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(54) **A METHOD OF MANUFACTURING CONSECUTIVE CONCRETE ELEMENTS IN A LONG MOULD BED, AND A RAIL-BOUND CARRIAGE FOR MOULD-STRIPPING.**

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| (30) Priority: 14.03.80 SE 8002029 | (73) Proprietor: A-BETONG AB/SABEMA MATERIAL AB
Box 24
S-351 03 Växjö (SE) |
| (43) Date of publication of application:
14.07.82 Bulletin 82/28 | (72) Inventor: SÖDERBERG, Sven
Mörners väg 75
S-352 46 Växjö (SE)
Inventor: STEEN, Ingvar
Sunnera
S-340 16 Ryssby (SE) |
| (45) Publication of the grant of the patent:
15.08.84 Bulletin 84/33 | (74) Representative: Wennborg, Göte et al,
KRANSELL & WENNBORG AB Sandhamnsgatan
42
S-115 28 Stockholm (SE) |
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Description

Technical field

The present invention relates to a method of manufacturing consecutive concrete elements, such as concrete sleepers, in a long mould bed comprising a plurality of mutually adjacent, vertically movable moulds or forms while using carriages arranged for movement on rails along the mould bed.

Background art

A method of manufacturing a plurality of sequential pre-tensioned concrete elements, for example concrete sleepers, in a long mould bed is described in Swedish Patent Specification No. 77 05021-9. Different types of moulds for casting concrete elements are described for instance in Swedish lay-open prints 379 668, 402 873 and 404 996, Swiss Patent 536 700 and US Patent 3 732 044.

Objects of invention

An object of the present invention is to provide a more developed and improved method for such concrete element manufacture. The method according to the invention, however, is also intended for application when manufacturing other kinds of concrete elements than concrete sleepers in long mould beds.

Another object of the present invention is to provide a method in the manufacture of concrete elements which enabled separate insert elements, such as rubber plates, to be mounted in the mould in a rational and reliable manner such that said elements are at least partially cast in the finished concrete element. For example, it shall be possible to apply the method when casting in a concrete sleeper such inserts which have the form of plates of a hardened casting compound as described in the Swedish Patent Specification No. 73 06727-4.

A further object of the invention is to provide a method of the afore-said kind which enables the mould to be stripped, cleaned and prepared for a further casting operation in a simple and effective fashion, with the use of carriages arranged for movement on rails along the mould bed and preferably having individual drive means.

Brief summary of the invention

A method according to the present invention which fulfils these objects is mainly characterized in that subsequent to casting and hardening the concrete elements the mould is successively stripped by means of devices located on a mould-stripping carriage for withdrawing the mould holders or ties of a mould and to release the cast concrete element by pressing the mould down towards a vertically movable mould holder elements which are swung in beneath the mould, whereat subsequent to removing the cast concrete element one or more further carriages are used for

successively preparing the mould for a subsequent casting operation.

The use of thus equipped and functioning carriage enable concrete elements to be manufactured in a rational and effective fashion, particularly by simplifying and rendering more effective those working operations which must be carried out between the actual casting operation, i.e. primarily mould-stripping, mould-cleaning and the preparation of the mould for renewed casting. The use of the aforescribed carriages arranged to travel on rails along the mould bed reduces to a minimum heavy and time-consuming manual working operations which would otherwise have to be carried out, whereat there is also afforded the possibility of the manufacturing process in an accurate and reproduceable fashion, which is an important prerequisite of the high degree of mechanization and automatization sought for.

When applying the method in practice it is preferred that the mould is pressed down by means of separate hydraulically actuated press rods located on the mould-stripping carriage, whereat the vertically movable holder elements are, at the same time, lifted to receive the mould released from the cast elements.

In this way the possibility is afforded of purposeful co-action between the elements used for the different movements, so that substantially the same drive means can be used both for the downward movement of the press rods and for the upward movement of the holder elements.

According to a preferred embodiment, in which the mould-stripping carriage is self-propelling at at least two speeds, the carriage is caused to take a correct position in relation to the mould while creep driving, whereafter the carriage is caused to stop and is fixed relative to the frame of the mould bed by means of devices arranged on the carriage, before the mould holders are withdrawn and the mould pressed down.

Because the mould-stripping carriage carries both those devices required for releasably securing the carriage to the mould in question and those devices which enable the mould to be stripped in a positive and effective fashion, the reliability and efficiency of the method is enhanced, primarily due to the fact that the carriage can be fixed in an accurately determined location relative to the mould, and to the fact that those forces required to press down the mould can be applied in a purposeful fashion.

To enable concrete elements to be manufactured in accordance with factory standards, it is particularly important that the various mould in the mould bed can be thoroughly cleaned of concrete residues after the mould-stripping operation. The cleaning operation obtains, moreover, particular significance in those instances, relevant in the present case, when the mould shall be prepared in a manner to

enable separate insert elements, such as rubber plates, to be cast in the concrete elements. As will be understood, any concrete particles which remain in the mould may cause the insert elements to be positioned obliquely when placed in the mould, which has disastrous consequences in respect of the quality of the cast concrete elements. Experiments have shown that it is not sufficient to vacuum clean the mould, because of the strength with which residual concrete particles adhere to the sides thereof. Thus, in order to remove concrete residues the mould sides must be subjected to some kind of the mechanical working, although experiments have shown that this does not provide a fully satisfactory result either. It has surprisingly been found, however, that mechanical working of the mould sides by means of suitable scraping devices, e.g. scraper plates, while blowing air under high pressure into the mould through nozzles let into the mould provides a very good result.

Accordingly it is proposed in accordance with a further development of the method according to the invention that the moulds are cleaned from concrete residues by the combined action of blowing and scraping with the use of vertically movable scraper devices arranged to contact the inner surfaces of the mould, and with the use of blower nozzles inserted in the mould.

The blower nozzles, which are suitably in the form of fan valves, produce a linear jet of air which cuts like a knife against concrete particles adhering to the mould. The scraper devices are, in turn, used primarily to remove concrete particles in the region where the insert elements are later to be mounted, since it is of particular importance than said insert elements are placed correctly in the mould.

Because the scraper devices move up and down in the mould, an effective mechanical cleaning operation is effected, while subjecting the adhering concrete particles to strong jets of air at the same time. The removed concrete residues collect in the bottom of the mould, from which they can be readily removed with the aid of a vacuum-cleaner suitably arranged on a rail-bound carriage following said mould-cleaning carriage.

The further carriage arranged to handle the inserts, e.g. rubber plates, to be mounted in the mould suitably carries said inserts in one or more cassettes provided with an outfeed mechanism. It is preferred herewith that said carriage is fixed in exact location relative to the mould with the aid of centering means extending downwardly from the mould; that an insert element located in a cassette is then fed to the mould; that the carriage is released from the mould and is driven slowly, creep driving, through a given distance whereat the carriage is again fixed relative to the mould and said feed insert element is pressed firmly in the mould,

whereupon said mould is sealed in the region of the element.

By utilizing a particularly designed carriage of the aforescribed kind, exact and accurate application and fixing of inserts to be cast is ensured, at the same time as manual operations in connection with the insert-applying operation can be restricted to merely supervision. Time-consuming and heavy manual work in connection with the preparation of the mould for casting is restricted to the least possible.

The present invention also relates to a rail-bound carriage for de-moulding, the main characterizing features of the carriage being set forth in claim 8.

Preferred embodiments of the invention will now be described in more detail with reference to the accompanying schematic drawings. Corresponding elements are identified in the various figures by the same references.

Brief description of the drawings

Figure 1 is a side view of a rail-bound mould-stripping carriage for use when carrying out the method according to the invention.

Figure 2 is a front view of the carriage illustrated in Figure 1.

Figures 3 and 4 illustrate one element of the carriage illustrated in Figures 1 and 2.

Figures 5—8 illustrate a cleaning carriage provided with scraper devices and blow nozzles, for use when applying the invention, whereat Figure 5 is a plan view of the carriage.

Figure 6 is a front view of the carriage illustrated in Figure 5.

Figure 7 is a side view of the carriage illustrated in Figures 5 and 6.

Figure 8 illustrates on the left side thereof part of the side view of the carriage according to Figure 7 in larger scale, while to the right of Figure 8 is illustrated a corresponding part of the carriage in front view and in the same scale as the left part of the figure.

Figure 9 is a side view of a rail-bound carriage for mounting insert elements when applying the method according to the invention.

Figure 10 is a plan view of a carriage illustrated in Figure 9.

Figure 11 is a front view of the carriage according to Figures 9 and 10.

Figure 12 illustrates a cassette and outfeed mechanism for a carriage according to Figures 9—11.

Figure 13, finally, is a plan view of a cassette associated with a carriage according to Figures 9—11.

Description of preferred embodiments

The rail-bound mould-stripping carriage illustrated in Figures 1 and 2 comprises a robust frame structure 1 which carries four wheels 2 arranged to run on rails 30 and driven by a reversible hydraulic motor 3 via a chain. The carriage also carries two movable yokes 4 to which are mounted vertically movable holder

elements 5 which can be swung in beneath the mould. The holder elements can be rotated through 90° by means of a ram 6. The holder elements are accommodated in a vertical guide 7.

Two hydraulic rams 8 are provided for raising and lowering the yokes 4. Arranged on each yoke is a cam guide 9. In addition, four swivel-press-cylinders 10 are provided for firmly holding the carriage when the mould is pressed downwardly.

The carriage also carries four rollers 11 arranged, as the yokes 4 move upwards, to actuate four arms 12 which, when actuated, clamp down spring-loaded down-press rods 13. The carriage is also provided with four withdrawing cylinders 14, the purpose of which is to release horizontally movable mould holders 15 from the mould 16. The carriage is also provided with two further hydraulic rams 17 arranged to activate a release cylinder 18 via an internal hydraulic system. A hydraulic unit 19 is also provided.

The carriage has the following mode of operation: Subsequent to starting the motor 3, the carriage moves forwards at a maximum speed. The motor 3 then receives a pulse for "creep driving". The motor then slows down until the carriage has reached the down-pressing location, whereafter the motor 3 stops. In conjunction therewith a pulse is sent to the swivel-press cylinders 10, which are then swiveled in beneath the frame structure of the mould bed and clamp the carriage.

As the swivel-press cylinders 10 move inwardly, the swivel cylinder 6 is activated which rotates the holder elements 5 via link arms 24. A further start pulse is then sent to the cylinder 14 which activates the mould holders 15, whereat return of the cylinders 14 is also initiated.

The hydraulic ram 8 is then activated, which displaces the yokes 4 vertically upwardly. When the outer ends of the yokes 4 contact the rollers 11 the down-press rods 13 are clamped down via the arms 12, thereby to release the mould. The holder elements 5, which are secured to respective yokes 4, accompany the upward movement of said yokes 4. When the yokes 4 occupy their uppermost position, the mould 16 has been pressed downwardly through a distance of about 50 mm. In the uppermost position of the yokes, cam 9 has released the piston rod of the hydraulic ram 17 therewith also activating the cylinder 18. Hydraulic liquid in the system will then be pressed back by the spring in the cylinder 18, causing the release cylinder 18 to urge the withdrawing cylinder 14 upwards, which is therewith released from the mould holders (see Figures 3 and 4).

Subsequent to the downward movement of the cylinder 8, the holder elements 5 are swung out at the same time as the swivel-press cylinders 10 execute a return movement of 90°. When all swivel-press cylinders have executed a

90° return movement, the motor 3 is started and the carriage moves forward again.

Arranged on the forward part of the carriage is an anti-collision device, which causes the drive motor to be stopped when an obstacle is met. As will be seen from the foregoing, the carriage and its associated machine equipment operate substantially automatically, whereat it is only necessary for the operator to ensure that the machine is initially positioned correctly, and to generally supervise the remainder of the operations.

The aforescribed carriage has the same length as the concrete element, e.g. the concrete sleeper, to be manufactured. Thus, the carriage operates successively by handling sequential moulds in order along the mould bed in the aforescribed manner.

Subsequent to stripping the mould and removing the cast concrete elements—which is suitably effected by means of separate carriages arranged for movement along the bed and having lifting devices arranged to grip the concrete elements—the work of preparing the mould for renewed casting is begun. The prime work in connection herewith is the cleaning of the mould, whereat there is used a separate cleaning carriage which will be described hereinafter with reference to Figures 5—8. The mould shall also be oiled, which is suitably done after placing in the mould separate elements, such as rubber plates, which are to be cast in the concrete elements. This is also effected with the use of a separate carriage, which will be described hereinafter with reference to Figures 9 and 10.

The cleaning carriage illustrated in Figures 5—8 comprises a robust frame structure 61 having four wheels 62 arranged to run on rails and driven by a reversible air motor 63 via a chain. The carriage has four pneumatic cylinders 64 and two pneumatic cylinders 65A and 65B for moving holders 66 up and down. The holders 66 carry a plurality of fan-like blow nozzles 67 arranged to produce linear air flows under high pressure against the sides of the mould. The nozzles co-act with sixteen scraper plates 78, arranged to engage the sides of the mould and therewith to cleanse said sides of concrete residues. The scraper plates 78 are arranged to move up and down under the action of the cylinders 65A and 65B which carry out a slow, oscillating movement. Also arranged on the carriage is an air compressor 68 and four magnet valves 69A—69D.

The cleaning carriage is also arranged to move along the mould bed at two speeds. Thus, the motor 63 drives the carriage at a maximum speed until the motor receives a signal for creep driving. The carriage then moves slowly forwards until it reaches its correct position, whereat the motor stops and the cylinder 64 locks the carriage in this position. The cylinder 65A then begins to move under the action of a limit switch (not shown), whereat the magnet

valve 69A opens. The cylinder 65A then returns until a further limit switch (not shown) is activated, whereat the direction of movement of the cylinder is reversed, etcetera. At the same time a time relay (not shown) is activated, which causes cyclic closing and opening of the valves 69A and 69B, whereat air under high pressure is delivered from the nozzles 67 at suitable intervals.

When the cylinder 64 has moved to its starting position, the motor 63 is started and a new cycle commences.

The carriage is also provided with an anti-collision device having a safety switch 79. Separate protective plates 80 prevent concrete residues from splashing against the nozzles, for example, during a cleaning operation.

In Figures 9 and 10 there is illustrated a further carriage intended for mounting rubber rail-inserts of the kind described in the Swedish Patent Specification No. 73 06727-4. To this end, the carriage comprises a frame structure 31 which carries four wheels 32 arranged for movement on rails, and is driven by a reversible hydraulic motor 33 via a chain. The machine is also provided with a plurality of hydraulic cylinders 34, 35 and 36, and cassettes 37 having outfeed mechanisms for the plates 59. In addition, there is provided a hydraulic unit 38 for driving cylinders and motor 33.

When the motor 33 is started, the machine moves forwards at a maximum speed until the motor 33 receives a creep-driving signal. Thereafter the motor 33 stops, whereat the cylinder 34 is activated and, via conical pegs 42 on the piston rod, firmly clamps the carriage to the mould via a centering pipe located therebeneath. The cassettes containing plates are then located centrally over corresponding abutment plates in respective moulds.

When the cylinder 34 and a limit switch (not shown) are activated a motor 44 arranged on the cassette is started, said motor 44 activating an outfeed mechanism 45 comprising a rotatable cross 46 arranged on a rotary shaft 47. Arranged on the opposite end of the shaft 47 is a cam plate 48 having four cams arranged to activate a microswitch 49. The outfeed motor 44 is therewith caused to move one quarter of a revolution at each new pulse and to stop when microswitch 49 is activated. When the outfeed motor 44 has moved through one quarter of a revolution and has delivered a plate 59, whereat the microswitch 49 is activated, return movement of the cylinder 34 is commenced. When said cylinder occupies its starting position, a further limit switch (not shown) is activated, whereat the drive motor 33 starts to move the carriage slowly forwards, creep driving. The cylinder 35 is then activated, so as to firmly clamp the carriage to the mould via conical pegs 42 on the piston rod. Respective cylinders 36 for fixedly pressing plates are therewith centered over respective plates inserted in the mould. Subsequent to activating the cylinder 35

and subsequent to the activation of a further limit switch (not shown) respective cylinders 36 are activated, said cylinders pressing the rubber plates firmly in the mould, via a sprung anvil 52 in the mould, to fix said plates in said mould. Subsequent hereto the return movement of the cylinder 35 commences. The carriage drive motor 33 is then started for renewed propulsion of the carriage at said maximum speed.

This carriage is also provided with an anti-collision device 56, which stops the drive motor when the carriage strikes an obstacle in its path.

As will be understood from the above, the aforescribed machine accurately mounts the plates in the mould and efficiently seals the mould, so that the subsequent casting operation can be satisfactorily carried out.

In order to render said sealing more effective plastic wedges shaped in a special manner (not shown) can be used.

Other working operations carried out in preparation for casting operations, such as the drawing of reinforcing lines, can be carried out with the aid of separate carriages arranged to move along the mould bed on rails.

Claims

1. A method of manufacturing consecutive concrete elements, e.g. concrete sleepers, in a long mould bed comprising a plurality of mutually adjacent, vertically movable moulds (16) with the use of carriages arranged for movement along the bed on rails (30), characterized by subsequent to casting and hardening, successively stripping the moulds by means of devices located on a mould-stripping carriage and arranged to withdraw mould holders (15) of respective moulds and to release the cast concrete elements by pressing the mould down against vertically movable mould holder elements (5) swung in beneath the mould, and using after the cast concrete element has been removed one or more additional carriages for successively preparing the mould (16) for subsequent casting operations.

2. A method according to claim 1 characterized by using one additional carriage for cleaning the moulds (16).

3. A method according to claim 2, characterized by using one additional carriage for applying thereto in exact locations inserts such as rubber plates, which are then at least partly cast in the consecutive concrete elements.

4. A method according to claim 1, characterized in that the mould (16) is pressed down with the aid of separate hydraulically actuated downpress rods (13) arranged on the mould-stripping carriage, whereat the vertically movable holder elements (5) are, at the same time, lifted to receive the mould (16) released from the cast elements.

5. A method according to claim 4, in which said mould-stripping carriage is provided with its

own drive means (3) having at least two different speeds, characterized by causing said carriage, during creep driving, to take a correct position relative to the mould (16), and stopping the carriage and fixing it relative to the bed frame structure of the mould (16) by means of devices (10) arranged on said carriage before the mould holders (15) are withdrawn and the mould (16) pressed down.

6. A method according to claim 2, characterized by cleaning the mould of concrete residues by combined blowing and scraping operations with the use of vertically movable scraper devices (78) engaging the inner surfaces of the mould (16) and blow nozzles arranged in the mould (16) for delivering a jet of air at high pressure.

7. A method according to claim 3, in which at least one additional carriage carries inserts, e.g. rubber plates (59), to be mounted in the mould (16), in one or more cassettes (37) provided with an outfeed mechanism, characterized by holding the carriage in an exact location relative to the mould (16) by means of centering means extending downwardly from the mould (16); discharging an insert element present in a cassette (37) to the mould (16); releasing the carriage from the mould (16) and driving it slowly through a given distance, creep driving; again holding the carriage relative to the mould (16) and pressing said discharged insert element to fixed position in the mould (16) and sealing the mould in the region of the insert element.

8. A rail-bound mould-stripping carriage for use when manufacturing consecutive concrete elements, such as concrete sleepers, in an elongate bed of consecutive moulds (16), said carriage including a frame structure (1) provided with rail-bound wheels (2) and a drive motor (3), characterized by means (10) for releasably fixing the carriage in an exact position relative to the mould (16), means (14) for withdrawing mould holders (15) between the moulds (16) and respective bed frame, means (13) for pressing the mould down so as to release the ready-cast and hardened concrete element, and vertically movable holder elements (5) arranged to be swung in under the mould and to receive the mould (16) separated from the concrete element.

9. A carriage according to claim 8, characterized in that the downpressing means include at least four arms (12) arranged to co-act with four down-press rods (13) engaging the corners of the mould, said arms being arranged to co-act with vertically movable yokes (4) which also carry the mould holding means (5) arranged to be swung in under the mould (16).

Patentansprüche

1. Verfahren zur Herstellung aufeinanderfolgender Betonelemente, z.B. Betonschwellen, in einem langen Formbett, mit einer Vielzahl von

gegenseitig benachbarten, in senkrechter Richtung bewegbarer Formen (16) und unter der Verwendung von Wagen, die zur Bewegung längs des Bettes auf Schienen (30) montiert sind, dadurch gekennzeichnet, daß nach dem Gießen und Härten, die Formen nacheinander mittels Vorrichtungen entformt werden, die auf Entform-Wagen angeordnet sind und die dazu ausgebildet sind, die Formhalter (15) der entsprechenden Formen herauszuziehen und die Guß-Betonelemente zu lösen, indem die Formen gegen die senkrecht bewegbaren Formhalter-Elemente (5), die unter die Formen geschwenkt sind, nach unten gepresst werden und daß nachdem das Guß-Betonelement entfernt worden ist, ein oder mehrere zusätzliche Wagen verwendet werden, um sukzessive die Formen (16) für die nachfolgenden Guß-Operationen vorzubereiten.

2. Verfahren gemäß Anspruch 1, dadurch gekennzeichnet, daß ein zusätzlicher Wagen für die Reinigung der Formen (16) verwendet wird.

3. Verfahren gemäß Anspruch 2, dadurch gekennzeichnet, daß ein zusätzlicher Wagen verwendet wird, um an genau bestimmten Stellen Einsätze, wie Gummiplatten dahinein anzubringen, die dann zumindestens teilweise in die aufeinanderfolgenden Betonelemente eingegossen sind.

4. Verfahren gemäß Anspruch 1, dadurch gekennzeichnet, daß die Form (16) mit Hilfe von gesonderten, hydraulisch betätigten Preßstangen (13) nach unten gepreßt wird, die an dem Entform-Wagen angeordnet sind, wobei die senkrecht bewegbaren Halterelemente (5) zur gleichen Zeit gehoben werden, um die Form (16) aufzunehmen, die von den Gußelementen gelöst ist.

5. Verfahren gemäß Anspruch 4, bei welchem der besagte Entform-Wagen mit eigenen Antriebsvorrichtungen (3) ausgerüstet ist, die zumindestens zwei verschiedene Geschwindigkeiten haben, dadurch gekennzeichnet, daß dieser Wagen dazu gebracht wird, während der Kriechfahrt eine korrekte Stellung im Verhältnis zu der Form (16) einzunehmen und daß der Wagen gestoppt und relativ zu dem Bett-Rahmengerüst der Form (16) gehalten wird, durch die Verwendung von Vorrichtungen (10), die auf diesem Wagen angeordnet sind und zwar bevor der Form-Halter (15) zurückgezogen und die Form (16) nach unten gepreßt wird.

6. Verfahren gemäß Anspruch 2, dadurch gekennzeichnet, daß die Form durch kombinierte Blas- und Schabevorgänge von Betonrückständen gereinigt wird, unter der Verwendung einer senkrecht bewegbaren Schabe-Vorrichtung (78), die an der Innenfläche der Form (16) wirkt und Blasdüsen, die in der Form (16) angeordnet sind, um einen Luftstrahl mit hohem Druck zu liefern.

7. Verfahren gemäß Anspruch 3, bei welchem zumindestens ein zusätzlicher Wagen Einsätze trägt, z.B. Gummiplatten (59), zur

Montage in der Form (16) und zwar in einer oder mehreren Cassetten (37), die mit einem Ausbring-Mechanismus versehen sind, dadurch gekennzeichnet, daß der Wagen Mittels Zentriervorrichtungen, die sich von der Form (16) nach unten erstrecken, in einer exakten Stellung relativ zu der Form (16) gehalten werden, daß ein Einsatzelement, das in einer Cassette (37) vorhanden ist, in die Form (16) entladen wird, daß der Wagen von der Form (16) gelöst wird und langsam längs einer bestimmten Entfernung im Kriechgang bewegt wird, daß der Wagen wieder relativ zu der Form (16) gehalten wird und daß dieses entladene Einsatzelement in eine feste Position in die Form (16) gepreßt wird, und daß die Form im Bereich dieses Einsatzelementes abgedichtet wird.

8. Schienengebundener Entform-Wagen zur Verwendung bei der Herstellung von aufeinanderfolgenden Betonelementen, wie Betonschwellen, in einem länglichen Bett von aufeinanderfolgenden Formen (16), wobei dieser Wagen ein Rahmengerüst (1) aufweist und mit schienengebundenen Rädern (2) und einem Antriebsmotor (3) versehen ist, gekennzeichnet durch Mittel (10) zur lösbaren Fixierung des Wagens in einer genauen Stellung im Verhältnis zu der Form (16), Mittel (14) um die Formhalter (15) zwischen den Formen (16) und dem entsprechenden Bettrahmen hinweg zu ziehen, Mittel (13) um die Form nach unten zu pressen, um das fertig gegossene und gehärtete Betonelemente zu lösen und senkrecht bewegbare Halterelemente (5), die angeordnet sind um unter die Form zu schwenken und die Form (16) aufzunehmen, die von dem Betonelement getrennt ist.

9. Verfahren gemäß Anspruch 8, dadurch gekennzeichnet, daß die Mittel zum Nach-Unten-Pressen mindestens vier Arme (12) aufweisen, die so angeordnet sind, daß sie mit vier Preßstangen (13) zusammenwirken, die mit den Ecken der Form in Verbindung stehen, wobei diese Arme so angeordnet sind, daß sie mit senkrecht bewegbaren Jochen (4) zusammenwirken, die auch die Formhaltermittel (5) tragen, die dazu eingerichtet sind, unter die Form (16) geschwenkt zu werden.

Revendications

1. Un procédé de fabrication d'éléments en béton consécutifs, par exemple de traverses ou poutres en béton, dans un lit de moules de grande longueur, comprenant plusieurs moules (16) mutuellement adjacents, mobiles dans la direction verticale, à l'aide de chariots agencés pour se déplacer le long du lit sur des rails (30), caractérisé en ce que, après le moulage et le durcissement, on démoule successivement les moules au moyen de dispositifs placés sur un chariot de démoulage et agencés pour retirer des supports de moules (15) de leurs moules respectifs et pour libérer les éléments en béton

moulés en repoussant le moule vers le bas contre des éléments (5) de supports de moules mobiles dans la direction verticale, amenés par pivotement au-dessous du moule, et on utilise, après le démoulage de l'élément en béton moulé, un ou plusieurs chariot(s) additionnel(s) pour préparer ensuite le moule (16) pour des opérations de moulage consécutives.

2. Un procédé selon la revendication 1, caractérisé en ce qu'on utilise un chariot additionnel pour nettoyer les moules (16).

3. Un procédé selon la revendication 2, caractérisé en ce qu'on utilise un chariot additionnel pour y déposer dans des positions exactes des éléments insérés tels que des plaques de caoutchouc, qui sont ensuite au moins partiellement noyées dans les éléments de béton consécutifs.

4. Un procédé selon la revendication 1, caractérisé en ce que le moule (16) est repoussé vers le bas à l'aide de barres presseuses séparés (13) actionnées hydrauliquement, agencées sur le chariot de démoulage, les éléments de supports (5) mobiles dans la direction verticale étant en même temps soulevés pour recevoir le moule (16) dégagé des éléments moulés.

5. Un procédé selon la revendication 4, dans lequel ledit chariot de démoulage est équipé de ses propres moyens d'entraînement (3) possédant au moins deux vitesses différentes, caractérisé en ce qu'on amène le chariot, pendant la marche lente, à prendre une position correcte par rapport aux moules (16) et on arrête le chariot et on le fixe par rapport à la structure de châssis du lit du moule (16) au moyen de dispositifs (16) agencés sur le chariot avant que les supports de moules (15) ne soient retirés et que le moule (16) ne soit repoussé vers le bas.

6. Un procédé selon la revendication 2, caractérisé en ce qu'on nettoie le moule des résidus de béton par des opérations combinées de soufflage et de raclage, à l'aide de dispositifs racleurs (78) mobiles dans la direction verticale, qui attaquent les surfaces internes du moule (16), et de buses de soufflage agencées dans le moule (16) pour débiter un jet d'air sous haute pression.

7. Un procédé selon la revendication 3, dans lequel au moins un chariot additionnel porte des éléments insérés, par exemple des plaques en caoutchouc (59), qui doivent être montées dans le moule (16), dans une ou plusieurs cassette(s) (37) munie(s) d'un mécanisme d'éjection, caractérisé en ce qu'on maintient le chariot dans une position exacte par rapport au moule (16) à l'aide de moyens de centrage qui s'étendent vers le bas à partir du moule (16), on décharge un élément inséré présent dans une cassette (37) dans le moule (16), on libère le chariot du moule (16) et on le fait avancer lentement sur une distance donnée, en marche lente; on maintient à nouveau le chariot par rapport au moule (16) et on presse ledit élément inséré déchargé

en position fixe dans le moule (16) et on ferme le moule dans la région de l'élément inséré.

8. Un chariot de démoulage monté sur rails, destiné à être utilisé dans la fabrication d'éléments en béton consécutifs, tels que des traverses en béton dans un lit allongé de moules consécutifs (16), ledit chariot comprenant une structure de châssis (1) équipés de roues (2) roulant sur des rails, et un moteur d'entraînement (3), caractérisé par des moyens (10) servant à bloquer le chariot de façon libérable en position exacte par rapport aux moules (16), des moyens (14) servant à retirer les supports de moules (15) entre les moules (16) et le châssis de lit correspondant, des moyens (13), servant à repousser le moule vers le bas de manière à dégager l'élément en béton, prêt,

moulé et durci, et des éléments de supports (5) mobiles dans la direction verticale, agencés pour être amenés sous le moule par pivotement et pour recevoir le moule (16) séparé de l'élément en béton.

9. Un chariot selon la revendication 8, caractérisé en ce que les moyens de pression vers le bas comprennent au moins quatre bras (12) agencés pour coopérer avec quatre barres (13) de pression vers le bas, qui attaquent les coins du moule, lesdits bras étant agencés pour coopérer avec des bâtis (4) mobiles dans la direction verticale, qui portent également les moyens de support de moules (5) agencés pour être amenés par pivotement au-dessous du moule (16).

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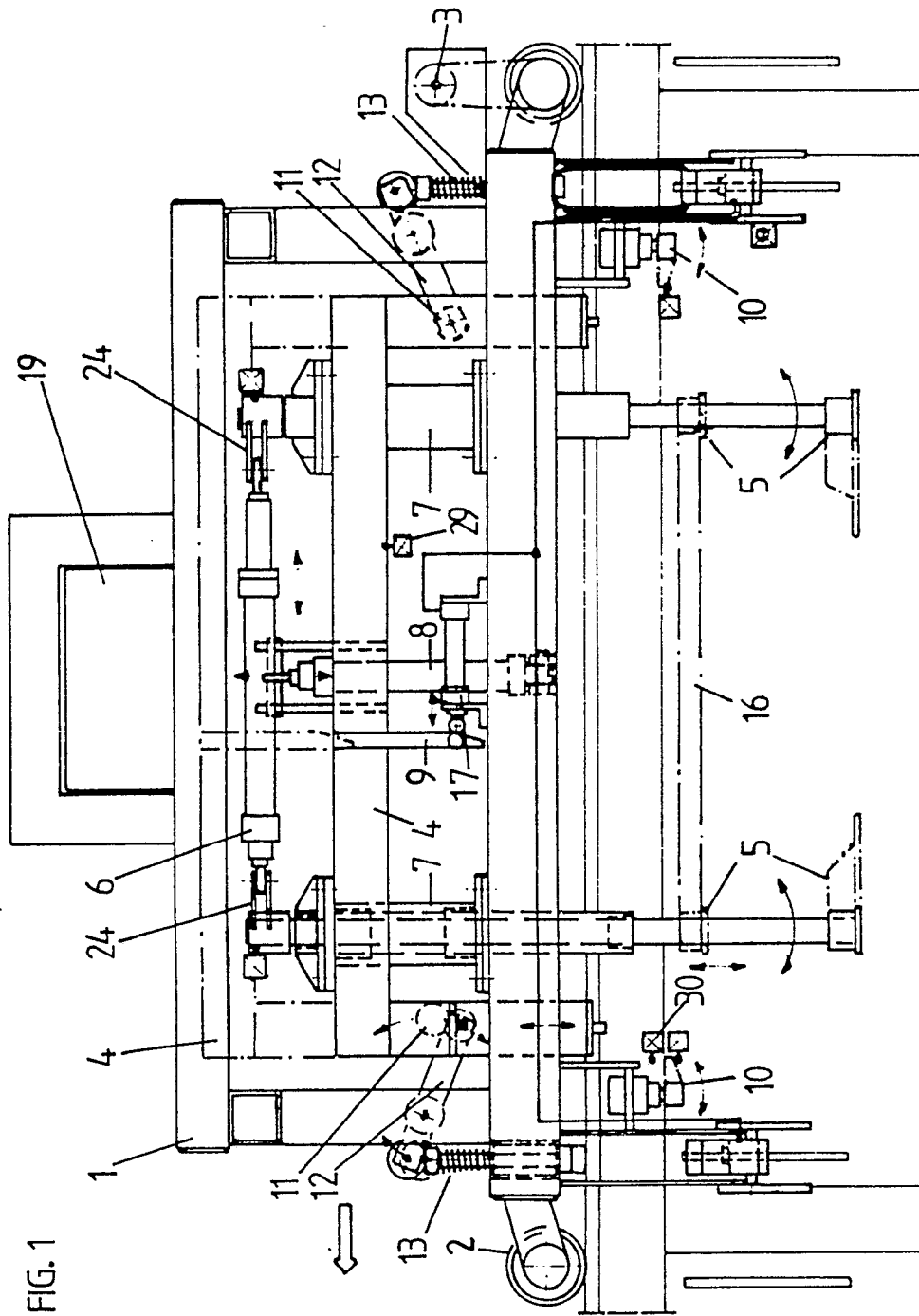
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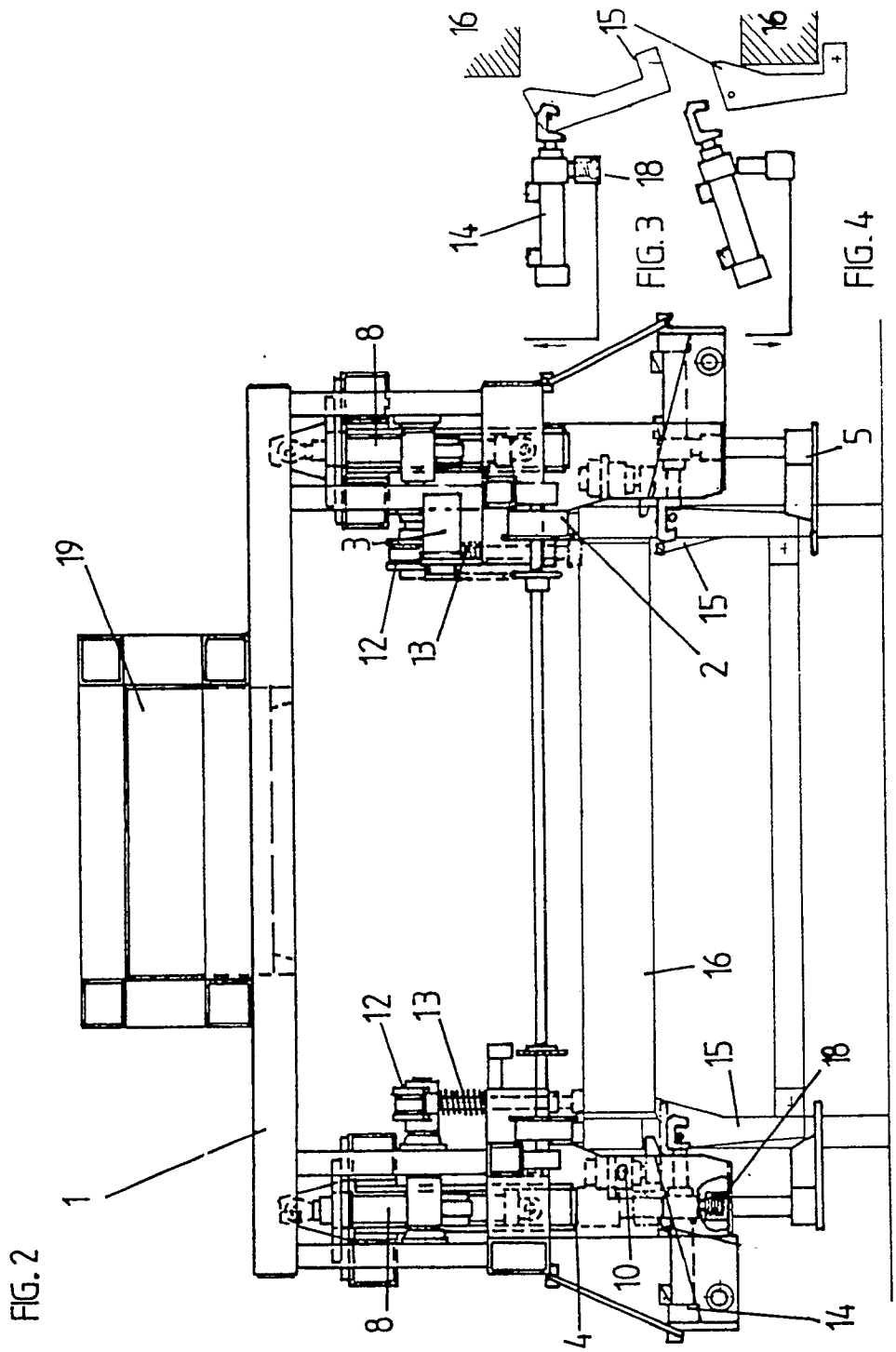
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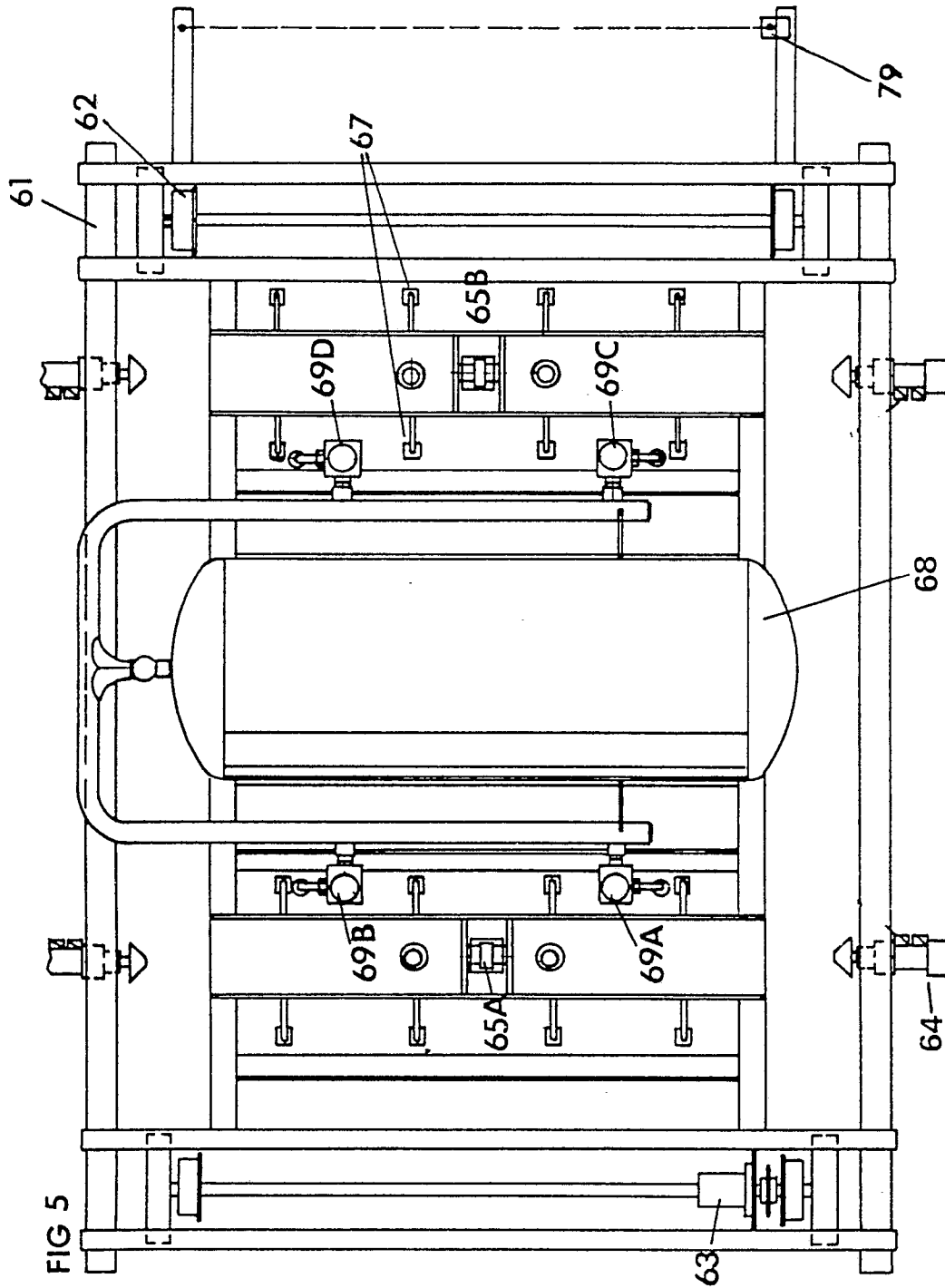
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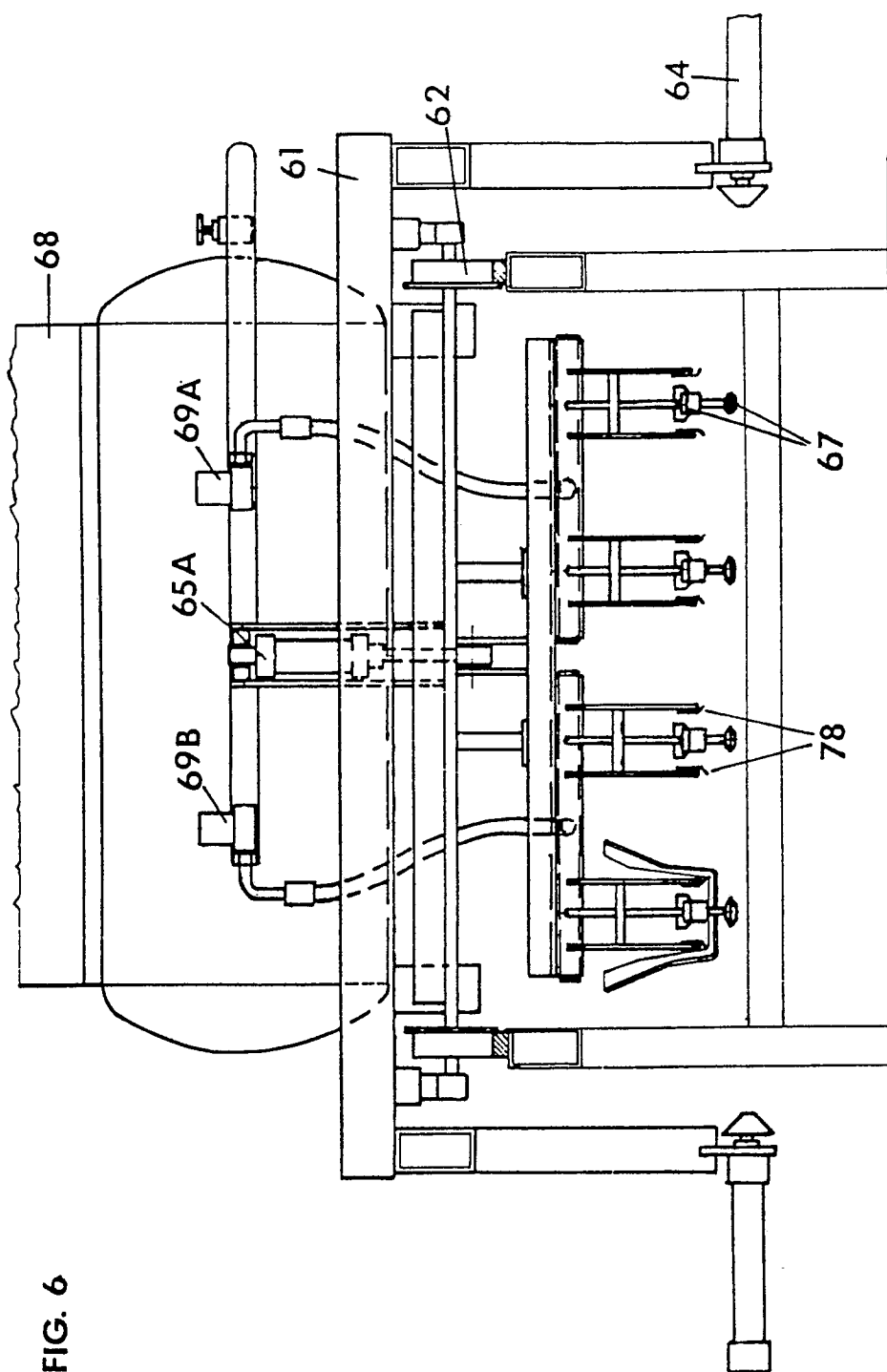


FIG. 6

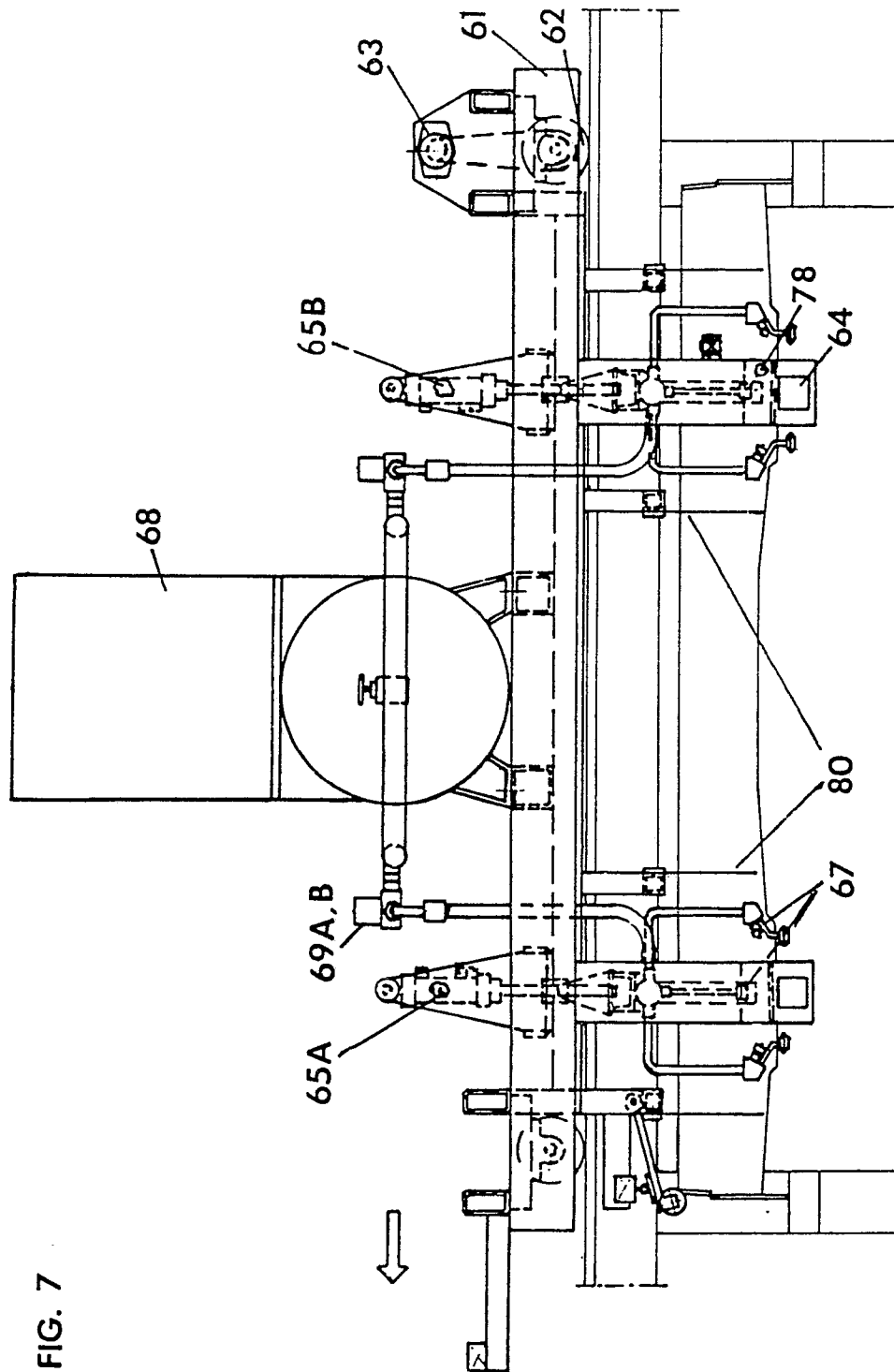
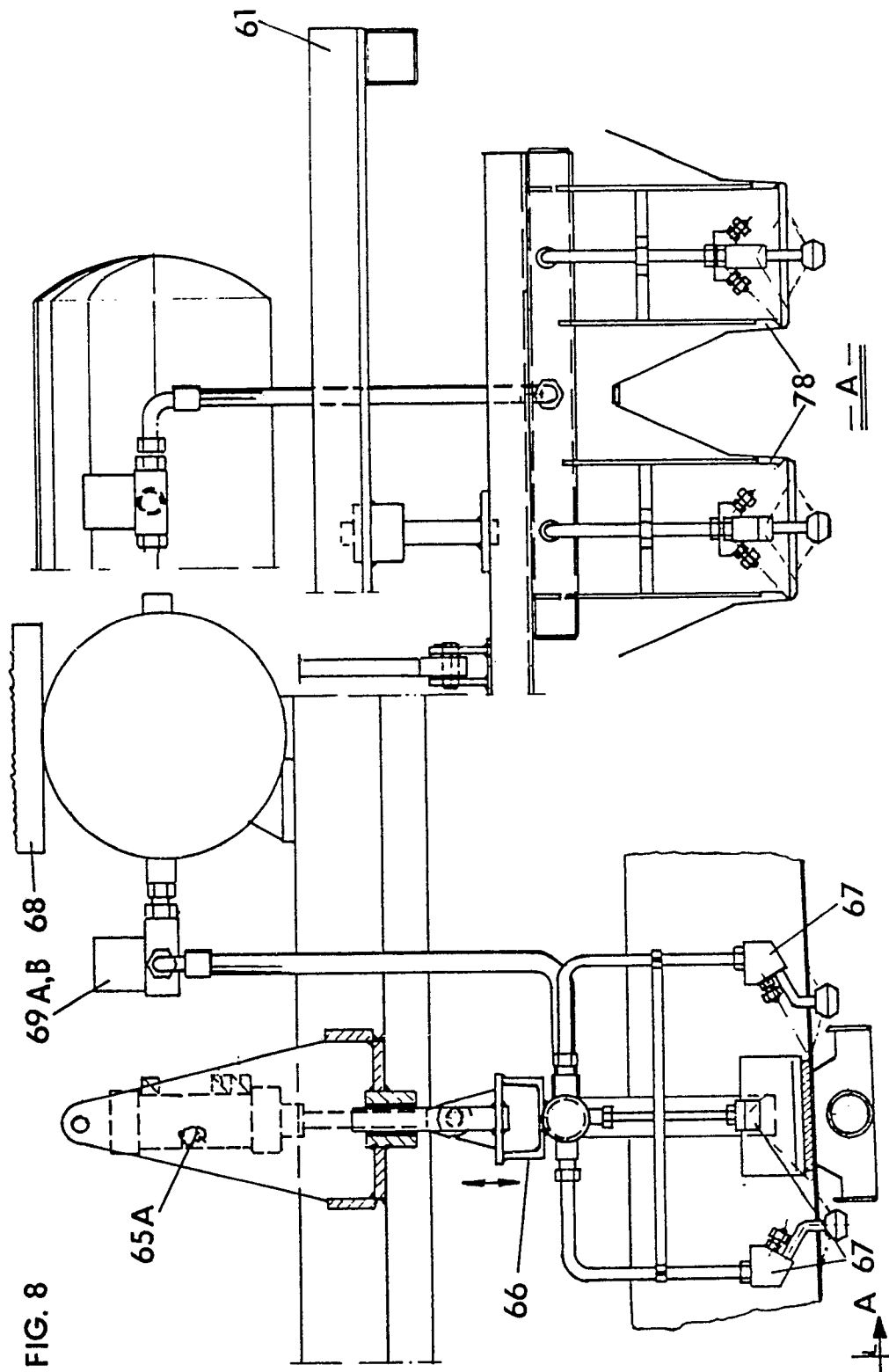
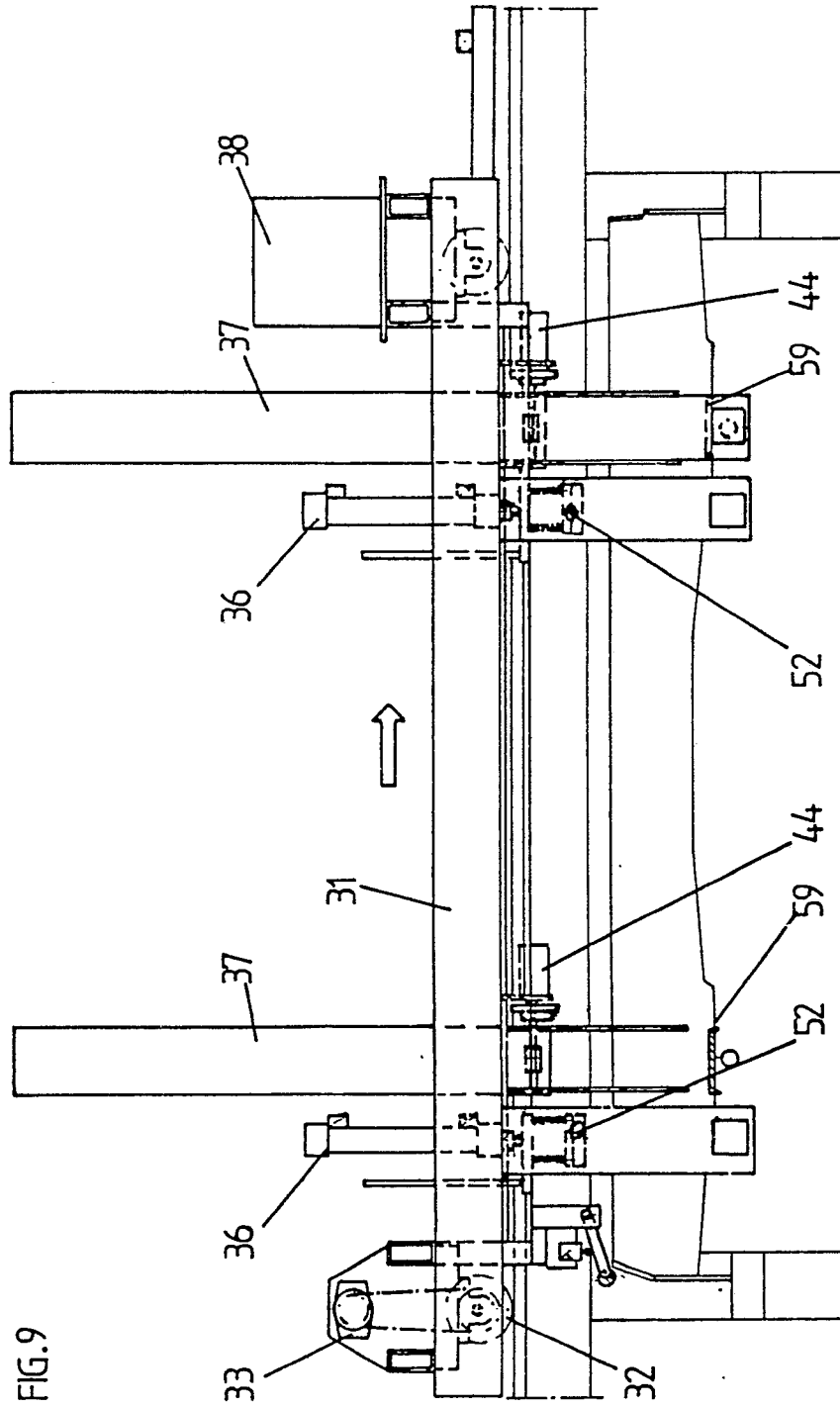
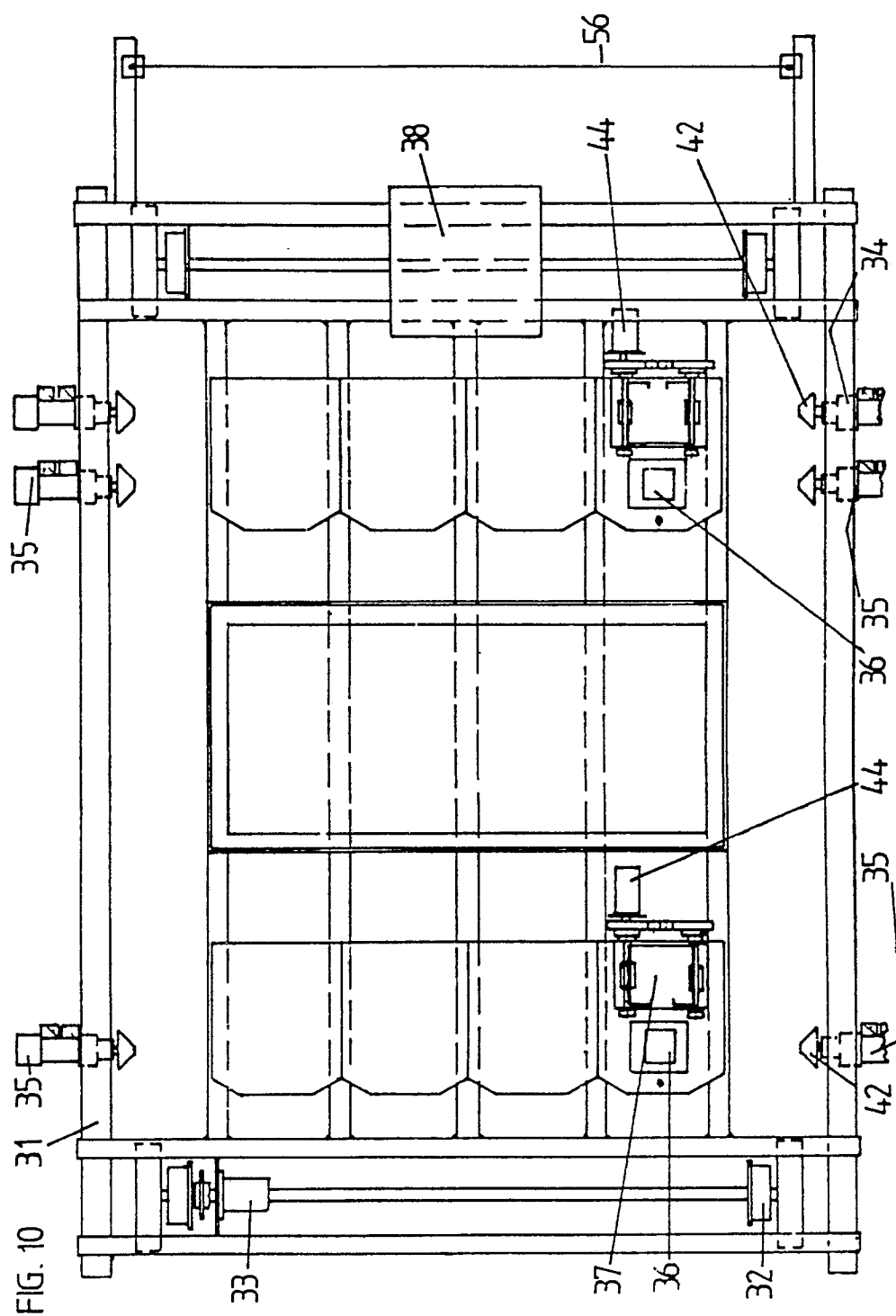


FIG. 7







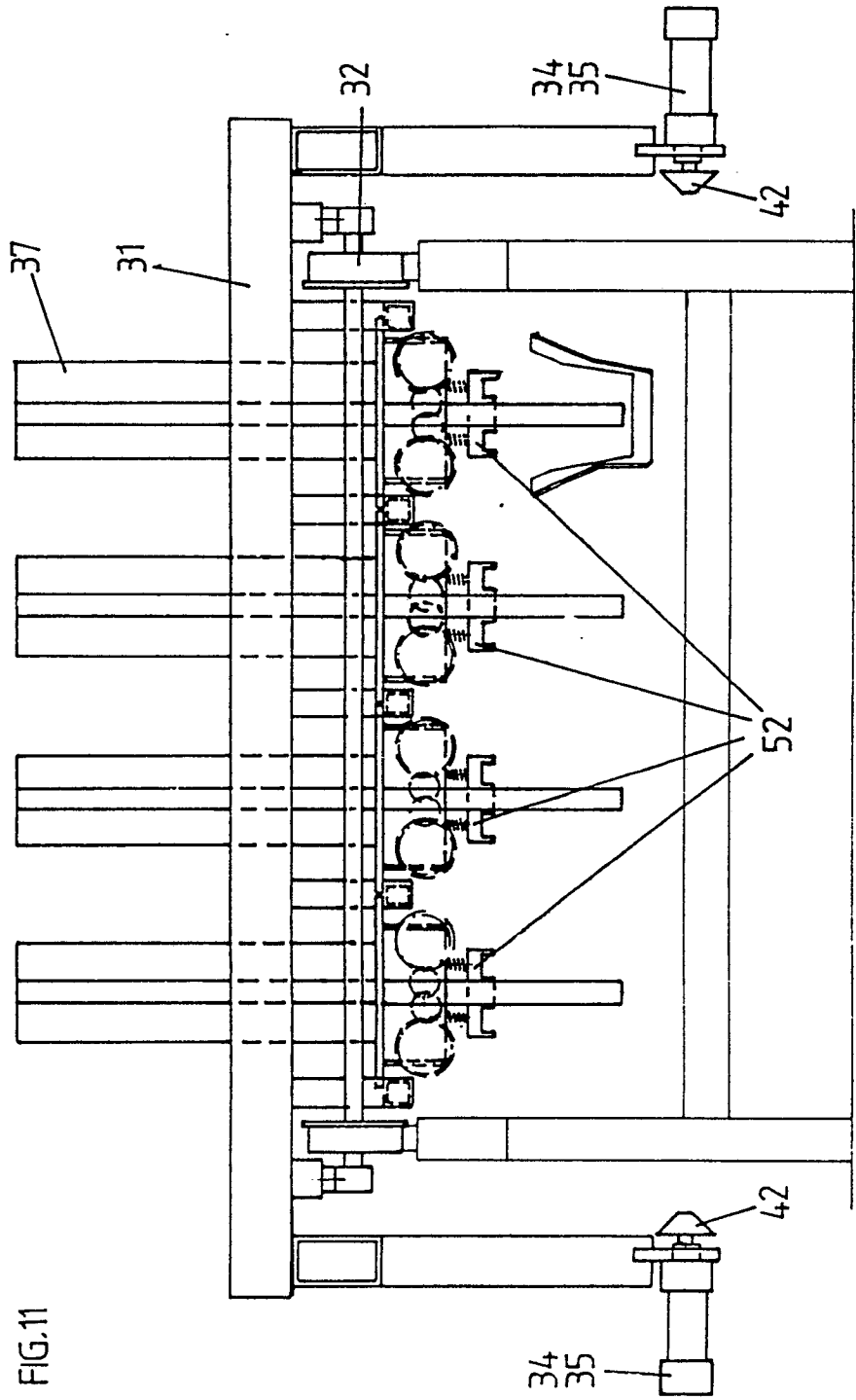


FIG.11

FIG.12

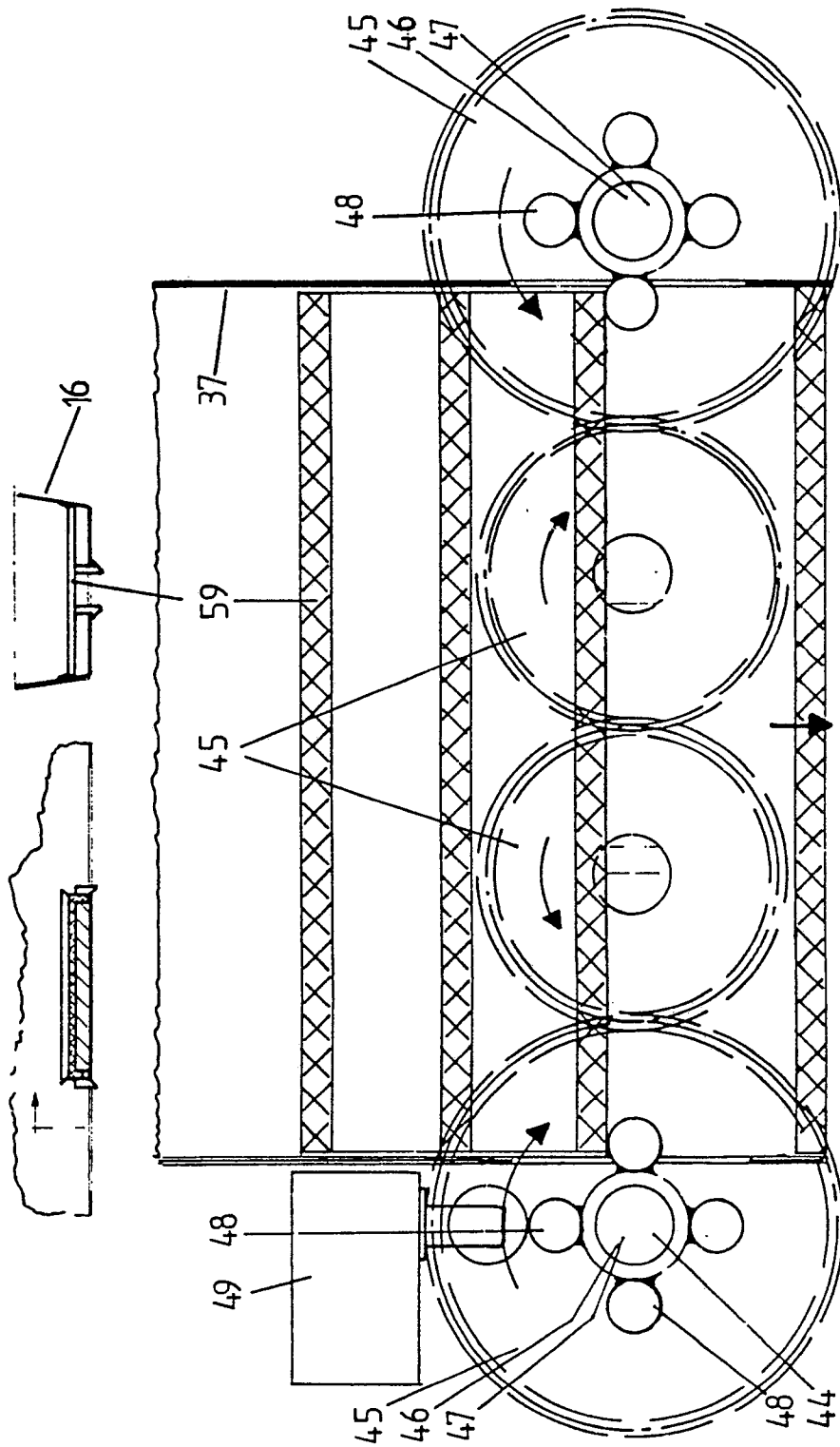


FIG. 13

