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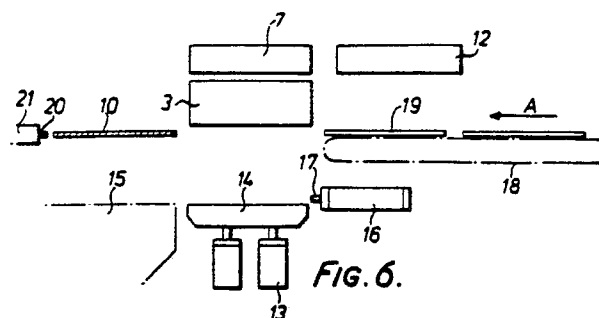
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(54) **Method for manufacturing stones in a press, and press for manufacturing said stones.**

(57) Method of manufacturing stones in a press provided with a mould subdivided in several moulding rooms by means of dividing walls, with a stamp arranged above the mould and being movable up and down, with a table arranged under the mould and being movable up and down, with supply means for supplying empty product plates below the mould and with discharge means for discharging the product plates carrying stones shaped in the mould, whereby prior to filling the mould with the moulding mass below dividing walls there are moved a plurality of filling pieces that extend parallel to one another between the mould and a moulding plate on the table the filling pieces having surfaces protruding beyond said dividing walls for shaping bevelled edges on the stones and ribs sliding in grooves provided in the lower ends of the dividing walls, whilst the filling pieces are withdrawn from below said dividing walls prior to pressing the stones supported by a product plate out of the mould.



EP 0 324 530 A2

The invention relates to a method for manufacturing stones in a press provided with a mould subdivided in several moulding rooms by means of dividing walls, with a stamp arranged above the mould and being movable up-and -down, with a table arranged under the mould and being movable up-and -down, with supply means for supplying empty product plates below the mould and with discharge means for discharging the product plates carrying stones shaped in the mould, as well as to a press and a mould especially for use in such a method.

Paving stones and the like, need to have a constant length and width to make possible the pavement of a road surface or the like in a regular pattern, whilst such paving stones must be provided with bevelled edges or so-called chamfers. For the thickness dimension the requirements are less strict, as differences in the thickness of the paving stones can be absorbed by the sand bed or the like in which the stones are placed. Therefore it has been quite common so far to manufacture such stones lying in a mould, so that the measures of length and width of the stones are determined by the vertical dividing walls bounding the moulding rooms in the mould, so that a constant measure of length and width can be ensured. In particular with stones having chamfers the stones are thereby shaped in the mould in such a manner that the eventual upper surface of a stone is shaped in the bottom of the mould lying on the moulding plate. In practice the upper surface of the stones shaped in such a manner appears to be the least wear-resistant surface of the brick, therefore.

A purpose of the invention now is to obtain a method whereby such stones provided with chamfers can be produced vertically standing, as a greater production capacity can be achieved herewith as well as a better compression of the material of which the stone is made. In particular the upper surfaces of the stones, which are shaped in the mould against the upright side walls of the moulding rooms in the mould obtain a dense surface thereby, which is more wear-resistant than the upper surfaces of the stones produced in the usual manner.

According to the invention this can be obtained by a method according to claim 1, a press according to claim 3 and a mould according to claim 5, resp.

It is noted that from US-A- 2.977.657 there is known a mould for concrete blocks wherein lower edges of walls of the mould have been provided with wedge shaped rubber strips for forming bevelled edges. In removing the stone from the mould cavity said rubber strips has to be compressed by the surfaces of the stone moving along said strips whereby said surfaces will be effected in an adverse way and the mould will grow filthy. Also said

strips will be exposed to heavy wear by the concrete moving along said strips.

Further from US-A- 3.679.340 there is known a method for making concrete blocks in a mould whereby by means of a movable core member there can be made a recess having a relatively great section in the lower end of the block intermediate between the upstanding sides of said block. Any indication with respect to the forming of chamfers on the edges of paving stones can not be found in said reference.

According to a further aspect of the invention there could be manufactured stones having bevelled edges at two facing sides of the stones by using a press of the type according to claim 3 when stamp heads of the stamp have been provided with protruding noses for forming bevelled edges and also the corners of the moulding rooms have been bevelled for forming bevelled edges on the stones.

The stones having bevelled edges and produced in the mould either in a vertical position or in a horizontal position, can be efficiently used for paving as the pavier has not to pay particular attention to the position of the stone so that the side of the stone having the bevelled edges is on the upper side.

The invention will be more fully explained hereinafter with reference to some embodiments of the method and a device according to the invention illustrated in the accompanying figures.

Fig. 1 is a view of a stone to be manufactured while applying the method and/or device according to the invention.

Fig. 2 is a diagrammatic section of a mould with a plate provided with ribs located thereunder.

Fig. 3 is a top view of a part of the mould illustrated in fig. 2.

Fig. 4 is a larger-scale illustration of a part of fig. 2.

Fig. 5 illustrates a part of a stamp.

Figs. 6- 11 diagrammatically illustrate an embodiment of a press according to the invention, whereby the various parts of the press are illustrated in positions which they take during consecutive stages of the method according to the invention.

Fig. 12 is a section of a part of a mould, a part of a flat plate placed under the mould and filling pieces moved between said flat plate and the mould.

Figs. 13 -17 diagrammatically illustrate a press according to the invention, whereby use is made of the parts illustrated in fig. 12 and in figs. 13 -17 the various parts of the press are illustrated in positions during consecutive stages of the method according to the invention.

The purpose of the device and method accord-

ing to the invention is to produce a stone or clinker of the type such as illustrated in fig.1, i.e. a preferably elongated stone 1, rectangular in cross-section, which at least at one of its bounding planes is provided with bevelled edges 2.

For shaping such a stone use is made of a mould 3, which is subdivided into moulding rooms 4 by means of longitudinal walls 5 and transverse walls 6.

As illustrated in fig.3 the moulding rooms are bevelled near the joining points between the longitudinal walls 5 and the transverse walls 6. In the illustrated embodiment all angles are bevelled so that a stone shaped in such a moulding room 4 will be provided with bevelled edges at two planes lying opposite each other. It will be apparent that it will also be possible, however, to let the walls 5 and 6 join each other rectangularly at one side of the moulding room 4, so that the stone will be provided with bevelled edges at only one side.

The moulding mass to be provided in the moulding rooms 4 can be compressed by means of a stamp 7 illustrated in fig.5, which stamp is provided with a number of stamp heads 8. In the illustrated embodiment each stamp head 8 is provided with a pair of protruding noses 9 for forming bevelled edges at two facing sides of the stone to be formed. It will be apparent, however, that if desired also one of the noses can be left out, so that only at one side of the stone a bevelled edge will be formed by means of a nose 9.

As further appears from figs. 2 and 4 the mould 3 may be closed at the bottom during shaping of the stones by means of a so-called moulding plate 10, which is provided with upright ribs 11, which have been provided in such a manner that said ribs extend at least substantially under the longitudinal walls 5. As will be particularly apparent from fig.4 the ribs protruding outside the longitudinal walls 5 are bounded by sloping boundary planes, so that said parts of the ribs 11 protruding outside the longitudinal walls 5 will form bevelled edges in the stones shaped in the moulding rooms 4.

In the illustrated embodiment bevelled edges will be formed at facing sides of a stone shaped in the moulding room by the ribs 11. It will be possible, however, to bound a rib 11 at one side by means of a vertical plane located in the extension of one side of the relevant longitudinal wall 5, so that the stones 1 shaped in the moulding rooms 4 of the mould will each be provided at only one side with a bevelled edge by the ribs 11.

Summarizing it will be apparent, however, that by means of the above mould in co-operation with the stamp 7 and the moulding plate 10, depending on the chosen shape stones can be shaped which may be provided, either at one side or at two

facing sides, with bevelled edges or so-called chamfers. The stones can thereby be produced in the mould with their longitudinal axis arranged vertically on the moulding plate 10, so that with a area of the mould remaining equal a considerably larger amount of stones can be produced than in the case when the stones are produced in the mould with their longitudinal axis parallel to the moulding plate 10.

A possible method for manufacturing stones while using parts described hereinabove in a press for manufacturing stones will be more fully described hereinafter with reference to figs. 6- 11.

Said press comprises a frame, not further illustrated, in which the stamp 7 is arranged movable in vertical direction above the mould 3 mounted in the frame. Furthermore the press is provided with a filling wagon 12, being movable to and fro along rails or the like not further illustrated. Under the mould 3 a table 14, movable up and down by means of adjusting cylinders 13, is arranged. When the table 14 takes its lowest position, illustrated in fig.6, the upper surface of the table 14 is located at the same level as the upper surface of a discharge device 15. Arranged at the side of the table 14 turned away from the discharge device is an adjusting cylinder 16 by means of which a pushing means 17 is movable to and fro in horizontal direction across the table 14 when the table takes the lowest position illustrated in fig.6.

The device is provided with a conveyor 18, diagrammatically illustrated on the right of the mould in fig.6, which conveyor is not illustrated in the other figures 7 - 11. By means of said conveyor so-called product plates, preferable being entirely flat at least at their upper side, are supplied into the direction according to arrow A.

At the side of the mould 3 turned away from the conveyor 18 supporting means, not further illustrated, have been provided across which a moulding plate 10 is displaceable by means of a pushing means 20 displaceable to and fro in horizontal direction and being adjustable by an adjusting cylinder 21 only partly illustrated.

As will further be apparent from fig.6 both the product plates 19 and the moulding plate 10 lie in one plane thereby, in which they are displaceable just under the bottom of the mould 3.

For filling the moulding rooms 4 of the mould 3 the table 14 is pressed upward from the position illustrated in fig.6 to the position illustrated in fig.7, whilst the moulding plate 10 is moved on the table by the pushing means 20. Simultaneously or afterwards the stamp 7 is moved upward and the filling wagon is brought above the mould 3, so that the moulding mass in the filling wagon can be deposited from the filling wagon into the moulding rooms 4 of the mould 3.

Then the filling wagon is moved back and the stamp 7 is moved downward, as illustrated in fig. 8. By means of suitable vibrating means the stamp 7 and/or the mould and/or the table 14 can then be set into vibration for compressing the moulding mass in the moulding rooms 4. After the moulding mass in moulding rooms has been sufficiently compressed the conveyor 18 is put into operation for displacing the product plate into the direction according to the arrow A. As is illustrated in fig. 9 one of the product plates 19 is moved under mould 3 as a result of that, whilst simultaneously the moulding plate 10 is pushed back to the original retracted position illustrated in fig. 6.

Next the table 14 with the relevant product plate 19 resting on the table 14 is moved downward, whilst simultaneously the stones shaped in the mould are pressed downward by means of the stamp heads. It is noted that the construction is such that after compression of the moulding mass in the moulding rooms the stamp heads can still be moved downward through the moulding rooms to near the bottom of the mould for effecting an even removal of the shaped stones from the moulding rooms while moving downward the product plate 19 supported by the table 14.

The stones pushed out of the mould, standing on the product plate 19, are further moved downward until the table 14 has again arrived at the discharge device 15. Then the product plate can be pushed on the discharge device by means of the pushing means 17, as illustrated in fig. 11.

Then the table 14 can be moved upward again and the production cycle described hereinabove can be repeated again.

It will be apparent that in this way stones, vertically standing with their longitudinal axis if desired, can be produced whilst the stones are provided with bevelled edges or chamfers at one or two facing sides, whereby the actual production of the stones takes place on a specially formed moulding plate provided with upright ribs, whilst the discharge of the stones takes place on considerably cheaper smooth so-called product plates.

With the press illustrated in the figs. 6 - 11 the stamp 7 is furthermore provided with stops or spacing means (not shown) provided at the sides of the stamp and extending downward, which are intended to cooperate with stops or spacing means (not shown) fixed to the table 14. At the moment when the spacing means on the stamp, during the downward movement of the stamp during vibration of the moulding mass, get into touch with the spacing means on the table a signal can be given as a result of which vibrating is stopped. The stones shaped in the mould then have exactly the desired height.

When then the stamp 7 and the table 14 are

moved downward simultaneously for pressing the products shaped in the mould out of the mould said abutments or spacing means make sure that the distance between the bottoms of the stamp heads of the stamp and the upper surface of the product plate 19 remains constantly equal during said pressing of the stones out of the mould, so that the adjusted length of the stones is maintained and the stones are not deformed in an undesirable manner.

Fig. 12 illustrates a section of a mould 3, whereby the bottom ends of the longitudinal walls 5 are located a little higher than the bottom edges of the transverse walls 6, whilst grooves have been provided in the bottom ends of the longitudinal walls 5. Said grooves serve to accommodate ribs 27, which are fixed to filling pieces 28, which correspond in section with the ribs 11 of a moulding plate 10 described hereinabove. On application of said ribs 28 extending parallel to each other it will not be necessary to use a moulding plate 10 and the stones can be shaped direct on a product plate 19. Using said filling pieces in a press according to the invention will be more fully explained hereinafter with reference to the figs. 13-17. As appears from fig. 13 the conveyor 18, only illustrated in fig. 13 again lies on the same level as the discharge means 15. Furthermore the filling pieces 28 extending parallel to each other at the level of the longitudinal walls 5 can here be displaced again by means of the pushing means 20 movable to and fro by means of the adjusting cylinder 21.

When the table 14, as illustrated in fig. 13, takes its lowest position a product plate 19 can be moved on the table by means of the conveyor 18. Next both the table 14 and the stamp 7 can be moved upward to the position illustrated in fig. 14 in which then, as indicated in fig. 14, the filling pieces can be moved between the product plate 19 and the mould 3 by means of the pushing means 20, whilst the filling wagon 12 can be moved above the mould for filling the mould.

While the filling pieces 28 are moved under the mould the protruding ribs provide a good guide for the filling pieces, so that said filling pieces are put in the correct position relative to the mould.

The ribs also make sure that the filling pieces do not make undesired movements when the filling mass is being compressed in the mould 3.

After filling the mould 3 the filling wagon can be moved away and the stamp moves downward for compressing the mass put into the mould. The stamp and the table may thereby again be provided with the spacing means described hereinabove.

After the moulding mass has been compressed in the desired manner the filling pieces can be retracted by means of the pushing means 20 again,

as illustrated in fig.15 for which purpose the pushing means has been provided with suitable means for taking along the filling pieces. After removal of the filling pieces the shaped stones can be pressed out of the mould by the simultaneous downward movement of the table 14 and the stamp 7 (fig.16)-,after which the table can be moved further downward to the level of the conveyor 18 and the discharge means 15 (fig.17). By putting the conveyor 18 into operation again the product plate filled with stones will be moved from the table 14 on the discharge means 15 by an empty product plate. Then the table 14,now supporting an empty product plate again, can be moved upward again,after which the production cycle described above can be repeated again.

Of course variations and/or additions to the embodiments described hereinabove and illustrated in the figures will be possible within the spirit and scope of the invention. Thus it will be possible e.g. to use mechanical means instead of the adjusting cylinders for displacing the various parts. Furthermore it is possible for the various plates to be displaced by pulling means instead of pushing means.

Claims

1. Method of manufacturing stones (1) in a press provided with a mould (3) subdivided in several moulding rooms (4) by means of dividing walls (5,6), with a stamp (7) arranged above the mould (3) and being movable up and down,with a table (14) arranged under the mould and being movable up and down,with supply means (18) for supplying empty product plates (19) below the mould and with discharge means for discharging the product plates carrying stones (1) shaped in the mould, characterized in that prior to filling the mould (3) with the moulding mass below dividing walls (5) there are moved a plurality of filling pieces (28) that extend parallel to one another between the mould (3) and a moulding plate (19) on the table (14) the filling pieces having surfaces protruding beyond said dividing walls (5) for shaping bevelled edges on the stones and ribs sliding in grooves provided in the lower ends of the dividing walls (5),whilst the filling pieces are withdrawn from below said dividing walls prior to pressing the stones supported by a product plate out of the mould.

2. Method according claim 1 whereby during compression the stamp (7) is moved downward until the stamp (7) is located at a certain distance from the table (14) determined by cooperating stops provided on the table and on the stamp after which the filling pieces are withdrawn from below

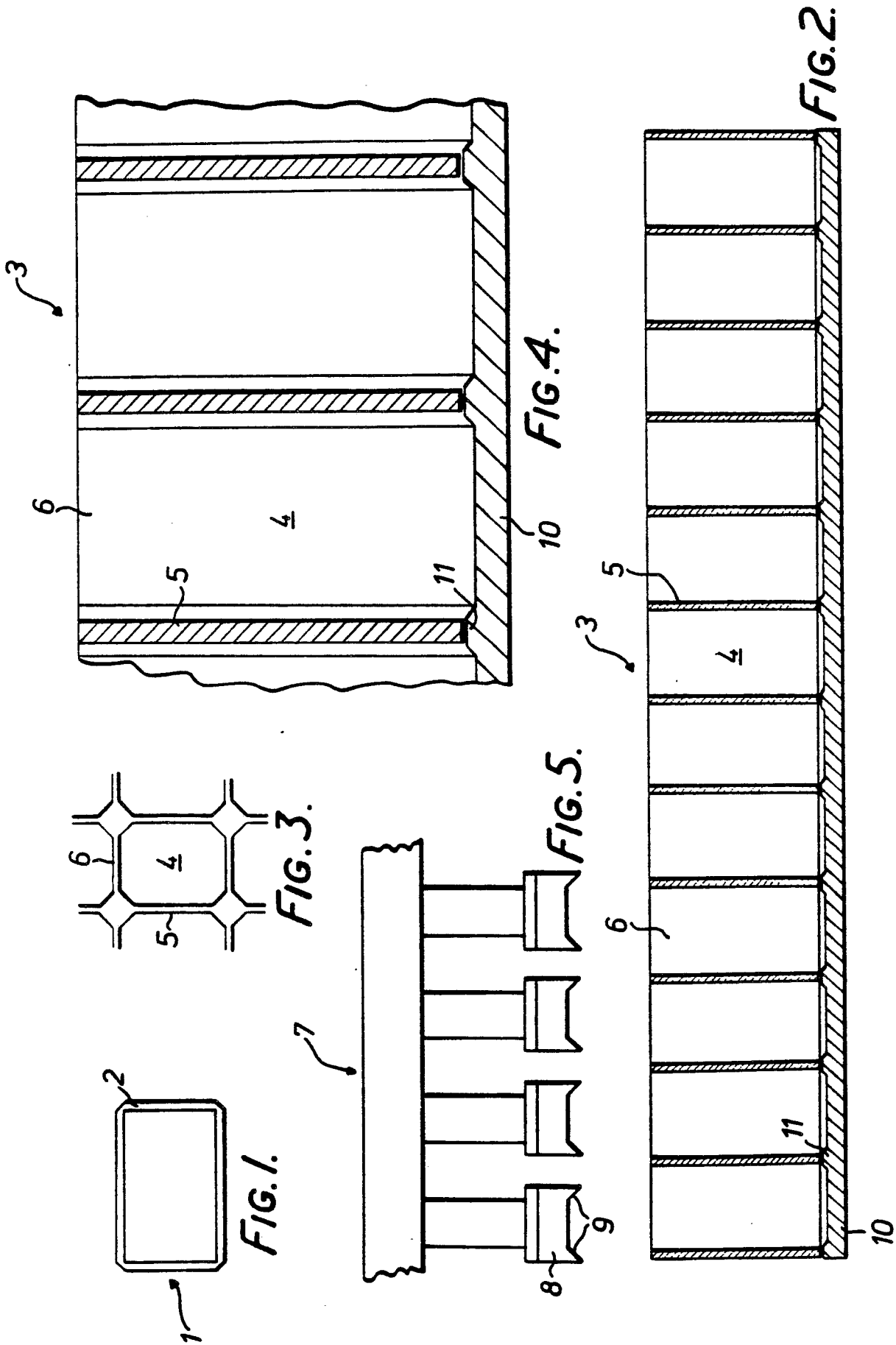
the mould and next the stones (1) shaped in the mould (3) are pressed out of the mould (3) by moving the stamp (7) and the table (14) simultaneously downward while maintaining the desired distance between the table and the stamp by means of said stops.

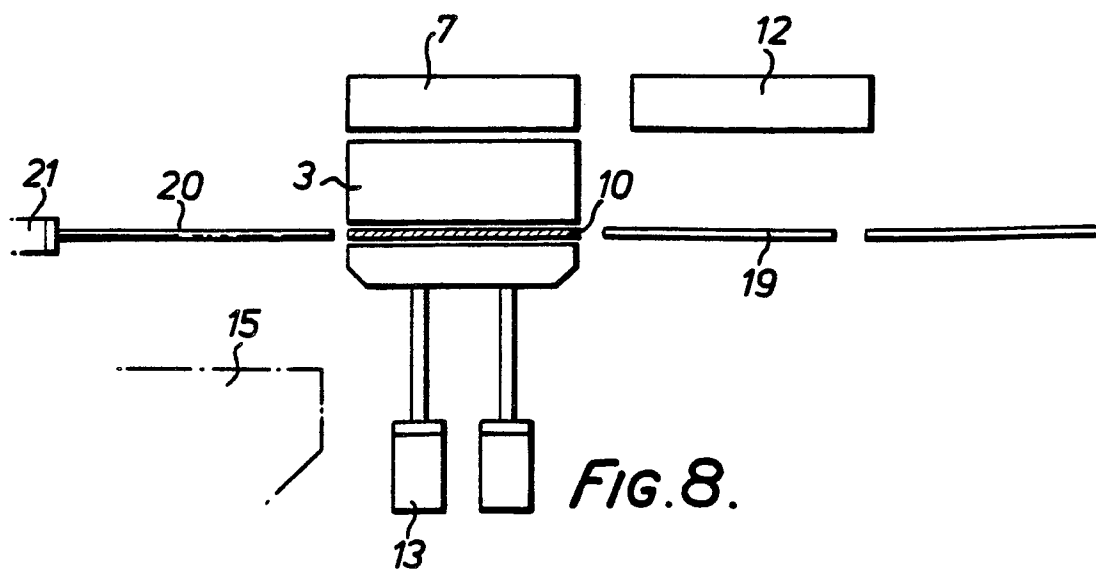
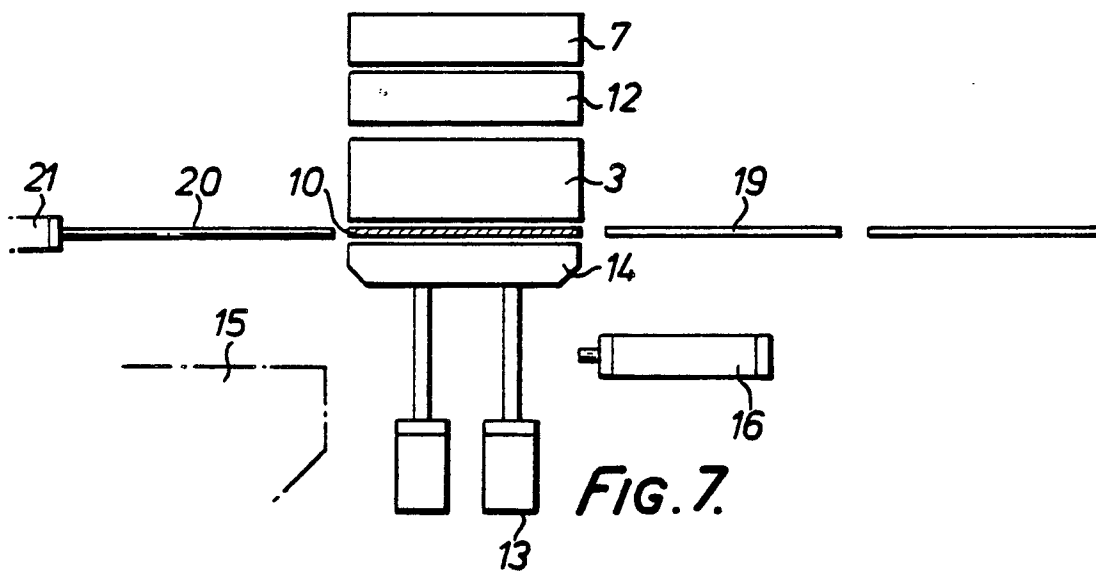
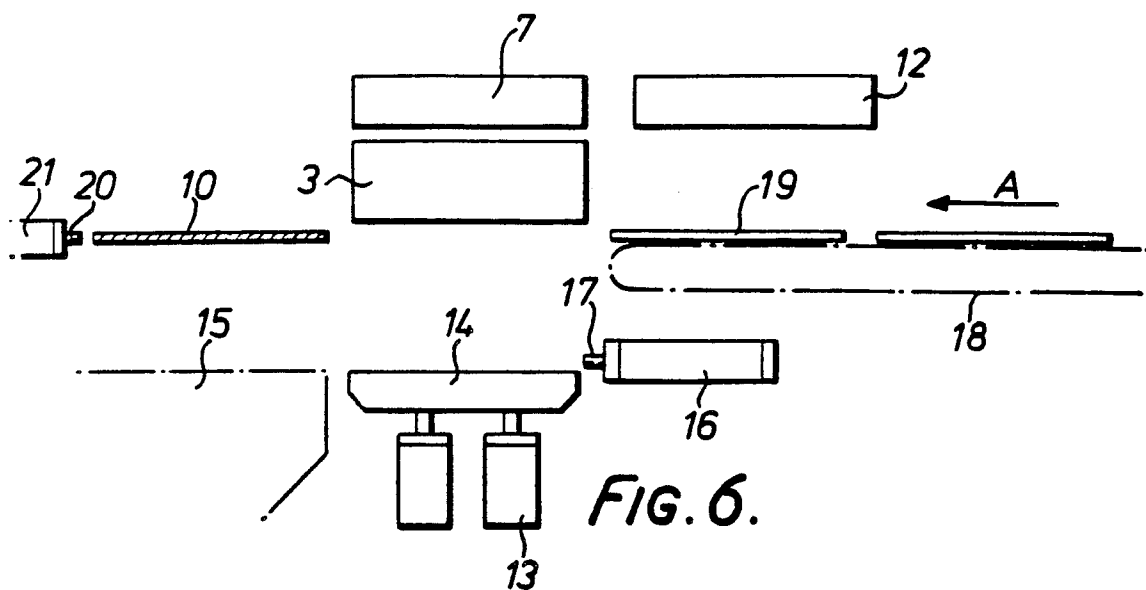
3. Press provided with a mould (3) subdivided in several moulding rooms by means of dividing walls (5,6) with a stamp (7) arranged above the mould and being movable up and down,with a table arranged under the mould and being movable up and down,with supply means (18) for supplying empty product plates (19) and with discharge means for discharging the product plates carrying stones (1) shaped in the mould,characterized in that the press has been provided with a plurality of filling pieces (28) that extend parallel to each other,means being provided for moving said filling pieces to and fro between a first position wherein said filling pieces are situated below dividing walls (5) and a second position wherein, when seen in plan view said filling pieces are positioned besides said moulding rooms,said filling pieces having surfaces protruding beyond said dividing walls for shaping bevelled edges on the stones in said first position and having ribs (27) slidable in grooves (26) provided in the lower ends of said dividing walls the arrangement being such that in said first position of said filling pieces the lower surfaces of said filling pieces lie substantially in a single plane with the lower surfaces of the dividing walls (6) extending transverse to the dividing walls (5) under which are positioned said filling pieces in said first position.

4. Press as claimed in claim 3 ,characterised in that the stamp (7) and the table (14) has been provided with co-operating stops for limiting the movement of the stamp (7) and the table (14) towards each other.

5. Press as claimed in claim 3 or 4,characterised in that stampheads (8) of the stamp (7) have been provided with protruding noses (9) for forming bevelled edges and also the corners of the moulding rooms have been bevelled for forming bevelled edges on the stones.

6. Mould obviously for use in a press according claim3,4 or 5.





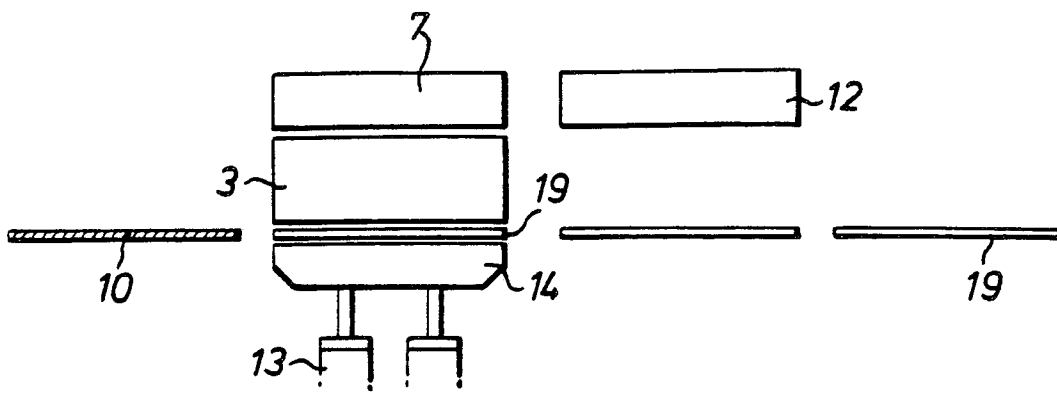


FIG. 9.

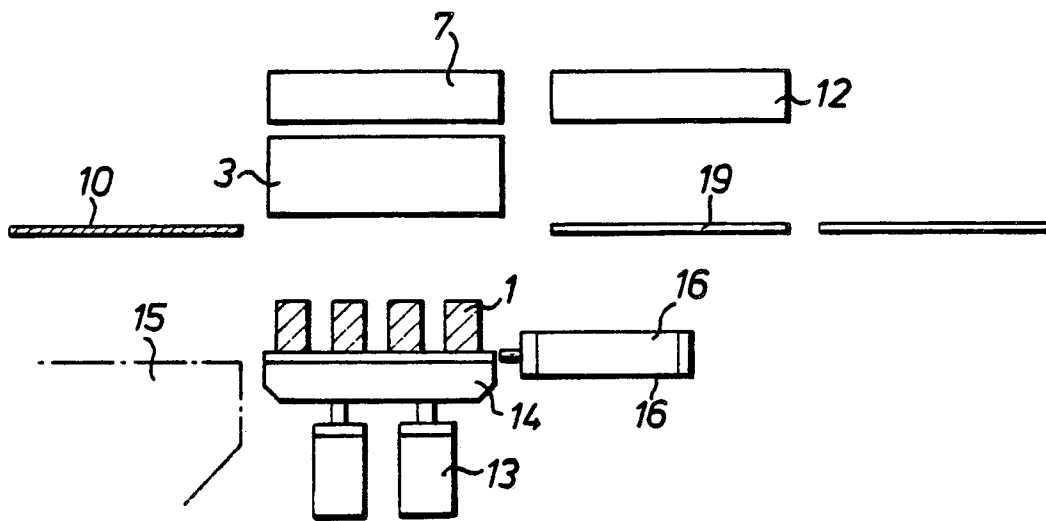


FIG. 10.

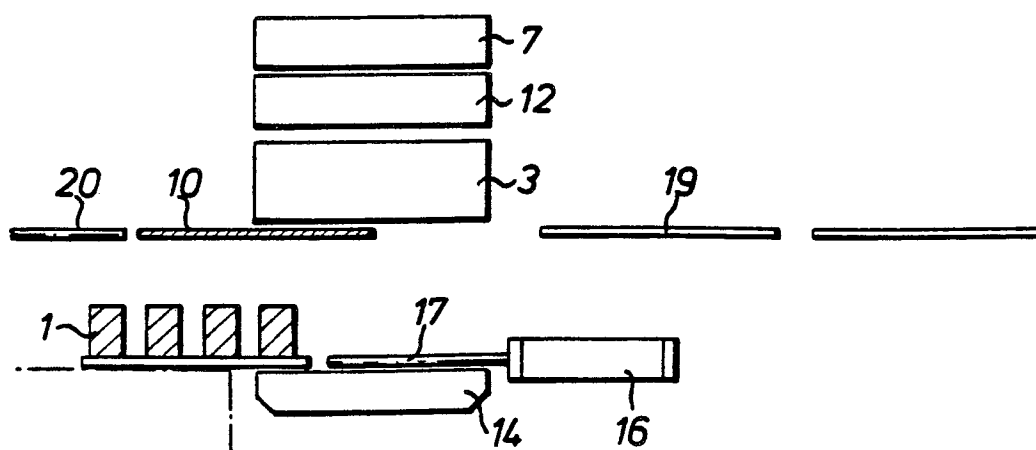


FIG. 11.

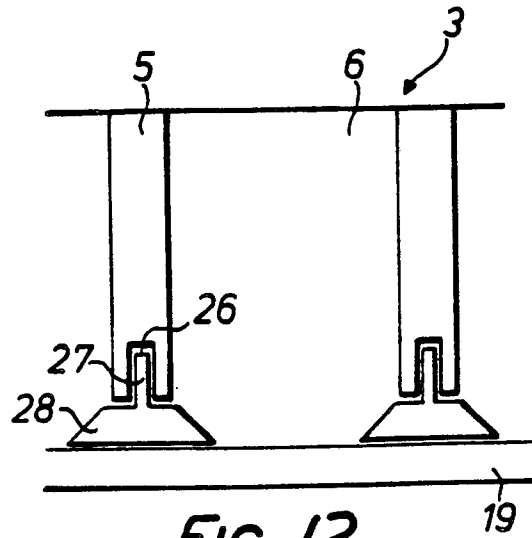


FIG. 12.

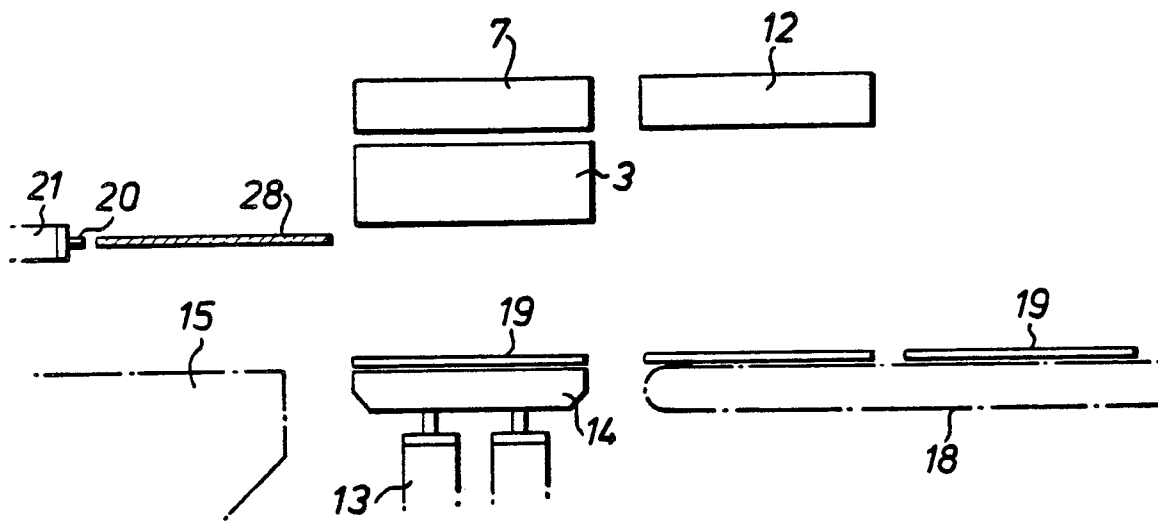


FIG. 13.

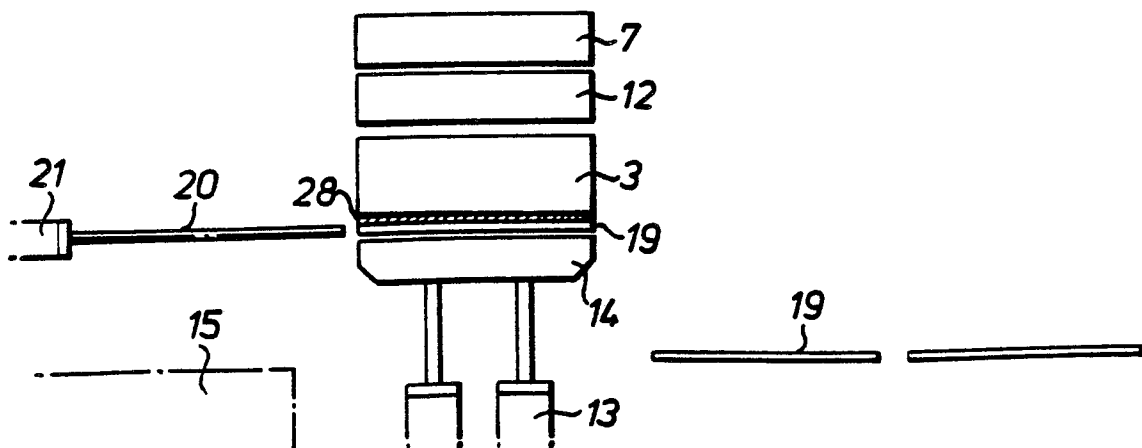


FIG. 14.

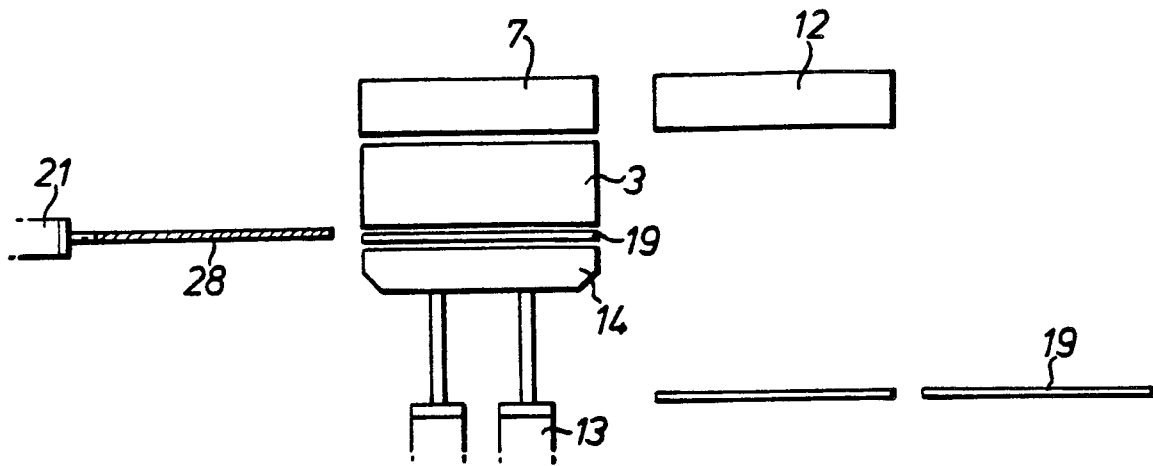


FIG. 15.

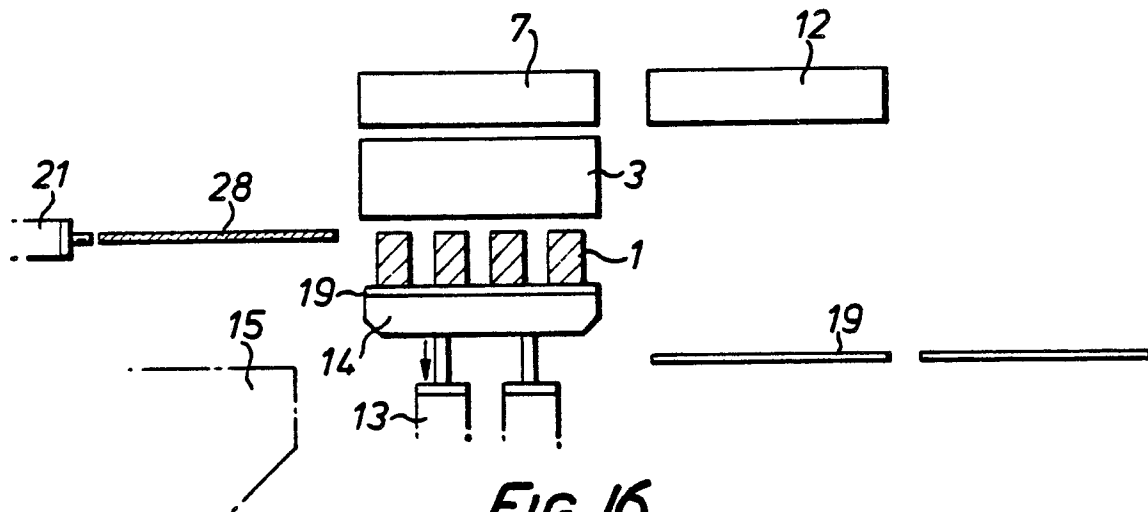


FIG. 16.

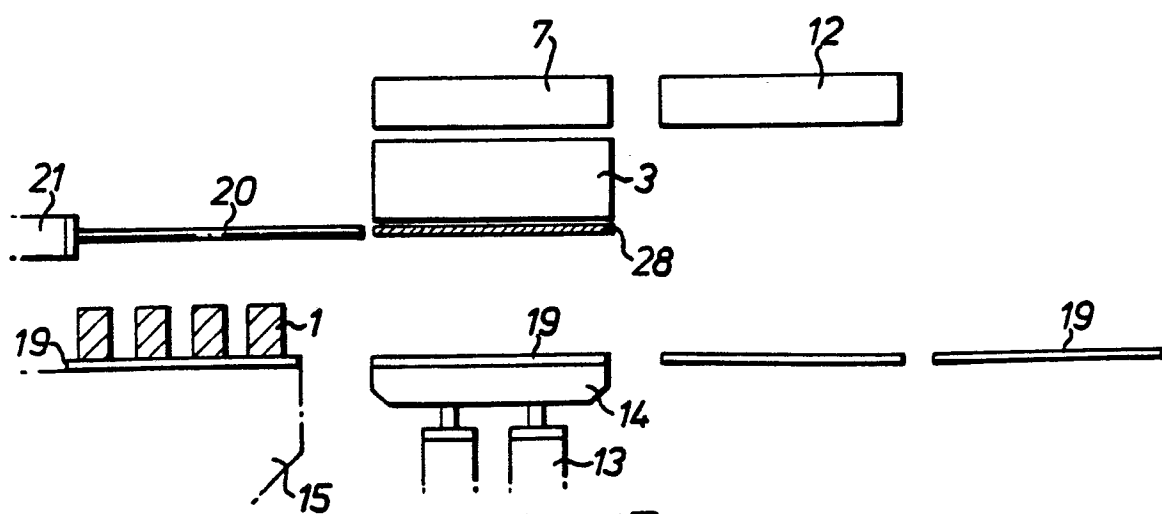


FIG. 17.