United States Patent [19]

Niemi et al.

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[45] **July 10, 1973**

[54] **SHIFTABLE PACKET MOULD PARTITIONS**

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[30] **Foreign Application Priority Data**

July 2, 1970 Finland 1876/70

[52] **U.S. Cl.** **49/125**, 49/425, 105/376, 160/201, 249/129, 249/161

[51] **Int. Cl.**... **B41b 11/56**, E05d 13/02, E05d 15/10

[58] **Field of Search** ..... 105/29 R, 376; 49/125, 127, 130, 409, 410, 411, 425; 160/199, 201, 206; 249/129, 131, 160, 161, 163

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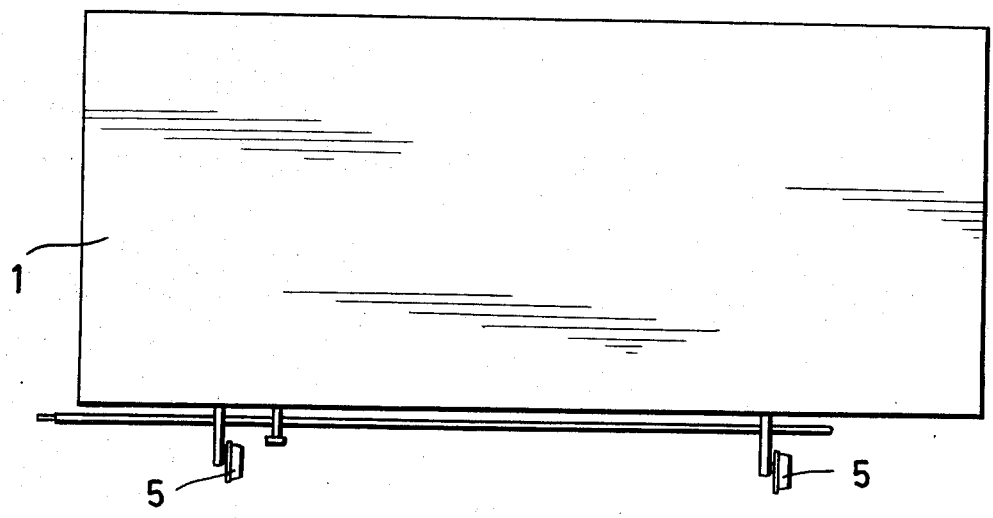
Primary Examiner—Gerald M. Forlenza
Assistant Examiner—Howard Beltran
Attorney—Eric H. Waters et al.

[57] **ABSTRACT**

A transport wheel and rail assembly for the transfer of partition plates and support walls in packet moulds used in vertical casting of concrete elements, the plates and walls being provided with transport wheel assemblies movable along rails by means of rack and pinion drive mechanisms, the wheel assemblies in each plate or wall being arranged in such a way that part thereof travels along one side of a rail, the other travelling along the other side of the rail, thus making an overlapping arrangement of wheel assemblies belonging to adjacent plates possible.

12 Claims, 18 Drawing Figures



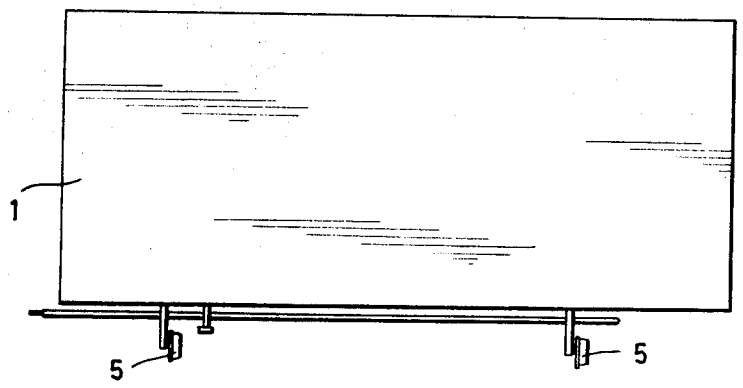


FIG. 1

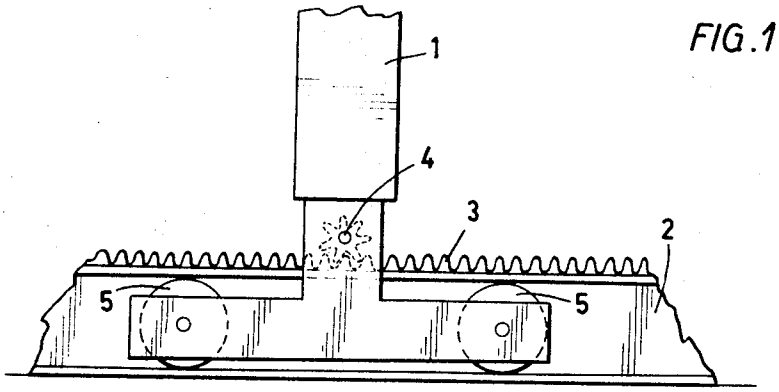


FIG. 2

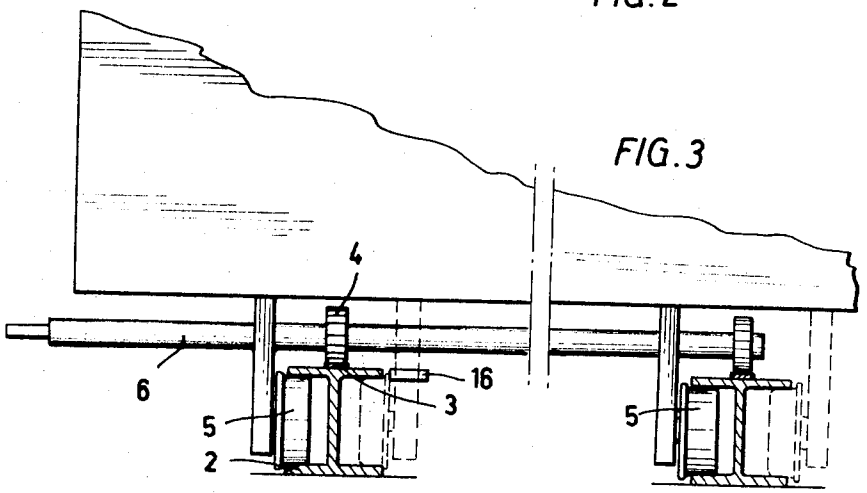


FIG. 3

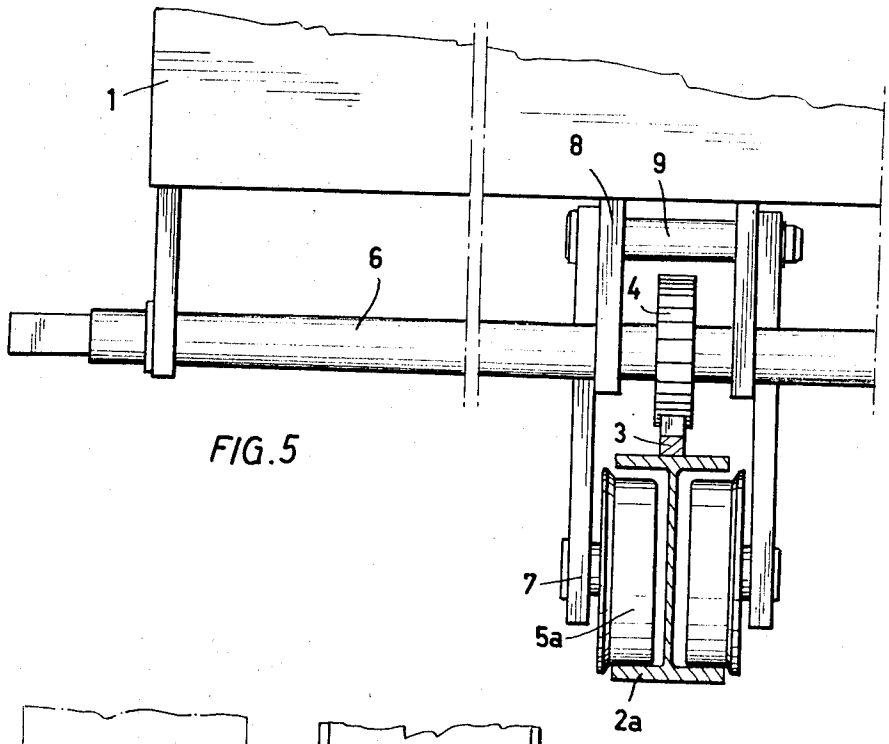


FIG. 5

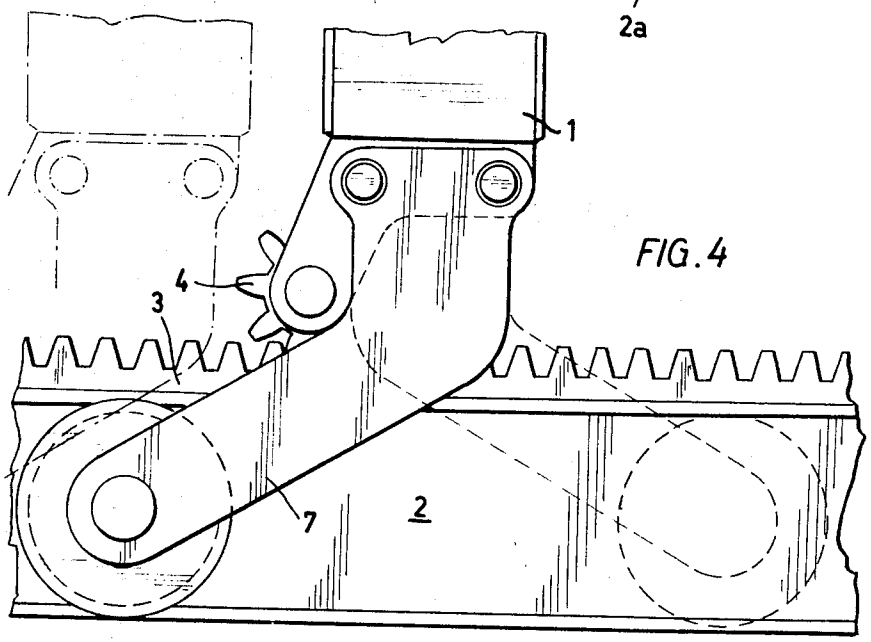


FIG. 4

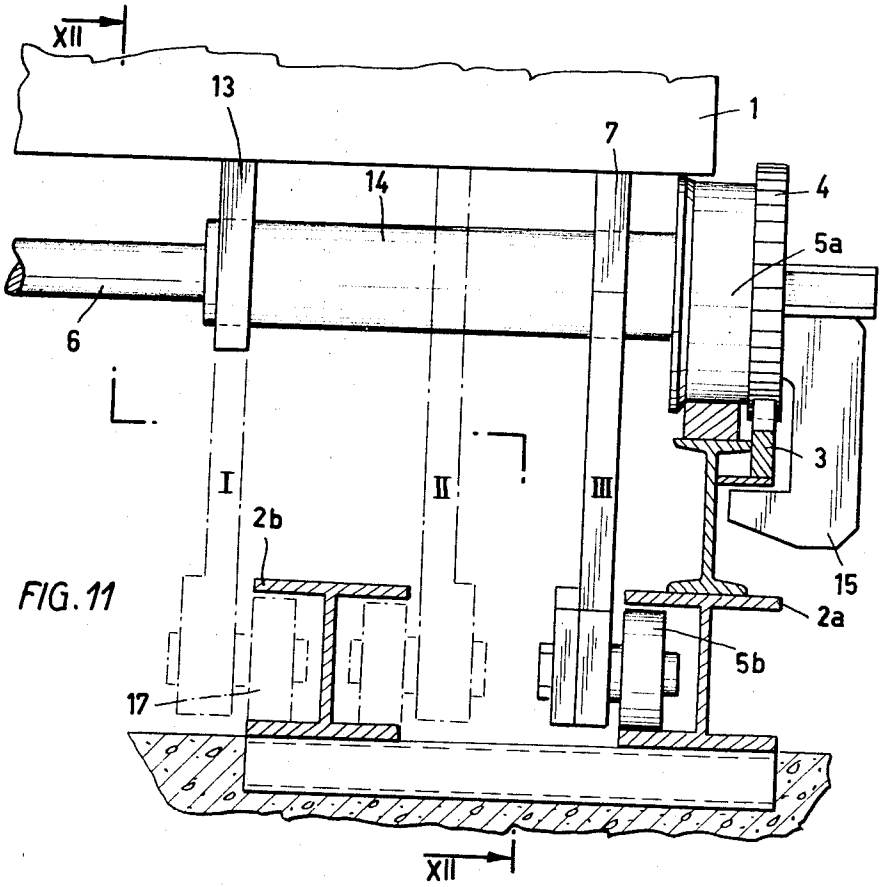


FIG. 11

FIG. 18

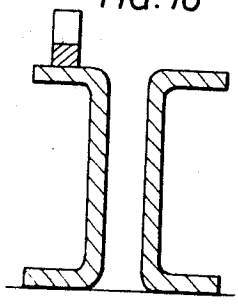


FIG. 6

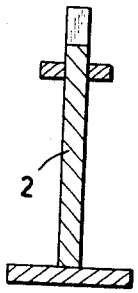
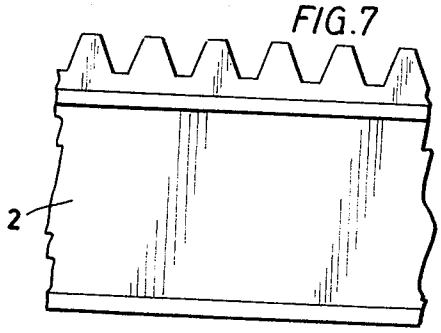


FIG. 7



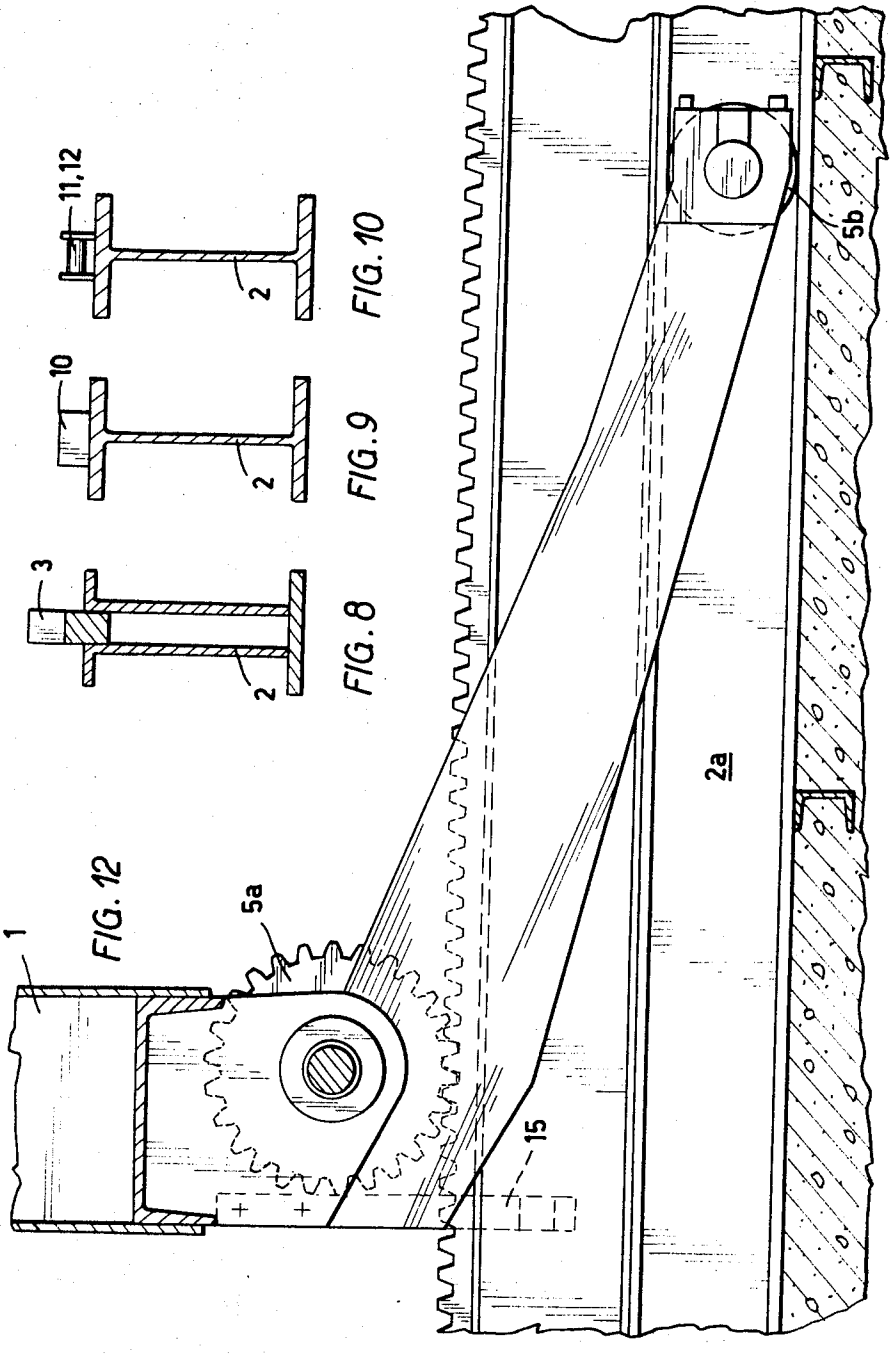


FIG. 10

FIG. 9

FIG. 8

FIG. 12

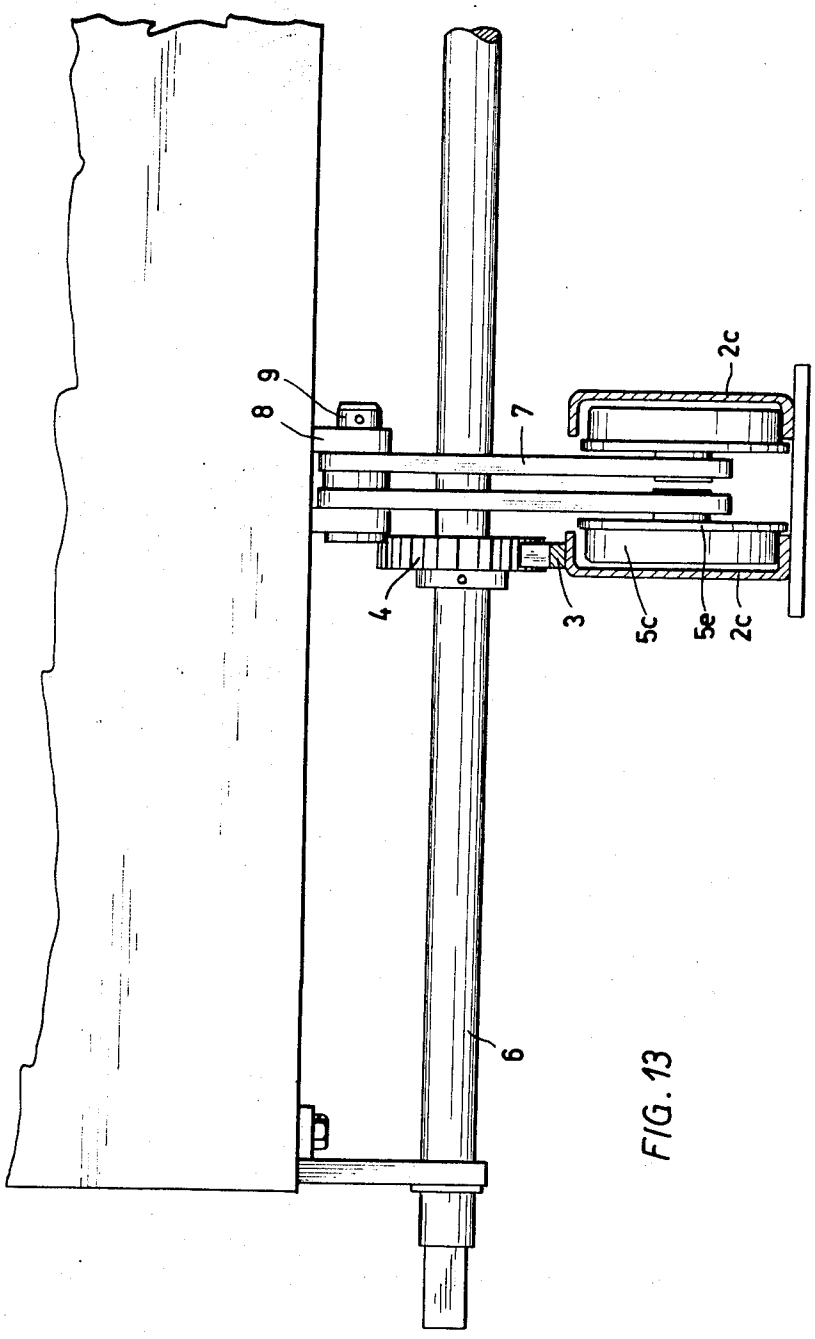


FIG. 13

FIG. 14

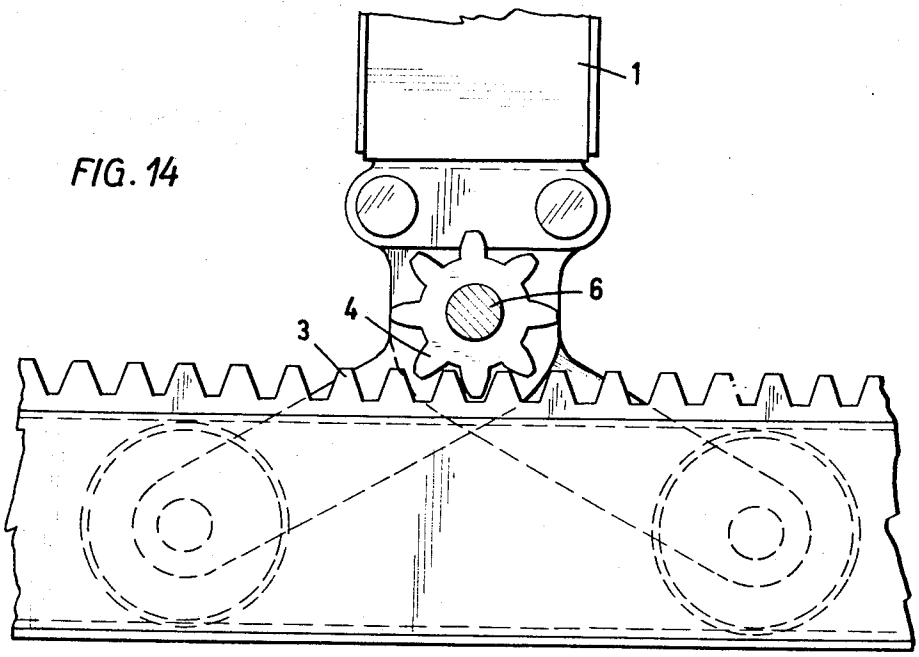


FIG. 15

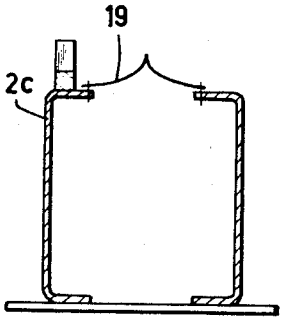


FIG. 16

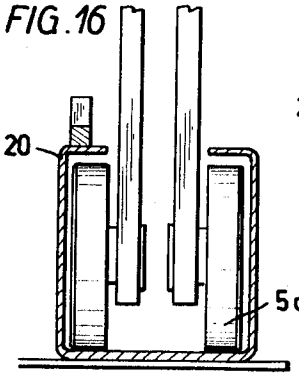
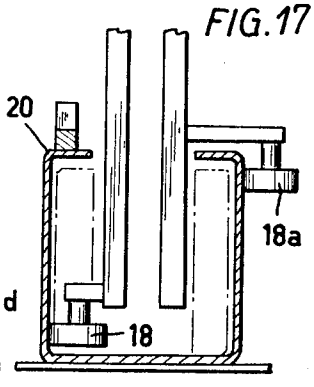


FIG. 17



SHIFTABLE PACKET MOULD PARTITIONS

The object of this invention is a transport wheel and rail assembly particularly for the transportation of the partition plates or support walls of packet moulds which are used especially in the vertical casting of concrete elements, each partition plate of support wall being provided with two transport wheel assemblies moving along rails and a drive mechanism, designed in such a fashion that the transport wheel assemblies of adjacent partition paltes or support walls overlap each other. The construction of a packet casting mould or packet mould requires that the support walls and partition plates be movable either along a frame beam or along rails mounted on the floor. It is an essential feature of a packet mould that the partition plates and support walls are capable of being positioned very close to each other, for example within a distance of 5 cm. of each other. However, the wheel assembly moving along the rails must still be wide enough to prevent the plate from falling over. This problem has previously been solved by the use of several pairs of rails, the wheel assemblies of adjacent plates being positioned on different rails, thus enabling them to overlap each other.

It is, however, expensive and complicated to use several pairs of rails, necessitating, for example, the use of plates having different types of wheel locations in the same mould.

The purpose of this invention is to eliminate these disadvantages, and to produce an assembly such that only one pair of rails will generally be needed.

It is therefore a basic characteristic of the assembly that it comprises two rails, one for each wheel assembly of the partition plate or support wall, and that the transport wheel assemblies or wheels are arranged to move along either side of the rails, thus enabling them to overlap each other on the same common rail.

The solutions in accordance with patent claims 2 to 12 are characteristic to embodiments of the assembly in accordance with the invention.

Considerably advantages over previously known systems are achieved with the aid of the invention:

- the construction of the wheel assembly beam or wheel assembly is simplified,
- the partition wall - wheel assembly combination has better dimensional accuracy,
- the construction and fitting of the rail arrangement to a floor or base is simplified,
- because the same shaft acts as differential and power transmission element, tooth contact is sufficient for the transmission of transport power,
- a simple I-beam, which provides a secure lock against falling, can be used as a rail, and
- the transport wheels are located in a covered position, and their operation cannot be impeded by pieces of concrete or other dirt.

The invention is described in more detail in the following, with the aid of the embodiments in accordance with the attached drawings:

FIG. 1 shows a schematic diagram of the front view of a partition plate or supporting wall.

FIG. 2 shows a side view of one embodiment of the assembly in accordance with the invention.

FIG. 3 shows a front view of the assembly drawn in FIG. 2.

FIG. 4 shows a side view of a second embodiment of the assembly in accordance with the invention.

FIG. 5 shows a front view of the assembly drawn in FIG. 4.

FIG. 6 shows a cross-section of a rail beam welded together from different parts.

FIG. 7 shows a side view of the beam drawn in FIG. 6.

FIG. 8 shows a cross-section of a rail beam welded together from different parts and equipped with a toothed rail.

FIG. 9 shows a cross-section of an I-beam provided with pegs.

FIG. 10 shows a cross-section of an I-beam provided with a chain.

FIG. 11 shows a front view of a third embodiment in accordance with the invention.

FIG. 12 shows a side view of the embodiment drawn in FIG. 11.

FIG. 13 shows a front view of a fourth embodiment of the invention.

FIG. 14 shows a side view o the embodiment of FIG. 13.

FIG. 15 shows in cross-section a rail in accordance with FIGS. 13 and 14 and provided with a resilient cover element.

FIG. 16 shows in cross-section the wheel arrangement in a box-like rail according to a fifth embodiment of the invention.

FIG. 17 shows in cross-section the wheel arrangement of FIG. 16 provided with guide rollers.

FIG. 18 shows in cross-section a rail composed of two separate U-beams, the open sides thereof turned away from each other.

In the embodiment depicted in FIGS. 1 to 3 the plate 1 is moved along two I-beam rails 2. Each wheel assembly comprises two wheels 5 which can move along the lower flange in the space between the horizontal flanges of the I-beam 2. Each plate is fitted in position from one side from the left in FIG. 3) so that both wheel assemblies 5 lie to the same sides of the rails. The following plate is placed in position from the opposite side thus permitting the necessary overlapping. Plate 1 is provided with a locking device 16 which prevents any sideways movement and thus holds the plate in position. A toothed rail 3 (or pegs) located on the upper surface of the I-beam enables the plate 1 to be transported with the aid of a toothed drive wheel 4 and a shaft 6.

In the construction shown in FIGS. 4 and 5 the assembly consists of two wheels 5 connected to the plate 1 by means of arms 7 The wheels 5 are arranged to move along opposite sides of the rail 2*a*, and the distance, in the direction of motion, between the shafts of the wheels is sufficient to support the plate steadily. This is a very practical and simple construction, and requires only one pair of rails for a mould. Plate 1 is prevented from falling over by the locking effect between the flanges of the I-beam, but adjacent plates can still be placed sufficiently near t each other for thin elements to be cast.

For a mould in which it is necessary to have a removable partition wall the wall is constructed separately from the wheel assembly and attached to it, for example by means of bolts or pins. In practice, this is carried out in such a manner that the partition plate is held in a vertical position (FIG. 5) and the pins 9 are removed, thus freeing the wheel assembly 5, 7 from plate 1.

When the plate is lifted away, toothed wheel 4, shaft and arm 8 come with it.

Since wheels 5 are located on opposite sides of the rail, the whole wheel assembly is horizontally rotatable to such an extent that the wheels 5 can be removed from underneath the upper flange of rail 2. The wheel assembly can then be lifted away from the rails.

In such moulds form which the removal of partition plates is not necessary the wheel assembly with its arms 8 can be permanently fixed to plate 1. It will not even be necessary to include arms 8 if the drive element is fitted to arms 7.

FIGS. 11 and 12 show an embodiment different from the above-mentioned. In this, separate supporting wheels, which travel along their own separate rail 2*b*, prevent plate 1 from falling over. In practice, however, one additional rail 2*b* is only required provided that both of its sides are used. The carrying wheels themselves, however, travel only along the two rails 2*a* in accordance with the original idea of the invention. Shaft tube 14 is attached to fixing arm 13, and hook 15 prevents the plate from falling outwards.

FIGS. 13 and 14 show still another embodiment of the invention. According to this embodiment, the I-beam accoridng to FIGS. 4 and 5 is thought to be split along a plane within the web portion of the beam, and the so formed U-beams are arranged at such a distance from each other, the open sides facing each other, that the support arm plates 7 of the wheels can pass between them, said beams 2*c* forming a box open on the upper side. According to FIG. 13, the wheels 5*c* consequently travel within the box, being locked between the flanges of the box analogously to the I-beam situation. Guidance of the wheels is effected by means of flanges 5*e* in the wheels 5*c* themselves.

When using a plate box 20 according to FIG. 16 without any particular rail, a flangeless wheel 5*d* can be used and, if necessary, the guidance can be effected by means of guide rolls 18, 18*b* in accordance with FIG. 17, which can be situated either inside or outside the box, or both.

The toothed rail- toothed wheel transmission 3, 4 can be designed in the above-mentioned beam construction with the same variations as when using the I-beam. In FIGS. 13 and 14, the tooth transmission 3, 4 of the wheel assembly is arranged in direct connection with the plates 7 but it can also be made separate as in FIGS. 4 and 5.

In FIG. 15 is shown how the beam construction of FIGS. 13 and 14 can be protected by means of a cover element 19 that can be made of rubber, a plastic material, or other similar material. By means of this cover element, the box being open on its upper side can be protected against dirt in such a way that the plates 7 of the wheel assembly open a longitudinal slit made in the resilient cover element on their way along the box.

In addition to the embodiments described, others can also be designed in accordance with the invention. Two pairs of rails may even be necessary in certain special applications. The shape of the rail can vary as shown in FIGS. 6 to 10. The principal idea is that the wheels 5 can move along opposite sides of the rail thus enabling overlapping to take place even when only one pair of rails is being used. The wheels can also move along the upper flange of the rail.

What I claim is:

1. In a packet mold including a number of generally parallel mold partition plates or support walls which are movable in regard to each other, a rail-type supporting and transporting system, comprising:
   a. first and second rails, said rails each including first and second parallel spaced-apart tracks extending generally transversely to the plane of the partition plates; and
   b. two wheeled structures attached to each said partition plate, each of said rails having respectively one of the wheeled structures associated therewith, each said wheeled structure being movable along respectively one track of one said rail, the corresponding wheeled structure of each adjacent partition plate being movable along the second track of said last mentioned rail, so as to enable the wheeled structures to overlap each other in the direction of transport of said partition plates or support walls.

2. In a packet mold including a number of generally parallel mold partition plates or support walls which are movable in regard to each other, a rail-type supporting and transporting system, comprising:
   a. first and second rails, said rails each including first and second parallel spaced-apart tracks extending generally transversely to the plane or the partition plates; and
   b. two wheeled structures attached to each said partition plate, each of said rails having respectively one of the wheeled structures associated therewith, each said wheeled structure comprising first and second parts, said first part bieng movable along one track of one rail and extending in one direction lengthwise of the rail, said second part being movable along the second track of the same rail and extending in an opposite direction lengthwise of the rail, so as to enable the wheeled structures of adjacent plates or walls to overlap each other.

3. A system as claimed in claim 2, each said wheeled structure comprising a pair of wheels movable on opposite sides of the associated rail, shaft means rotatably journalling said wheels on said structure in predetermined spaced relationship along the lengthwise direction of partition plate transport.

4. A system as claimed in claim 3, each said rail being constituted of an I-beam.

5. A system as claimed in claim 4, said wheels being movable along the lower flanges of said I-beam.

6. A system as claimed in claim 4, said wheels bieng movable along the upper flanges of said I-beam.

7. A system as claimed in claim 3, each said rail comprising a box-like structure having an opening along the upper surface thereof, said wheels being movable within said box-like structure.

8. A system as claimed in claim 7, said box-like structure comprising a pair of parallel extending spaced U-beams, having the flanges thereof facing each other.

9. A system as claimed in claim 7, comprising guide rollers for said wheeled structure movable within said box-like structure.

10. A system as claimed in claim 7, comprising guide rollers for said wheeled structure movable exteriorly of said box-like structure.

11. A system as claimed in claim 2, comprising drive means for each said wheeled structure, said drive means including a toothed rail mounted on the upper surface of each said rail, a rotatable shaft connected to said partition plate, gear tooth means rigidly fastened to said shaft and adapted to cooperatively engage said toothed rail.

12. A system as claimed in claim 11, said drive means comprising a chain and sprocket drive assembly.

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