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⑯ Apparatus for moulding articles from concrete or another material.

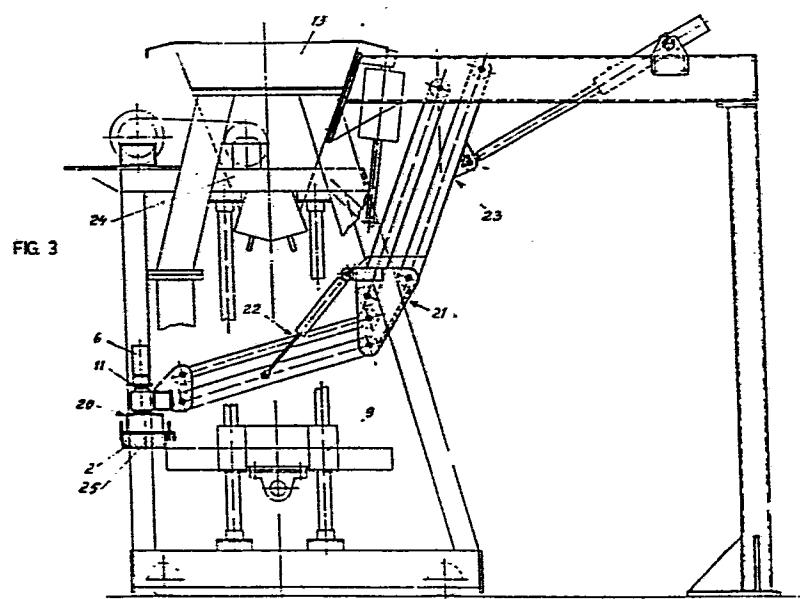
⑯ A continuous moulding system in which a wet concrete mixture is filled into a mould (9,10), vibrated and solidified to a shaped concrete product. The mould (9,10) has at least one free horizontal upper surface. After filling the mould (9,10) excess concrete must be removed and the surface must be treated to obtain a dense and smooth structure.

To reach this use is made of a scouring beam (2) that can be moved in a horizontal and a vertical direction. It has a lower surface (25) that can be moved in a straight as well as in a slightly circular path.

All movements of the beam (2) can be derived from and co-ordinated with the driving means of the moulding equipment.

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Apparatus for moulding articles from concrete or another material.

The invention relates especially to systems for the production of precast products from concrete and similar moulding materials.

5 The manufacture of concrete products which may be of large dimensions and which are more and more used for building purposes is an extensive matter. It is largely an item of competitive mass production and requires considerable investment and high labor expenses.

10 Examples of precast concrete products are, possibly enforced, cable troughs, cattle slats, posts, bumper blocks, manholes, lintels, preformed wall parts, building panels and many others.

15 The various objects and advantages of the invention will be more apparent from the following detailed description of typical embodiments thereof in the application to stationary moulding machines in which, if desired, the supply of the molds, turning upside down and removal of the finished product and of the empty mold may be carried out automatically.

20 This type of equipment can be constructed for a large number of applications in such a way that no special foundations are required and that they can easily be assembled and moved to another location.

25 Filling of the mold can be done through a charging hopper which itself can be filled in any known way, for instance by a belt conveyor or with some lever apparatus.

The mould may be provided when needed with a suitable reinforcement. After opening the locking members of the charging funnel the concrete mix falls down into the mould.

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After vibration and leveling a pallet may be positioned on top of the mould frame and clamped to it. After turning upside down the mould and releasing the clamps the shaped concrete remains on the pallet.

5 The pallet, possibly together with other product carrying pallets, may be piled up to a predetermined height and moved to the drying space.

Now, after setting of the concrete mass in the mould and before turning, it will be necessary to remove the excess concrete and to finish the concrete surface. Removal of the concrete excess is normally done by hand with a leveling device or a kind of shovel. Even more effort, however, is required for the finishing of the concrete surface. As a rule this is done with a small wooden scouring board which is moved over the concrete surface till it is estimated by vision to be sufficiently flat.

It is clear that these manual actions fall under the category of heavy labour and moreover extend the cycletime of the production. The result is highly dependent on the 20 experience, insight and endeavour of the handicraftsman.

Attempts to move the known scouring board over the concrete surface or to replace it by two transverse cross-pieces moving over the concrete surface did not result in the desired concrete quality and were difficult to control.

25 The concrete moulding apparatus according to the invention is characterized by an equalizing beam which is coupled to a drive mechanism, and can be moved in a horizontal as well as in a vertical direction and has at its lower side a free horizontal surface adapted to the upper surface of the mould, the drive mechanism being provided with one or more eccentrics enabling the lower beam surface to carry out circular movements over the mould surface while the beam moves over it. Supply of new concrete mix, movements of the beam and the removal system 30 of the mould are mutually coordinated.

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The invention is illustrated by some typical embodiments shown in figures 1 - 4. The figures present the following:

5 figure 1 a vertical section of the essential moulding part of a concrete moulding apparatus;

10 figure 2 a vertical section perpendicular to the section of figure 1 at the motor portion;

15 figure 3 a vertical section of an existing moulding apparatus with which the equalizing and finishing system according to the invention is combined;

20 figure 4 a section of a construction in which the supply carriage with concrete mix can move both over a fixed table behind the mould as well as over the mould surface.

The scouring system 20 proper shows the following parts:
15 (figures 1 and 2)

20 1. A support 1 for the scouring beam 2 with a fast acting pinching device.

25 2. The scouring beam 2 which for example may exist of wood, plastic or metal.

30 3. Two eccentric driving axles 3,14.

35 4. A bearing case 4 connected with beam 1.

40 5. A bearing case 5 connected with frame 7.

45 6. A driving motor 6.

50 7. Frame 7.

55 8. Chainwheel 11 with chain 12.

As soon as the driving motor 6 starts rotation the eccentric axles 3 start moving. The lower eccentric part 14 of axle 3 can rotate freely in casing 4 of support 1. The latter starts moving and in this way exercises a scouring action with respect to frame 7 and the surface of mould 10, situated below the scouring surface 25 of scouring beam 2. All points of the scouring beam are carrying out a circular movement. The diameter of the circles corresponds to the eccentricity of driving shaft 3. It is this type of moving that smoothes efficiently the surface of the concrete filling in the mould.

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The screed mechanism must also be movable in a horizontal direction over the surface of the concrete in the mould in order to remove the concrete excess. To fill the mould and to be able to use moulds of different height in one and the same apparatus the screed mechanism should also be movable in a vertical direction. During this vertical movement the scouring surface 25 must maintain its horizontal extension. To this effect use can be made of a certain co-ordination with the movements of the filling device 13 combined with a parallelogram type of construction for driving.

This can be realized in several different ways, for instance as follows:

- A. The screed mechanism forms part of a filling carriage that fills the mould.
- 15 B. The screed mechanism forms part of a filling funnel that moves above the mould.
- C. The screed mechanism forms part of a fixed filling funnel.

20 In case of the system sub A an adjustable quantity of concrete composition is dosed into the mould. Then vibration starts.

This filling system shows the following parts: (figure 4)

- 1. A fixed table 15 behind the mould 9.
- 25 2. A hydraulically driven filling carriage 16.
- 3. Valve 18 opening the carriage on one side.
- 4. A sliding valve 17.
- 5. Parallelogram type lift mechanism 19, serving the scouring system.
- 30 6. Scouring system 20.
- 7. Supply bunker 13.

Besides the mechanical leveling the required quantity of concrete is automatically introduced at the correct time.

35 The filling carriage 16 is filled from filling bunker 13.

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The carriage moves over mould 9 and fills it to the brim.
The dosing valve 17 moves to a predetermined height.

5 The filling carriage moves back again and in this way
doses just a little bit too much. The valve 17 closes on
reaching the end of the mould and all excess of fill
material is taken along.

10 The vibrational treatment starts. The dosing valve 17
and valve 18 move upwards and filling carriage 12 moves
forwards over the mould. This time the concrete is not
taken along but remains on table 15. The scouring system
moves downward to the mould surface and starts scouring.

15 Continually scouring the filling carriage moves slowly
and repeatedly over the mould and then returns to its
starting position. The small quantity of oversupplied
concrete is carried along to table 15.

Sub B.

20 Filling funnel with the scouring system mounted thereon.
In this case the supply bunker itself moves over the mould.
By pneumatically acting on the valves the concrete mix
is dosed into the mould by eyesight and distributed by
hand. Then the scouring system moves downward to the
mould surface and starts scouring. The filling funnel
travels to and fro slowly. Excess of concrete mix is
shoved away from the mould surface. The concrete in the
mould is finished to a dense and smooth surface.

Sub C.

Here one has a filling funnel 24 in fixed position with
fastened thereto the scouring system. (figure 3)

The following parts are noted:

30 1. Scouring system 20 as described under sub A.
2. Parallelogram mechanism 22 to lower the
scouring system to the mould surface.
3. Parallelogram-mechanism 23 to move the scouring
system over the mould surface forwards and backwards.
35 4. Construction 21 for attachment and mutually

coupling.

5. Supply bunker 13.

This solution has been mainly developed in order to provide existing machines with the scouring system according 5 to the invention.

It works as follows:

By means of pneumatically operated valves the concrete mix from bunker 13 is dosed into the mould 9.

The scouring system 2 descends on the mould and starts 10 scouring. The upper parallelogram 23 moves the scouring system forward and backward over the mould surface. This results in closing the surface structure.

It is clear that the invention is not limited to the application examples given above. Energy supply along 15 electric, pneumatic or hydraulic route can be replaced by any other energy form to attain the desired effect.

Highly important is that apart from an increased production rate with less manual work a result is obtained that at least equalizes present best results in industry and 20 even, as a rule, improves product quality.

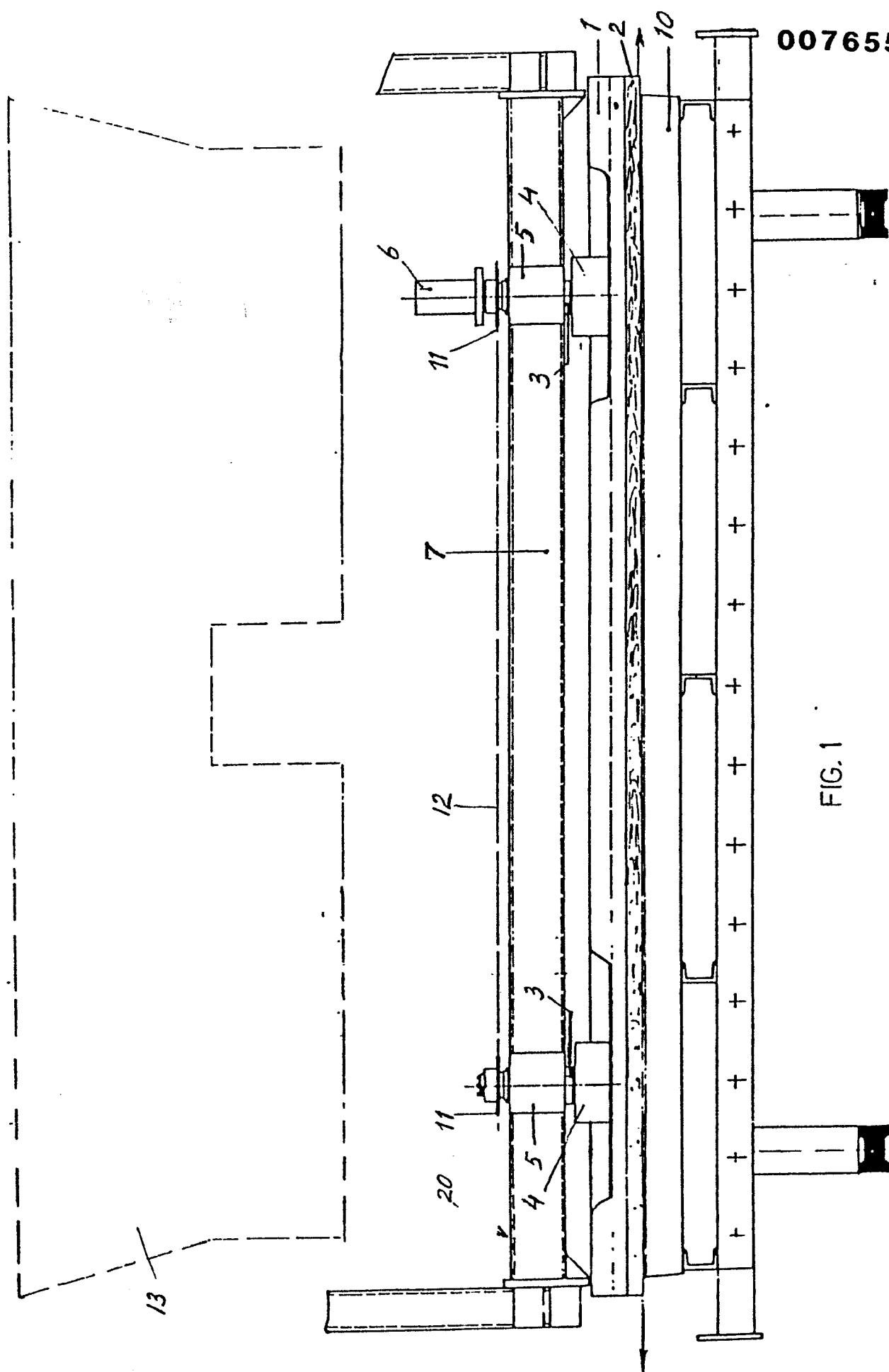
Material can be replaced by other material in different ways. So the scouring beam 2 may consist wholly or in part of metal, wood or plastic. There is also a wide choice for the scouring surface 25. The best results were obtained 25 with hard wood and stainless steel. The purpose is to obtain an effectively scouring surface of high stability that may be formed and/or shaped in any known way. Preferably it is a closed plane that is not interrupted by open spots or other disturbances. Satisfactory results 30 were, however, also obtained with scouring surfaces of some other shape such as a partly open frame.

Claims:

1. Apparatus for moulding solid articles from casting compositions, especially concrete mixtures, which can be formed into solid articles in the mould (9,10), characterized by
5 a scouring system (20), formed by a scouring beam (2) coupled to driving means which is movable both in a horizontal and vertical direction and has at its horizontal bottom side a scouring surface (25) adapted to the upper side of the mould (9,10), said beam (2) moreover being coupled to eccentric means (3,4,5,14) enabling to impart small circular movements to the scouring surface (25) one and the other co-ordinated with the supplying and controlling means (13,16,17,18,24) of the apparatus for the casting composition.
- 15 2. Apparatus according to claim 1, characterized by a scouring beam (2) carrying on its upper side one or more eccentric driving shafts (3,14).
- 20 3. Apparatus according to claim 2, characterized by a chain wheel (11) and chain (12) to guarantee a synchronic moving of the eccentric means (3,14).
- 25 4. Apparatus according to claims 1 - 3, characterized by a scouring element (2) with a flat non-interrupted scouring surface (25).
5. Apparatus according to claims 1 - 4, characterized in that the scouring surface (25) consists of hard wood.
- 30 6. Apparatus according to claims 1 - 4, characterized by a scouring surface (25) of metal, especially stainless steel. ----

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FIG.

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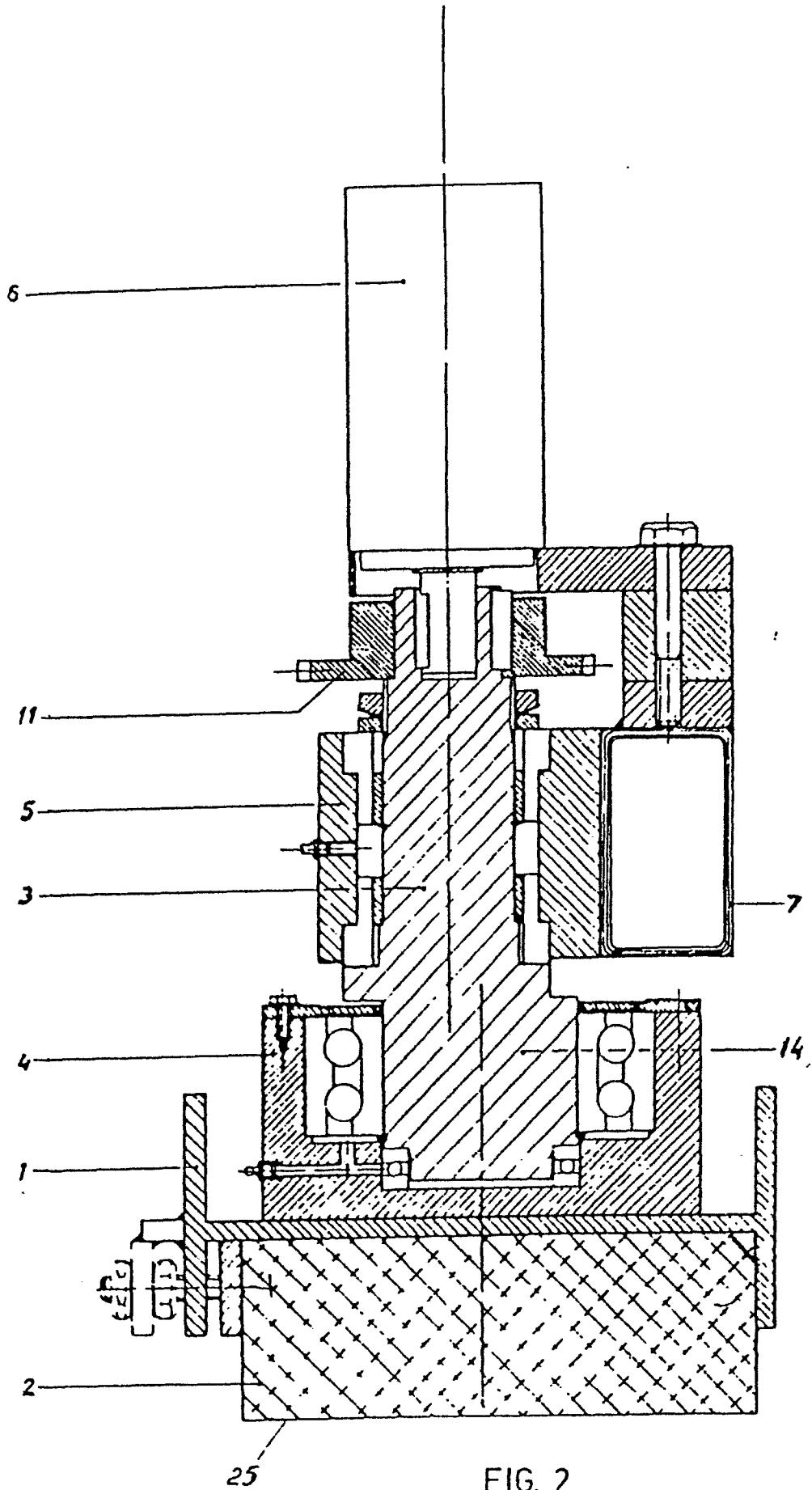


FIG. 2

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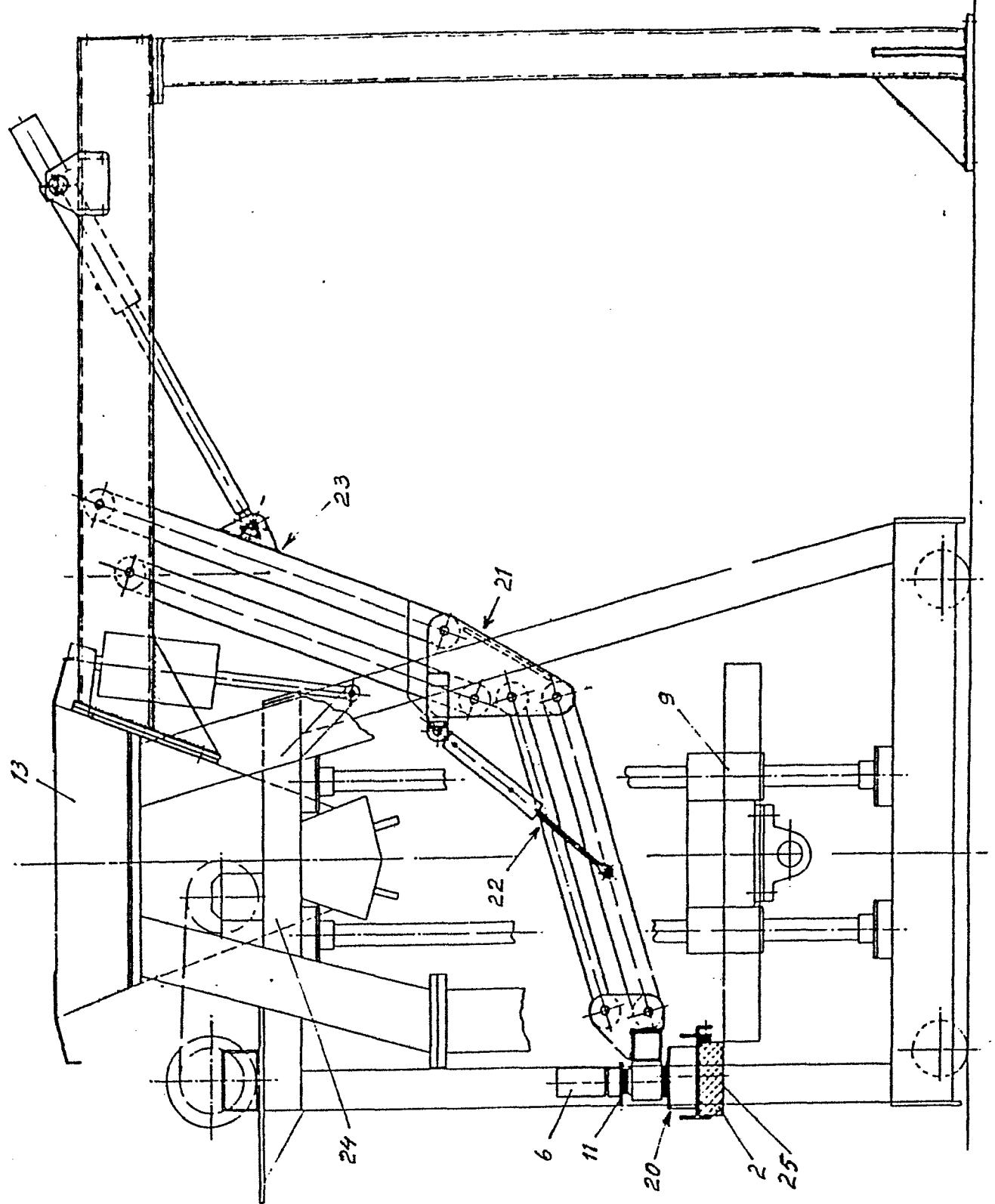
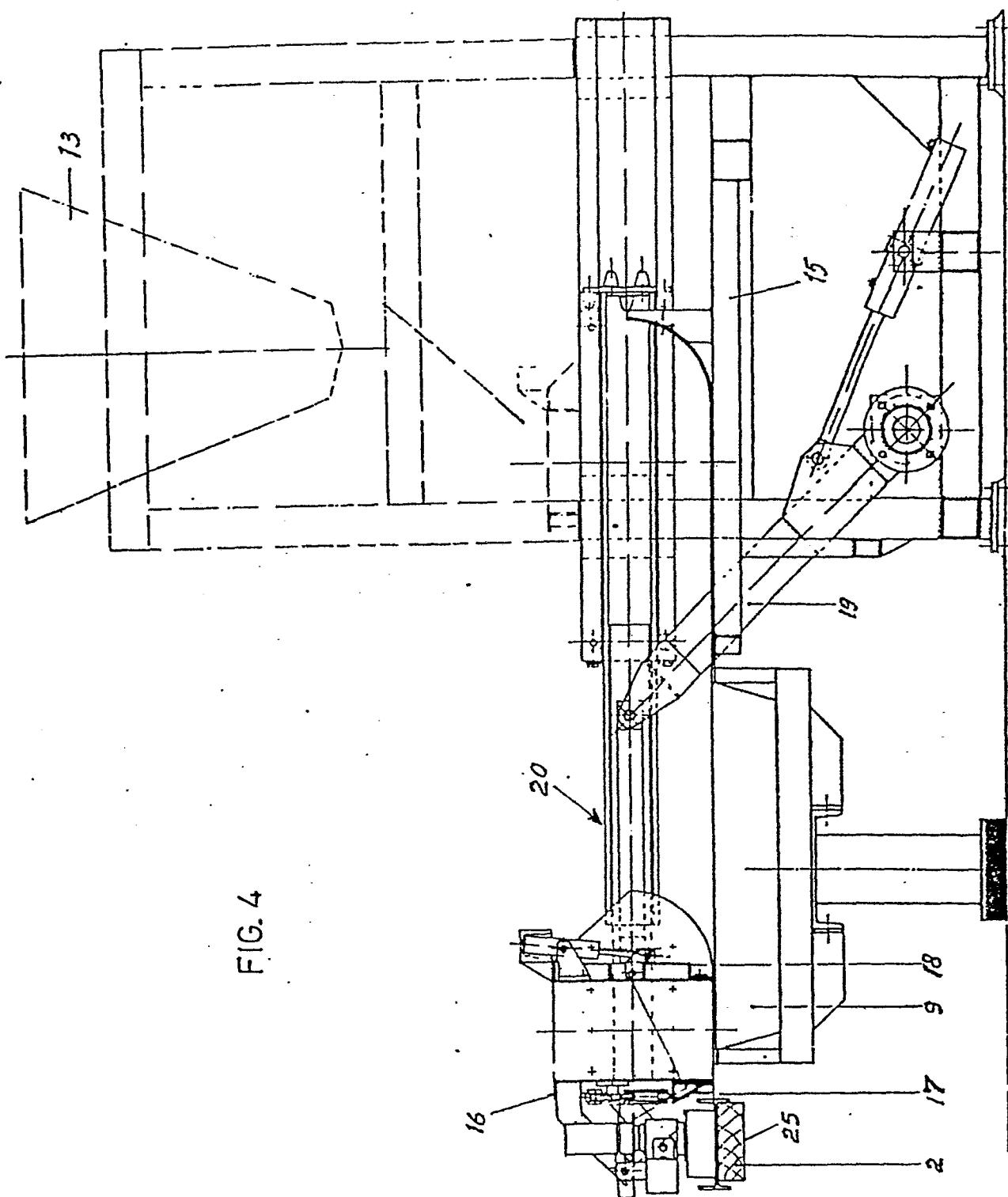


FIG. 3

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FIG. 4



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