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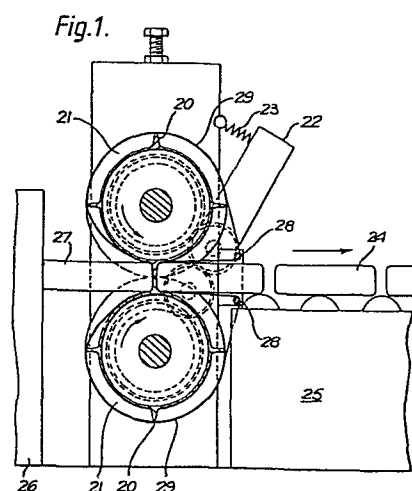
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54 Improved machine for moulding tiles in general.

57 This invention relates to a machine for moulding tiles in general, comprising, on a single frame (1-4) designed to be placed in front of a normal clay die (26), two horizontal moulding rollers (16, 17) of adjustable distance apart and of opposite directions of rotation, which are provided circumferentially with respective moulding half-cavities bounded perimetally by sharp profiles (20, 21), and which also comprises for each moulding roller (16, 17) a full-length elastic sheath or cover (29) arranged to make continuous direct contact with at least those generating lines of the corresponding roller which are concerned in the moulding stage, said sheath (29) having elevated elastic characteristics and being constantly maintained under transverse tension either by suitable means (28) or by initial elastic stretching on being mounted.



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IMPROVED MACHINE FOR MOULDING TILES IN GENERAL

In moulding so-called terracotta paving tiles, suitable machines are becoming increasingly more used which, starting from a suitable continuous cord of extruded clay, enable a succession of equal tiles to be obtained, these latter
5 possibly being provided on their exposed surface with ornamental bas-relief impressions.

A machine of this kind is described in detail in Italian patent application No. 46 893 A/77.
10

The machine described and represented in said application is constituted essentially by two strong side pieces with respect to which two horizontal superposed rollers rotating in opposite directions are rotatably mounted.
15

The generating surface of each roller is provided on its circumference with a limited number of moulding half-cavities which, together with the half-cavities of the remaining roller constitute a like number of cavities in which the clay
20 tiles are formed.

Finally, each half-cavity is defined perimetally by a series of sharp profiles or blades.

25 Although the aforesaid machine has proved particularly suitable for the purpose, its use has shown up drawbacks

which are described briefly hereinafter.

These latter can be briefly summarised in that after a tile has been moulded, it does not always separate by itself from
5 the two moulding rollers, but instead remains adhering to the surfaces which define one of the corresponding moulding half-cavities.

This usually happens when the moisture content of the mixture
10 used is not the optimum value, and instead exceeds the optimum value.

As a result of this, as soon as the tiles are moulded they do not become discharged and instead continue to occupy one
15 of the corresponding moulding half-cavities, so that if they remain attached to the upper roller they become moved into the working zone of the moulding rollers, and if they remain attached to the lower roller they usually fall to the base of the machine.

20 This drawback is obviously a source of further trouble such as stoppage of the machine and of the moulding operations, loss of tile production, lengthy cleaning of the machine, and the need to prepare a special mixture, i.e. specifically to
25 eliminate said clogging or lack of discharge.

The main object of the present invention is to propose improvements to machines of the aforesaid type which, by means of a simple, rational, functional and highly reliable
30 constructional design, remedy the aforesaid drawbacks by ensuring separation of the tiles after formation, even when the moisture content of their mixture is not the optimum value.

35 In order to attain said object, the basic idea of the

invention is to provide, for each moulding roller of a machine of the aforesaid type, a sheath or cover arranged to make continuous direct contact with at least those generating lines of the corresponding moulding roller which
5 are concerned in the moulding stage, the sheath or cover having elevated elastic characteristics and being constantly maintained under transverse tension either by means of a suitable member or by initial elastic deformation on being mounted over its roller.

10

The sheath according to the invention completely surrounds the corresponding roller, and its characteristics are such that it can support the inevitable pinching which occurs at the roller blades.

15

During the moulding stages, this sheath or cover, which is formed for example from a natural or synthetic elastomer, thus performs the double function of a lining for the corresponding half cavity in that it assumes the configuration of this latter on deforming, and of an expulsion
20 member for the corresponding tile in that it again assumes the configuration which it had before the moulding.

The objects, advantages and characteristics of the invention
25 will be more apparent from the detailed description given hereinafter with reference to the figures of the accompanying drawings, which illustrate preferred embodiments thereof by way of non-limiting example.

30 Figure 1 is a vertical section through the invention taken orthogonal to its moulding rollers.

Figure 2 is also a vertical section through the invention, taken on the common plane on which the axes of said moulding
35 rollers lie.

Figure 3 is a perspective view of an alternative embodiment of an equipped moulding roller for the same invention.

5 Figures 1 and 2, representing the first embodiment of the present invention, show a portal constituted by two strong vertical side pieces 2, connected together upperly by a cross member 1.

10 The said side pieces 2 are fixed lowerly to a suitable base 3.

15 The said frame is disposed in front of a normal clay die 26, designed to form a continuous cord of clay 27 which is fed between the two moulding rollers of the invention.

20 As shown in Figure 1, immediately downstream of the moulding machine there is a roller table 25 on to which the tiles 24 which have just been moulded are discharged.

25 The said moulding rollers are superposed and rotate in opposite directions as described hereinafter.

30 The lower moulding roller 16 comprises a horizontal shaft 7 which is rotatably mounted relative to the side pieces 2 by way of suitable rolling bearings.

35 Said shaft 7 extends beyond said side pieces to receive at one end a drive gear 11 through which motion is transmitted to the invention, and at the other end a gear wheel 8 for transmitting motion to the upper moulding roller 17.

40 In positions corresponding with the inner faces of the side pieces 2, the horizontal shaft 7 is provided with two opposing flanges 14 which act as a support for a cylindrical shell 15. This latter is provided longitudinally with

blades 20, the end flanges 14 being provided with circumferential blades 21, the depth of which is equal to that of the longitudinal blades 20.

- 5 In this manner, a small set of moulding half cavities is defined circumferentially on the generating surface of the lower roller 16.

- As shown in Figure 2, two slide seats 6 lying at a level
10 higher than the level of the lower horizontal shaft 7 are formed on the outer faces of the side pieces 2 by means of two vertical opposing plates 4 fixed to these latter.

- Each slide seat 6 acts as a housing for a slide 66, the upper
15 end of which is connected to a suitable adjustment pin 5 which is screwed through the cross member 1.

- An upper horizontal shaft 13 is rotatably mounted relative to the two vertical opposing slides 66 by means of suitable
20 rolling bearings.

- This latter shaft passes through the two side pieces 2 and through the pair of vertical plates 4 by way of apertures, which are greater in size than said upper horizontal shaft 13.

- 25 Said shaft 13 is disposed so that it lies exactly above the lower horizontal shaft 7 in a vertical direction. Said upper horizontal shaft 13 acts as a support for the upper moulding roller 17, which comprises two opposing flanges 18
30 torsionally rigid with the corresponding shaft and clamping a cylindrical shell 19 therebetween.

- This latter is provided with longitudinal blades 20 entirely similar to those provided on the lower cylindrical shell 15,
35 and the end flanges 18 are provided with circumferential blades 21.

In this manner, the upper moulding roller 17 is circumferentially provided with a set of moulding half cavities conjugate with those provided on the lower moulding roller 16, and which together with these latter form a like number of moulding cavities for said tiles 24.

The upper horizontal shaft 13 extends beyond the right hand side piece 2 as shown in Figure 2, where a gear wheel 12 is keyed thereon.

10

This latter engages with an idle pinion 10 which in its turn is in continuous engagement with a second pinion 9, this latter being in continuous engagement with the gear wheel 8 keyed on to the lower horizontal shaft 7.

15

As clearly shown in the accompanying Figures 1 and 2, said pinions 9 and 10 are mounted rotatable on two pins branching from an arm 22.

20 This latter is conveniently inclined to the vertical, and its lower end is pivoted on the corresponding vertical plate 4 concentrically to the respective end of the lower horizontal shaft 7.

25 The upper end of the swivel arm 22 is connected to a tension spring 23, the other end of which is hooked to the vertical plate 4.

30 It will here be apparent that with a transmission of this type, the two moulding rollers rotate in two opposite directions, and their peripheral speed is substantially equal to the speed of transfer or extrusion of the clay cord 27.

35 At the same time, the advantageous provision of the recipro-

cating arm 22 ensures engagement between the toothed members even when the relative position between the moulding rollers 16 and 17 is varied by means of the slides 66.

5 From the accompanying Figure 1 it will also be noted that a sheath or cover 29 of full length is provided to completely surround the upper, front and lower generating lines of the upper moulding roller 17 by means of direct contact, and is deviated about a horizontal idle roller 28 disposed at a
10 level higher than that occupied by the upper surfaces of the tiles 24 leaving the machine according to the invention.

In a manner similar to that described heretofore, an elastic sheath or cover 29 of full length is also provided for the
15 lower moulding roller 16, and makes direct contact with the upper, front and lower generating lines of the lower moulding roller 16.

This elastic sheath or cover 29 is also deviated about a
20 lower idle roller 28, this latter as in the case of the preceding one being supported by the side piece 2, which occupies a level which is at least slightly lower than that occupied by the slide plane defined by the upper generating lines of the rollers of the roller table 25.

25 It should be noted here that the idle rollers 28 are provided to maintain the two elastic sheaths 29 constantly under tension, these being preferably constituted by a natural or synthetic elastomer.

30 It should also be noted that in the accompanying Figures 1 and 2, those parts of the elastic sheaths 29 which upperly close the moulding half cavities of the lower moulding roller 16 and upper moulding roller 17 are shown with a cylindrical
35 development for clarity and simplicity of drawing, but it is apparent that both because of their nature and because of the

tension to which they are subjected, they sag bidirectionally at the central zone of each moulding half cavity.

The initial tension to which the elastic sheaths or covers
5 29 are subjected on being mounted is necessary for the reasons specified hereinafter.

The deviation members 28 are however not absolutely necessary for ensuring the required tension to the elastic sheaths 29.
10 In this respect, with reference to Figure 3 which shows an alternative embodiment of the present invention, it can be seen that the same advantages can be obtained by means of a full length elastic sheath or cover 29 which is mounted over the moulding rollers 16 and 17 with an initial stretching
15 caused by elastic deformation such as to enable the sheath to remain constantly under tension.

From the accompanying Figure 3 it can also be seen that bas-relief impressions, to be reproduced on the exposed surfaces
20 of the tiles 24, can be provided on the bottom of the moulding half cavities of the two moulding rollers 16 and 17, more precisely on the outer generating lines of the shells 15 and 19.

25 With reference to Figure 1, during the operation of the improved machine according to the invention, the two moulding rollers 16 and 17 rotate in opposite directions to entrain with them the two elastic sheaths 29 which are deviated over the idle rollers 28.

30 It will here be apparent that a natural or synthetic elastomer is chosen for the elastic sheaths or covers 29 because it can undergo pinching at the blades 20 and 21 without suffering damage.

It is also apparent that the distance between the horizontal axes 7 and 13 is to be adjusted such that the sheaths are subjected to said pinching but not to shear stresses, said pinching lying within the range of elasticity of the said elastomer so that this latter can again assume its initial configuration when it loses contact with the said blades.

In both the embodiments described heretofore, when the machine is in operation those portions of the sheath 29 external to the working zone of the machine are undeformed, or rather are in a sagged state as stated.

When two corresponding moulding half cavities reach the working zone of the invention, the pair of elastic sheaths 29 is elastically urged to assume the inner configuration of the moulding cavity thus formed, i.e. the external configuration of the corresponding tile 24.

Thus during this operational stage, the elastic sheaths or covers 29 perform an internal lining function for the moulding half cavities.

In contrast, with reference to Figure 1, on discharge, said elastic sheaths or covers 29 act as expulsion members in that because of the tension or elastic prestressing to which they are subjected, they tend to again assume their initial configuration, i.e. their configuration in those positions external to the working section, so that they ensure extraction of the tiles 24 from the moulding cavities by discharging them on to the upper generating lines of the rollers of the discharge roller table 25.

The operating stages heretofore described proceed in the same manner for each individual tile 24 formed by the invention. Moreover, although not previously stated it should be noted

that the fitting of the elastic cover 29 to the moulding rollers 16 and 17 as shown in Figure 3 presents no difficulty, as on first sight it may appear, because said fitting is carried out by means of a cylindrical member or cage on to which the elastic sheath 29 is mounted in a pre-stretched state. The cylinder or cage is then mounted over the corresponding roller.

Said cylinder is then extracted while retaining the sheath 29 at one end, this thus becoming deposited under elastic prestress on to the cylindrical generating surface of the moulding roller 16 or 17.

Finally, in the case of the embodiment shown in the accompanying Figures 1 and 2, further deviation rollers 28 can be provided for the sheaths 29, this lying within the basic concept of the present invention.

In this respect, to attain the stated objects, the sheaths 29 need only to make direct contact with those longitudinal zones of the rollers 16 and 17 which are participating in the moulding stage.

Furthermore, in the case of the alternative embodiment of Figure 3, two end rings mounted on the outside of the end flanges 14 and 18 can be provided, their purpose being to clamp the circumferential end edges of the sheaths to also provide them with an elastic prestress in a longitudinal direction.

The invention is not limited to the single embodiments heretofore described, and modifications and improvements can be made thereto without leaving the scope of the inventive idea, the basic characteristics of which are summarised in the following claims.

PATENT CLAIMS

1. An improved machine for moulding tiles in general, as
heretofore described, of the type comprising, on a single
5 frame designed to be placed in front of a normal clay die,
two horizontal moulding rollers of adjustable distance apart
and of opposite directions of rotation, which are provided
circumferentially with respective moulding half-cavities
bounded perimetally by sharp profiles, characterised by
10 providing, for each moulding roller, a full-length elastic
sheath or cover arranged to make continuous direct contact
with at least those generating lines of the corresponding
roller which are concerned in the moulding stage, said sheath
having elevated elastic characteristics and being constantly
15 maintained under transverse tension either by suitable means
or by initial elastic stretching on being mounted.

2. A machine as claimed in claim 1, characterised in that
said elastic sheath or cover is in the form of a small thick-
20 ness cylindrical membrane constituted by a natural or
synthetic elastomer.

3. A machine as claimed in claim 1, characterised in that
said means for constantly maintaining transverse tension are
25 in the form, for each moulding roller, of one or more idle
rollers over which the membrane which has been previously put
under tension is deviated, these being downstream of the
corresponding moulding roller outside the discharge zone
thereof.

30 4. A machine as claimed in claim 1, characterised in that
each elastic sheath or cover is simply mounted, after initial
elastic stretching, over the corresponding moulding roller so
that it completely surrounds its cylindrical development with
35 direct contact.

5. A machine as claimed in claims 1 and 4, characterised in that the prestretched elastic sheath simply mounted over the corresponding moulding roller is clamped, after being elastically stretched longitudinally, on to the opposing transverse
5 faces of the moulding roller to which it pertains by means of two rigid annular members.

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Fig.1.

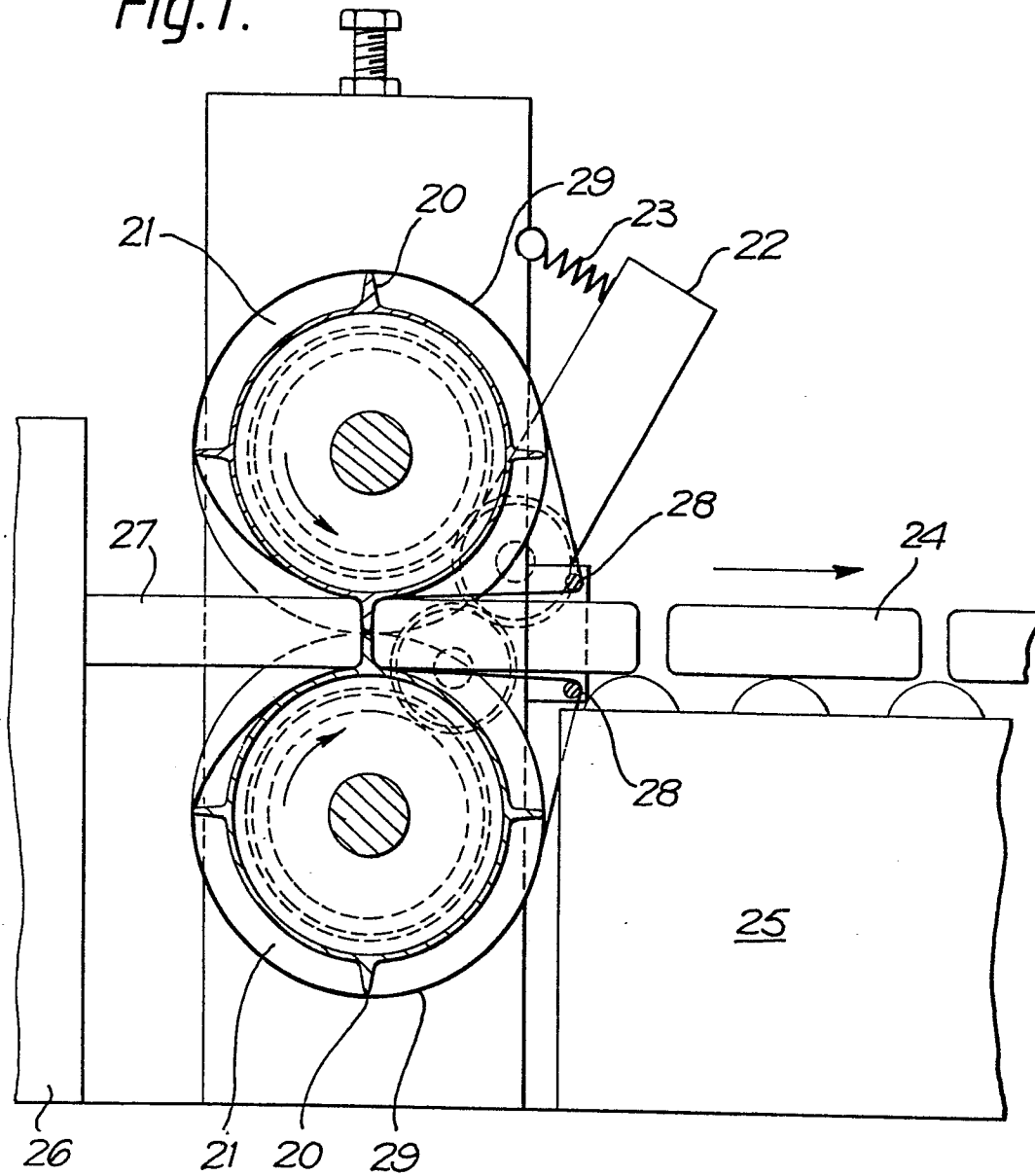


Fig.3.

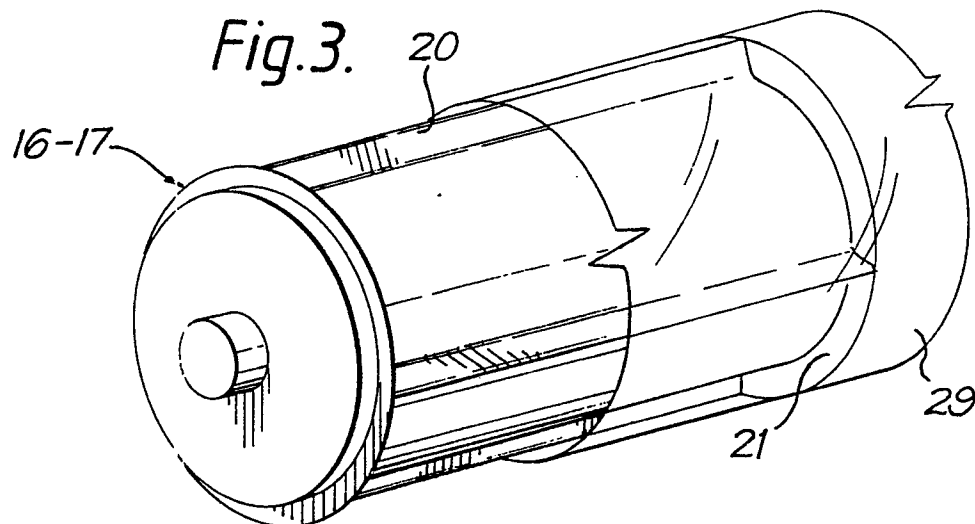
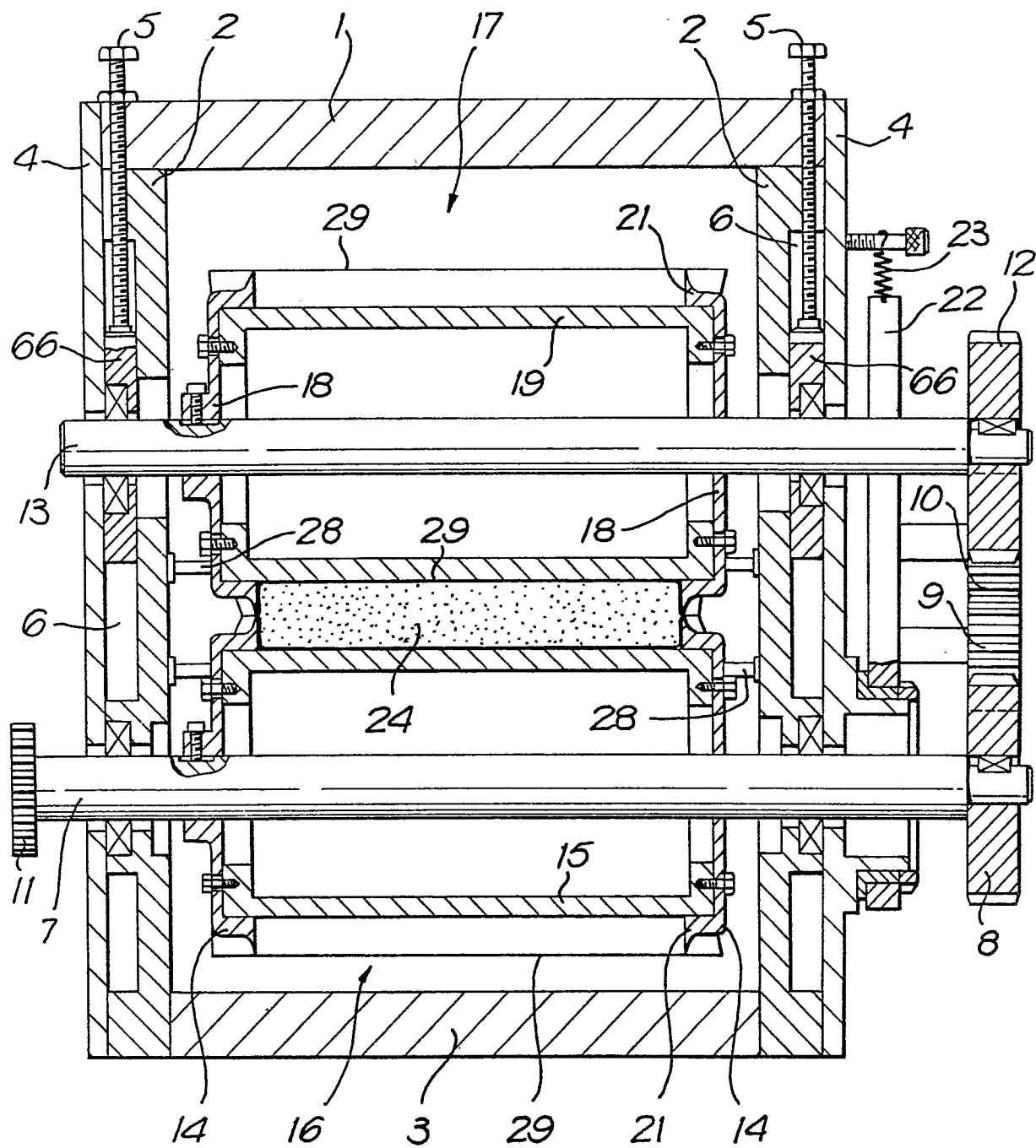


Fig.2.





DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	FR - A - 1 316 298 (C. ROSSI) * The whole document * --	1-3	B 28 B 3/14
	DE - C - 539 923 (F. KRUPP GRUSON-WERK) * The whole document * --	1,2,4,5	
	FR - A - 809 031 (HYDRO-ELECTRIQUE AIGUEBELETTE-BOURGET) * The whole document * --	1,2,4	TECHNICAL FIELDS SEARCHED (Int. Cl.)
	US - A - 2 874 604 (A. DIELS) * Column 2, lines 7-19; figure * --	1,2,4	B 28 B B 30 B
	DE - C - 114 472 (O. ZEUNER) * The whole document * --	1,2,4	
	DE - C - 114 473 (O. ZEUNER) * The whole document * --	1-3	CATEGORY OF CITED DOCUMENTS
	FR - A - 820 202 (G. MATHES) * The whole document * ----	1-3	X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
	The present search report has been drawn up for all claims		&: member of the same patent family, corresponding document
Place of search	Date of completion of the search	Examiner	
The Hague	26-11-1981	BOLLEN	