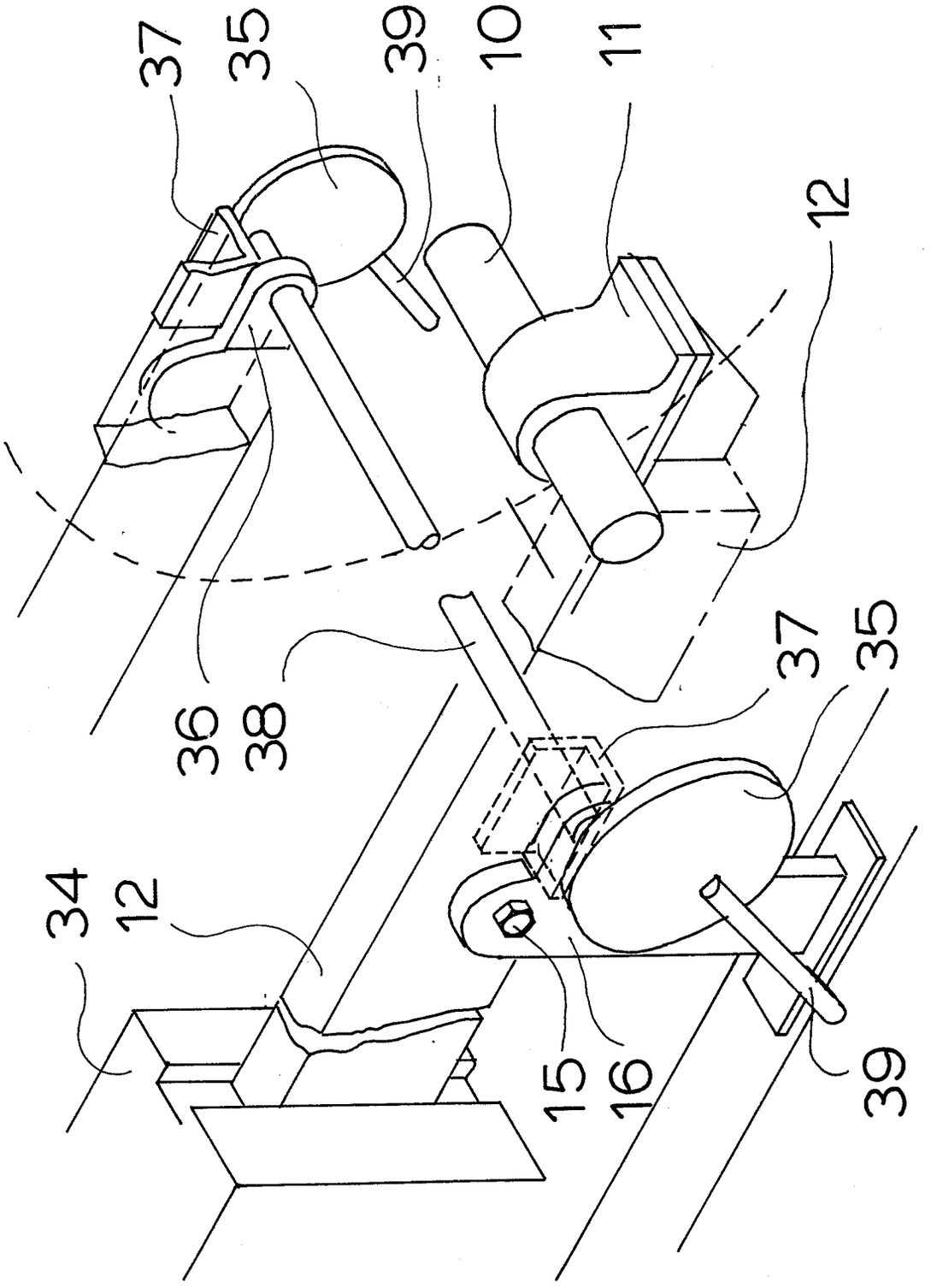

Fig.6

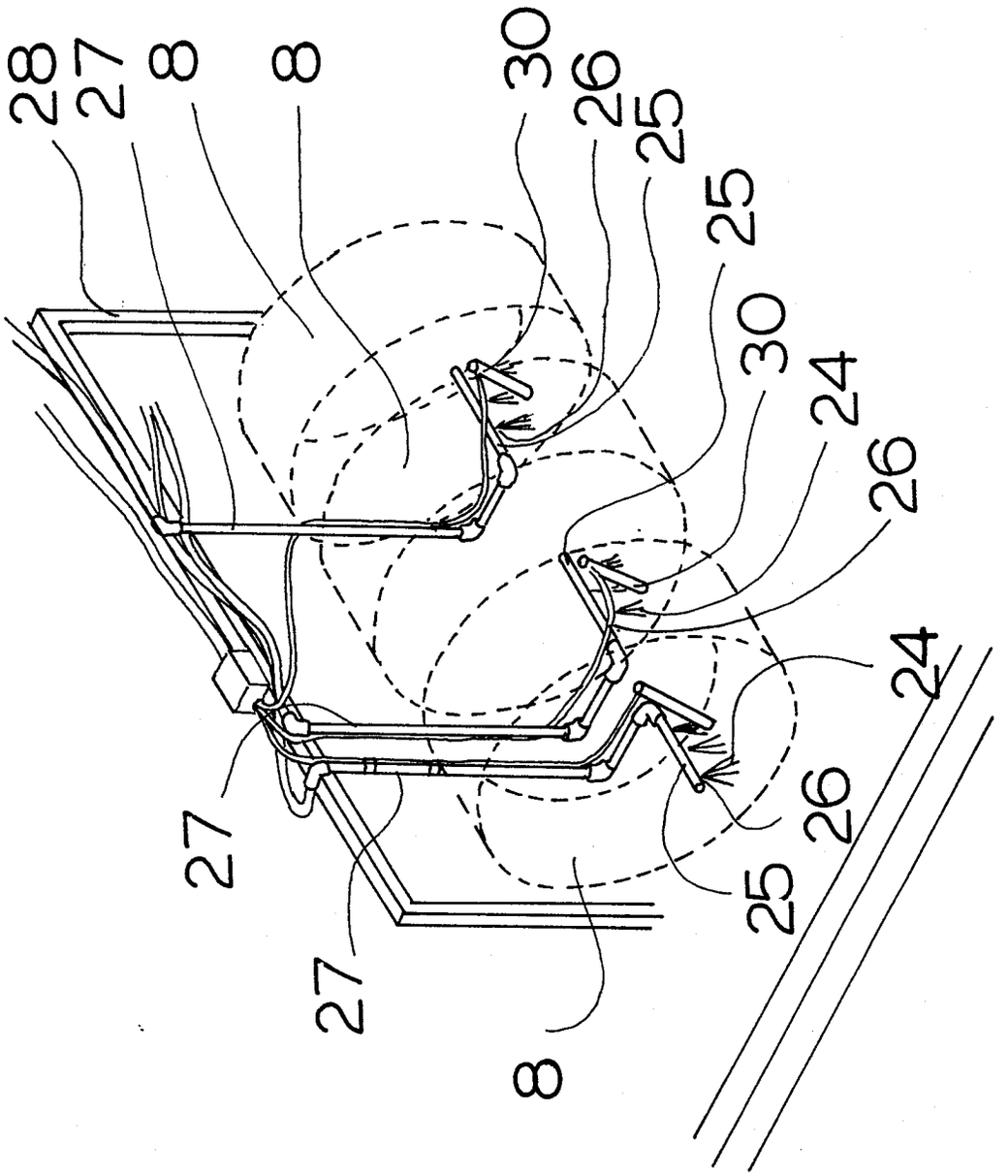

Fig 7

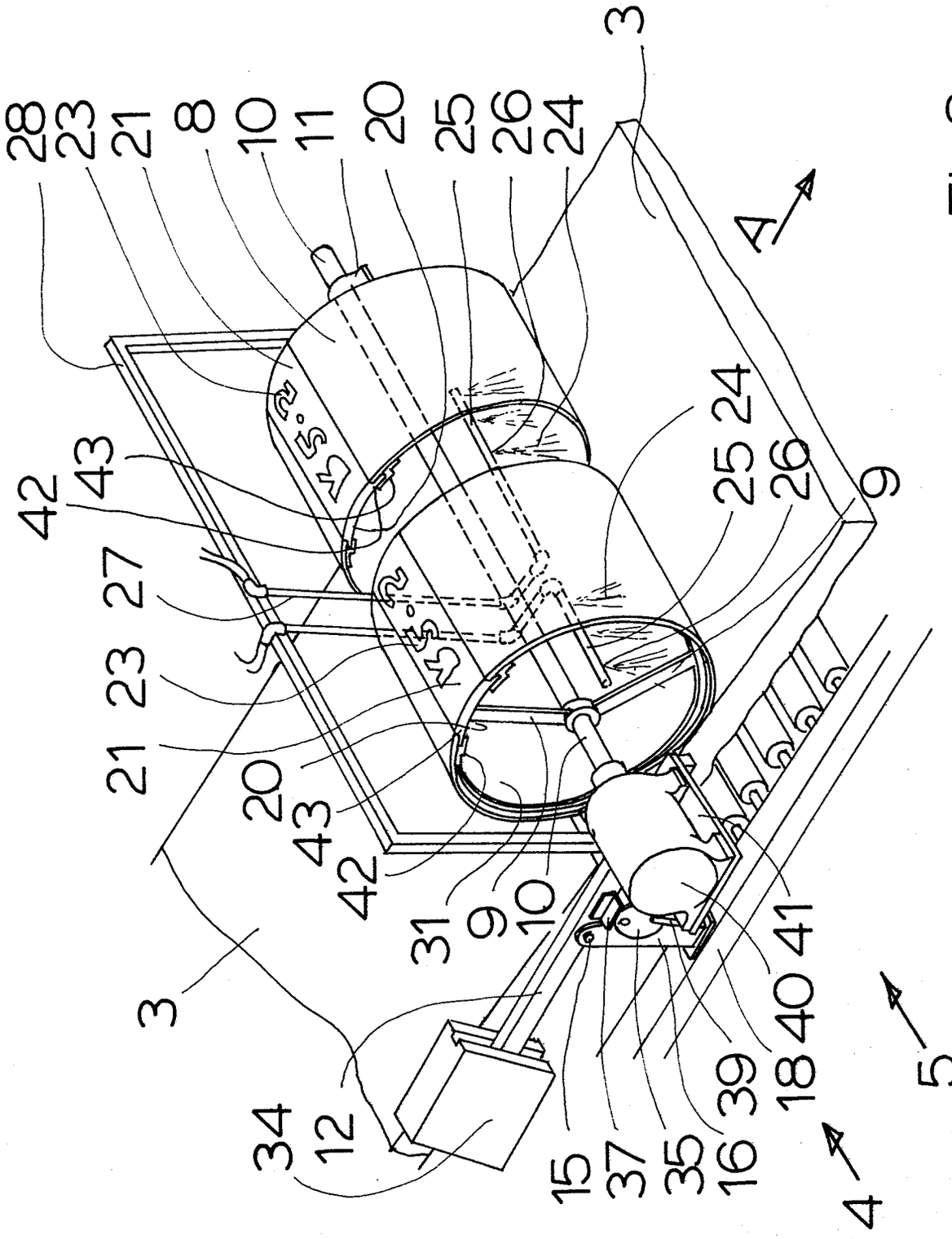
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Fig.8