(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 037 614**
A1

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: **81200376.2**

(51) Int. Cl.³: **B 28 B 1/00**

(22) Date of filing: **02.04.81**

(30) Priority: **03.04.80 NL 8002000**

(43) Date of publication of application:
14.10.81 Bulletin 81/41

(84) Designated Contracting States:
AT BE CH DE FR IT LI NL SE

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BE FR NL SE

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(84) Designated Contracting States:
CH DE IT LI AT

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(54) **Machine for shaping roofing means out of concrete by extrusion.**

(57) Machine for shaping roofing means of concrete by extrusion with at one end an integral flange portion, comprising an oblong stationary frame (1,2,3) in which in series a number of stations for shaping at a time one roofing means is present, each station comprises side walls (6) and transverse walls (5), in which a metal under-mould (4) can be fitted, each under-mould (4) comprises a main portion (4a) shaping the lower side of the roofing means, a transverse portion (4b) and a flange (4c), whereby a movable frame (20) can be displaced along the stationary frame (1, 2, 3) and is provided with means for filling and compacting all stations with mortar.

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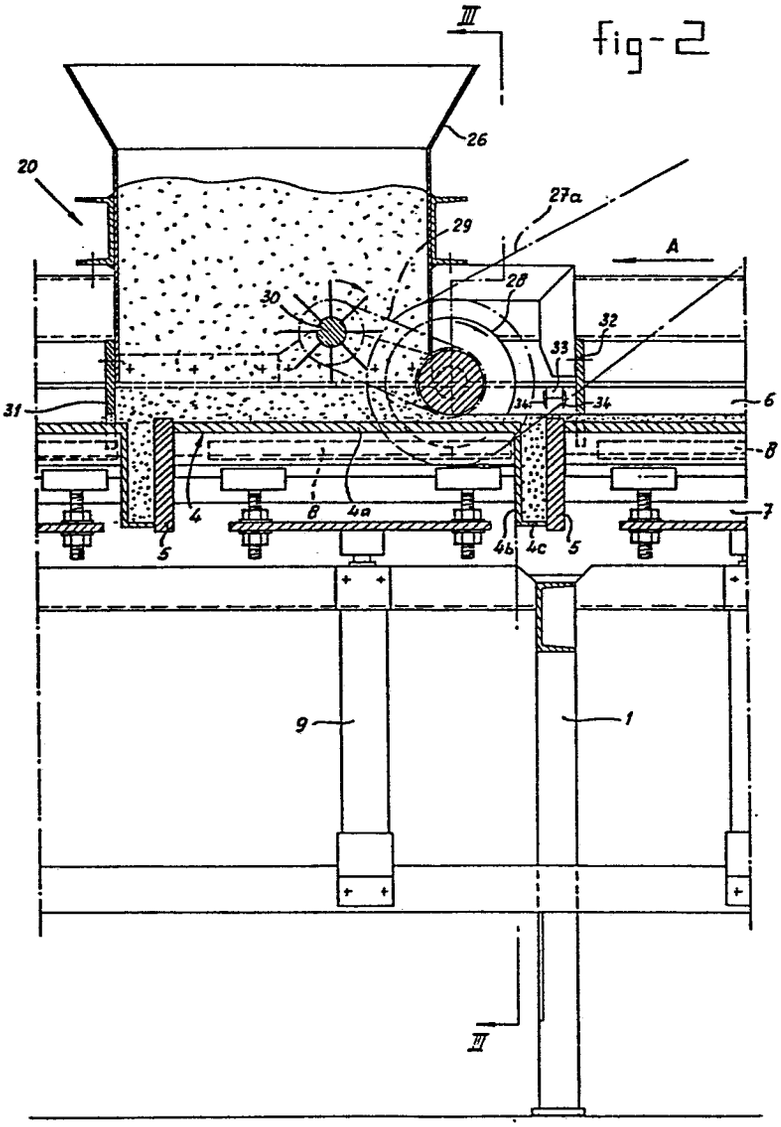
fig-2



Machine for shaping roofing means out of concrete by extrusion.

Machine for shaping roofing means out of concrete by extrusion in which each roofing means at one end is provided with an integral flange portion that is substantially perpendicular to the main direction of the roofing means and in which metal under-moulds are used each comprising a main portion shaping the lower side of the roofing means, a transverse portion at one end of said main portion shaping the innerside of said flange portion and a flange at the lower end of said transvere portion shaping the lower part of said flange portion.

At present it is general practice to shape tiles out of concrete. A machine used therefore comprises in general a horizontally extending conveyor track, in which under-moulds, so-called pallets, linked one behind the other are moved along with the aid of conveyor chains or such. Above the pallet in a determined position a shaing box is mounted with the reservoir for mortar, a mixing roller, a shaing roller and a doctor plate. This doctor plate together with the shaping roller takes care of the shaping of the upper face of the tiles.

On the upperside of the tiles no projections in cross direction are present for this is not possible in an extrusion method.

The lower side of the tiles indeed have projections in cross-direction, such as suspension bosses. These bosses are molded by appropriate recesses in the under-moulds. These projections only have a restricted height and do not give difficulties.

Though with such a machine not only concrete tiles but also roofing means in the shape of the gable tiles, these are tiles with a flange at one of its longitudinal sides,thus extending in the extrusion direction, can be made in a satisfactory way it is not possible to shape with the aid of such a device roofing means having a flange transverse to the extrusion direction. Examples of such roofing means are chaperon tiles, under-tiles, first ridge tiles and end ridge tiles. Also still exist roofing means with a flange along a longitudinal side and a flange along the upper or lower side, in fact in combination of gable tiles and chaperon tiles or under-tiles.

Chaperon tiles, so tiles with a flange along the upper side, are used to finish pent-roofs that are applied more and more.

Under-tiles, so tiles with a flange along the lower side, are used to seal of the lower edge of a roof, among others against

entering by birds and against looking in to the lower tile lath.

In both cases it was also possible to use normal tiles and to finish the edge with the aid of wood or mortar. This is expensive because of the maintenance and is not so nice respectively.

The demand for roofing means becomes greater and greater.

Roofing means provided with a transverse flange cannot be shaped by the normal continuously working machine because of the fact that the filling and the compacting of the mortar into the moulding cavity, delimiting the transverse flange, is not satisfactory. The main reason is that the moving pallet cannot be supported in a sufficient exact manner with regard to the transverse wall, that delimites the outer side of the flange portion and cannot be integral with the pallet. If this would be the case then the shaped roofing means cannot be released from the pallet.

Another reason is that no sufficient time is available to transmit sufficient mortar in the shaping cavity of the flange portion and to compact it.

Until now one has been urged to shape roofing means manually with flange portions of course indeed with mechanical auxiliary means. It will be clear that the shaping of roofing means is very labour intensive and therefore expensive and that moreover the quality depends strongly on the attention and skil of the labourer.

The invention aims to provide a machine with the aid of which roofing means with flange portions can be shaped mechanically. By this the objections of the manual shaping method are removed according to which in a manual the shaping cavity for the flange portion has to be filled and compacted.

The machine according to the invention is characterized in that the machine comprises a horizontal oblong stationary frame and in it in series a number of stations for shaping at a time onr roofing means, each station comprises side walls and transverse walls in which an under-mould can be fitted and comprises supports for supporting the undermould in vertical direction in such a manner that the shaping cavity for the flange portion is defined by the innerside of a transverse wall of the staion in said frame, the outerside of the transverse portion of the undermould and the upperside of the flange of the undermould, said machine further comprises movable frame, that can

be displaced along the stationary frame and that is provided with means to fill all stations in one step with mortar to compact and to shape its upperside.

A number of roofing means so are shaped in series in one step, by which the speed of production also is substantially higher than with the manual shaping method, while moreover by the measures to be described below, the quality of the flange portion is constant and good.

The invention will be described in more detail with the aid of the drawing in which an example is given.

Figure 1 shows in perspectif and schematically a view of the machine according to the invention.

Figure 2 shows a longitudinal section over a part of the machine according to the invention on larger scale.

Figure 3 shows a cross-section along the line III-III in fig. 2.

The machine according to the application comprises a stationary frame and amovable frame. The stationary frame is oblong, extends in horizontal direction and comprises a number of substantially horizontally extending parallel longitudinal rails, supported by legs. The legs are indicated by 1 and a number of longitudinal rails are indicated by 2 and 3 resp.

In the stationary frame in length direction of the frame one behind the other a number of stations is present for shaping at the time onre roofing means. It is for instance possible to provide a machine with 7 such stations. However, it will be clear that this number is completely arbitrary. In figure 2 one of such stations is shown completely while both adjoining stations are shown partly.

As is the case with the manual method for shaping roofing means under-moulds of aluminium or such material are used. These under-moulds, the so-called pallets, are indicated in the drawing by 4. The under-moulds are of known construction and are completely adapted for shaping the lower side of the roofing means to be formed. Each under-mould comprises an in general horizontally extending profiled main part 4a, a transverse part 4d destined to shape one side of the flange portion of the roofing means and a flange 4c destined to shape

the lower edge of the flange portion.

Each under-mould 4 fits between two vertical transverse walls 5 and two vertical side walls 6 6 of the stationary frame. It will be clear that the upper limit of each transverse wall 5 has to be adapted to the curvature of the roofing means to be shaped.

The side walls 6 of each shaping station are formed by two U-beams 7 extending along the length of the stationary frame. On the side walls 6 supports 8 are mounted on which the longitudinal axes of the under-mould 4 are supported when the under-mould is postioned on its place in the stationary frame.

In this way each under-mould is fittingly enclosed by the transverse walls 5 and the side walls 6 and is supported in vertical direction by the supports 8. It will be clear that still more supports can be provided, for instance on the transverse walls 5, sothat each under-mould also is supported at both or at one head end.

Below each station pneumatic lifting means 9 are present which are able to move the under-mould 4 vertically upwards from its place in a stationary frame (see fig. 1).

The movable frame is indicated by 20 and is supported at one side with the aid of rollers 21 by the square longitudinal beam 2 of the stationary frame and at the other side by rollers 22 resting on the U-beam 3 of the stationary frame. Along the U-beam 3 over the whole length of teh stationary frame a rack 23 is mounted along which a pinion can roll. This pinion is driven with the aid of motor 25 that moves together with the movable frame 20.

lt will be clear that in case the motor 25 drives the pinion 24 the movable frame 20 will move along the stationary frame.

The movable frame 20 comprises essentially a shaping box 26 in which from a hopper mortar can be casted. During the filling of the shaping box 26 the movable frame 20 is at one end of the stationary frame. It will be celar that therefore that stationary frame hs to be provided with a blind part. At the other end also a blind part is present above which the frame 20 is present in case the whole extrudate is extrudated.

On the frame 20 still a second motor 27 is present, see figure 1. This second motor 27 drives through a chain 27a or such the shaping roller 28. From this shaping roller 28 through a second chain 29 or such a shaft 30 is driven that is provided with pins or such that

are meant to keep the concrete mortar in movement and to press it below the shaping roller 28. Such a construction is known per se for a machine for shaping ordinary tiles, so tiles with flange parts.

It will be clear that the mortar is not allowed to spread freely over the stations. Therefore the shaping box 26 is limited at its side edges by side walls moving slidingly over longitudinal strips 6, whiIe the front side is delimited by a cover plate indicated by 31 and at the back a doctor plate 32 is present, of which the lower edge determines the final upper shape of the roofing means to be shaped.

This plate 32 together with the upperside of the row of under-moulds 4 forms the extrusion mouth for the extrudate.

During the filling of the shaping box 26 with mortar the frame 20 is present above the blind portion at one end of the stationary frame. In fig. 1 the filling station, not shown, is at the right hand side of the drawing.

When the moulding box 26 is sufficiently filled with mortar the frame moves with the aid of motor 25 to the left in the direction of arrow A in figures 1 and 2.

The drive motor 27 for the shaping roller 28 and the mixing shaft 30 are put into action. The mortar comes at the right hand side in figure 1 out of the shaping box 26 through the extrusion mouth. The mortar is pressed by the shaping roller 28 into the under-moulds 4 and also in the cavity of each flange portion.

The compacting of the mortar also is caused by the shaping roller 28 while the lower edge of teh doctor plate 32 wipes the upper side of the extrudate.

To take care of the fact that also the shaping cavities for the flange portions are filled and compacted in a sufficient manner for a sufficient supply of mortar has to be taken care. By driving the shaping roller 28 at a sufficient speed of rotation this can be obtained. It will be obvious that this speed of rotation of the shaping roller 28 depends on the speed of movement of the frame 20.

When the whole extrudate is shaped the frame 20 arrives above the left blind portion of teh stationary frame and is stopped.

Now the shaped extrudate has to be devided on the spot

of the transverse walls 5. For this one or more vertical moving cutting devices 33, see fig. 2, are used.

The or each cutting device 33 comprises two parallel cutting knifes 34 so between the cutting knifes a space is present.

When the cutting device 33 is moved from the position indicated in fig. 2 to a lower position the extrudate is cut at both sides of teh transverse wall 5. The material of the extrudate present on the upper side of the transverse wall 5 will be taken up in the space between both cutting knifes and removed at the moment the cutting device 33 moves up again.

The cutting of teh extrudate preferable takes place after the shaping of the whole extrudate so when the frame 20 is above the left hand blind portion.

With the aid of a mechanism then at the same time all cutting devices 33 can be moved upwardly and downwardly again. It is also possible to use only one cutting device 33 that subsequently executes all cutting steps and so moves along the stationary frame.

At the moment the extrudate is cut lifting means 9 take care that each under-mould 4 is moved upwardly and can be taken off sothat the roofing means shaped thereon can be dried in a drying device after which the roofing means can be taken from the under-mould.

It will be obvious that the capacity of the device can be increased by shaping a number of series roofing means next to each other in one step.

CLAIMS

1. Machine for shaping roofing means out of concrete by extrusion in which each roofing means at one end is provided with an integral flange portion that is substantially perpendicular to the main direction of the roofing means and in which metal undermoulds are used each comprising a main portion shaping the lower side of the roofing means, a transverse portion at one end of said main portion shaping the innerside of said flange portion and a flange at the lower end of said transverse portion shaping the lower part of said flange portion characterized in that the machine comprises a horizontal oblong stationary frame and in it in series a number of stations for shaping at a time one roofing means, each station comprises side walls and transverse walls in which an undermould can be fitted and comprises supports for supporting the undermould in vertical direction in such a manner that the shaping cavity for the flange portion is defined by the innerside of a transverse wall of the station in said frame, the outerside of the transverse portion of the undermould and the upperside of the flange of the undermould, said machine further comprises a movable frame, that can be displaced along the stationary frame and that is provided with means to fill all stations in one step with mortar, to compact and to shape its upperside.

2. Machine according to claim 1, characterized in that the movable frame by means of rollers or such is guided by longitudinal rails of the stationary frame and is driven by motor, said movable frame comprises a shaping box to take up mortar, said shaping box is provided with a motor driven shaping roller and a doctor plate that together with the undermoulds delimites the extrusion orifice, and in that the side walls of the shaping box sealingly slide along the upper edges of the continuous side walls of the stations in the stationary frame.

3. Machine according to claim 2 characterized in that the drive speed of the shaping roller and the drive speed of the movable frame are correlated in such a manner that a sufficient supply of mortar is obtained into the shaping cavity for the flange portion and for a sufficient compacting of it.

4. Machine according to claim 1, 2 or 3 characterized in that on one of the longitudinal rails of the stationary frame a toothed rack is provided along the entire length of the stationary frame and in that on the movable frame a pinion is provided that is driven by a motor mounted on the movable frame.

5. Machine according to claim 1, 2, 3 or 4, characterized in that at both ends of the stationary frame blind parts without shaping stations are provided over which the movable frame can be rolled.

6. Machine according to claim 5, characterized in that the shaping box is filled with mortar at the time that the movable frame is present in one of its end positions above one of said blind parts.

7. Machine according to one or more of the preceding claims characterized in that one or more cutting devices are present each comprising two mutualy spaced apart cutters movable in vertical direction cutting each time the oblong extrudate of concrete between two shaping positions directly at both sides of a transverse wall.

8. Machine according to one or more of the preceding claims, characterized in that below each shaping station in the stationary frame a lifting device is positioned that after the cutting of the extrudate is able to lift the undermould free from the side wals and transverse walls of each shaping station and subsequently the undermould together with the shaped roofing means can be taken out to be dried.

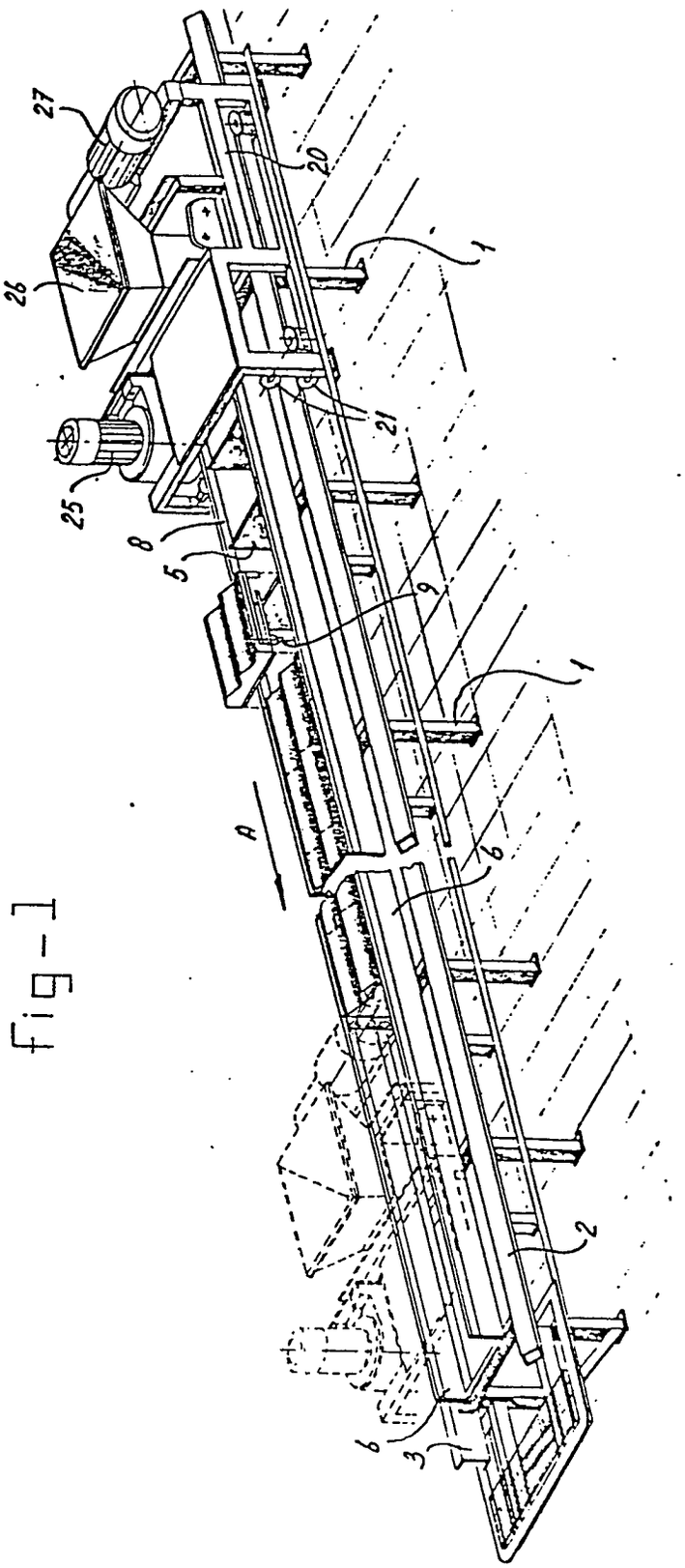


Fig-1

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fig-2

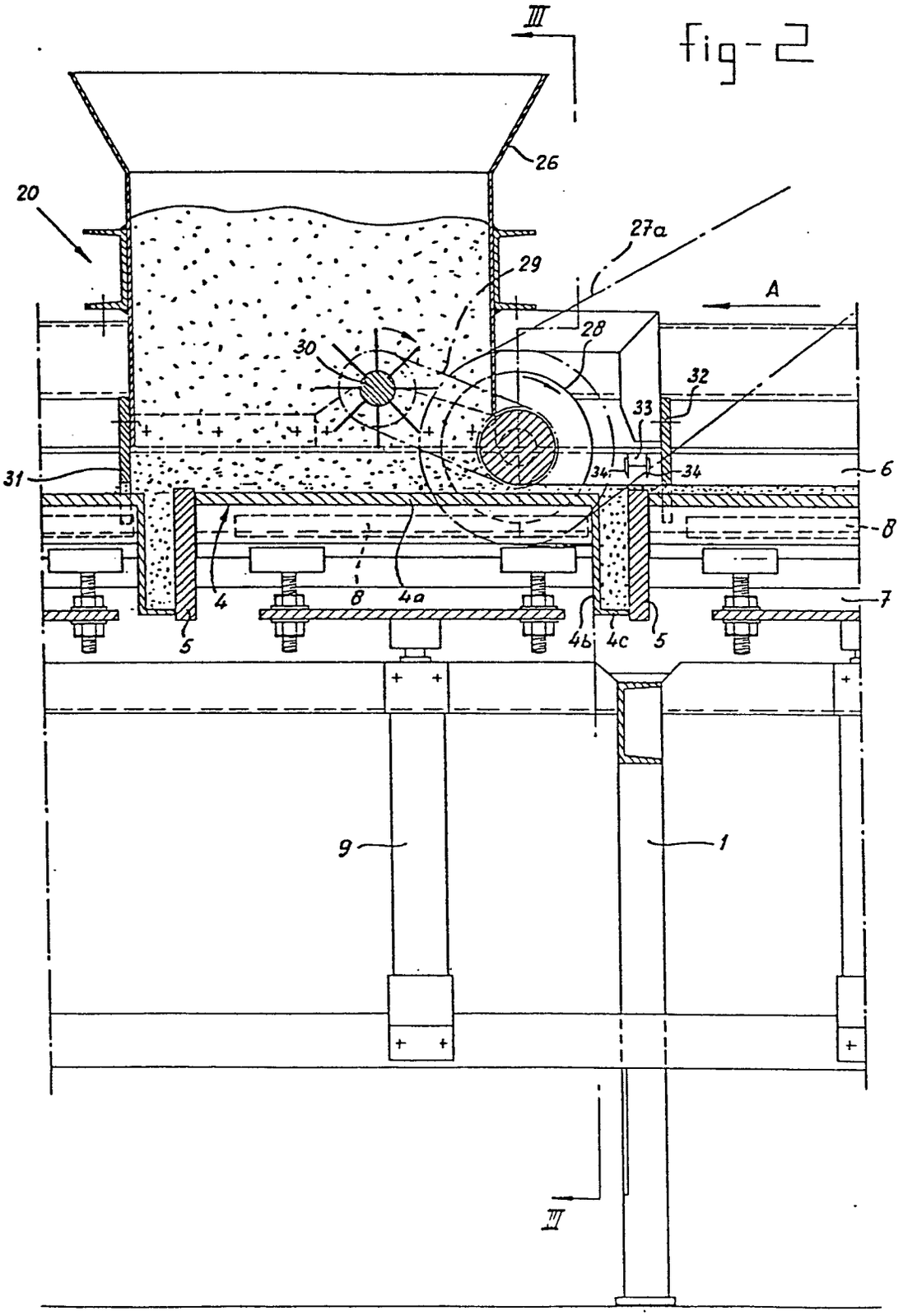
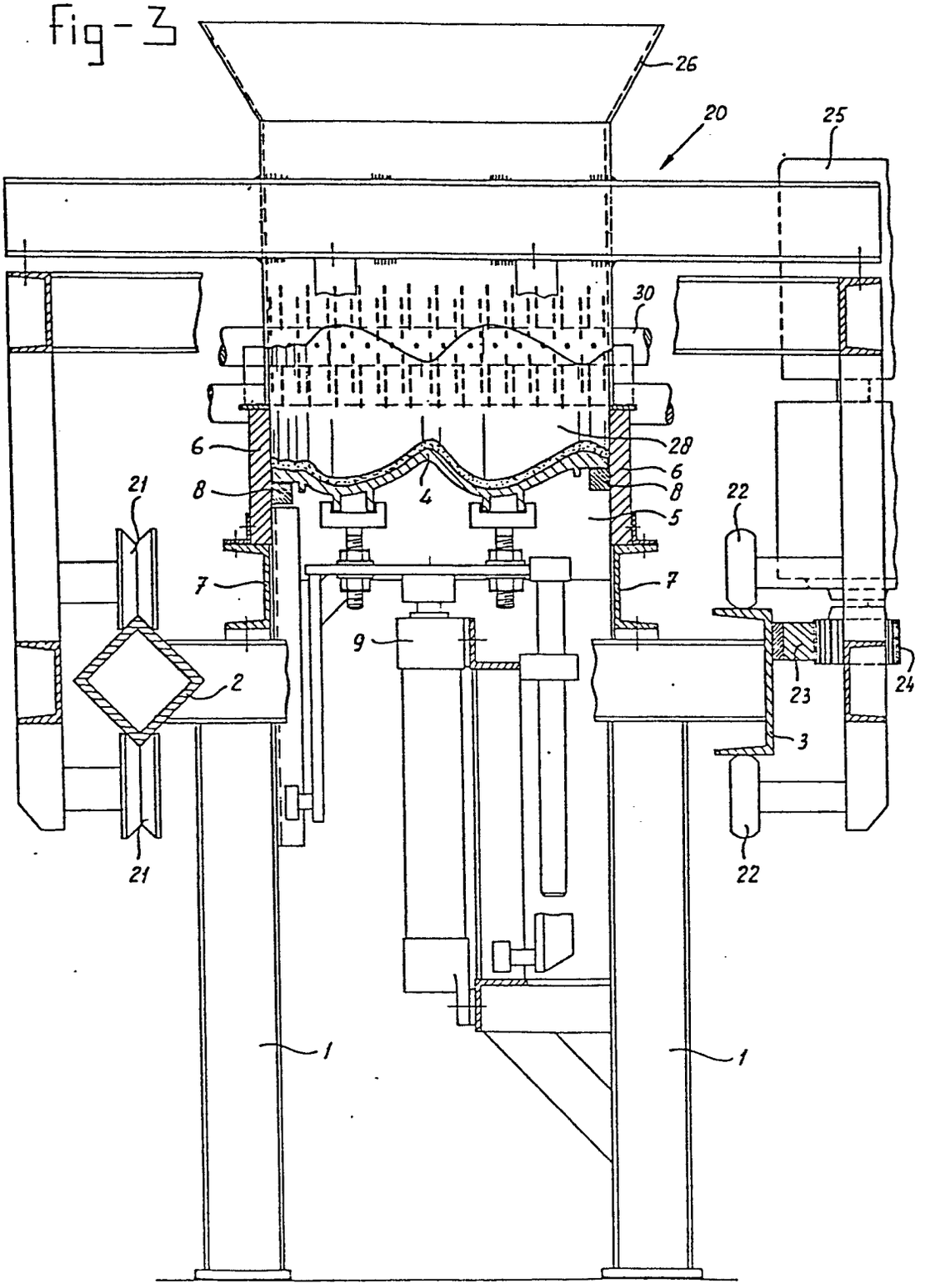


Fig-3



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EUROPEAN SEARCH REPORT

Application number
EP 81 20 0376

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
A	US - A - 3 122 812 (F.A. GORY) * The whole document *	1
A	US - A - 3 193 903 (D.M. WHITE) * The whole document *	1
A	US - A - 2 734 249 (M.C. WILLIS) * The whole document *	8
A	FR - A - 1 133 225 (W. ROTH) * The whole document *	1

CLASSIFICATION OF THE APPLICATION (Int Cl.³)

B 28 B 1/00

TECHNICAL FIELDS SEARCHED (Int Cl.³)

B 28 B

CATEGORY OF CITED DOCUMENTS

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

&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	24-06-1981	BOLLEN

EPO Form 1503.1 06.78