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**Process and apparatus for the preparation of mortars.**

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## Description

The invention relates to a process and apparatus for the preparation of mortars.

FR—A—2 357 400 discloses a process for the preparation of mortar, using a mobile silo for aggregate and binder, which are contained in separate compartments within the silo, wherein the volumetric flows of aggregate and binder are mutually adjusted, whereupon the aggregate and the binder are mixed together with the addition of water.

said silo consists of a body with several separate compartments. In the transport mode storage capacity extending bays are stored in the compartments, whose storage capacity they extend in the operational mode. The compartments are empty (but for said bays), while the silo is in transport mode. Before use at the building site the bays must be inverted and the compartments filled.

The silo and operation platform/towing unit form an intricate and expensive system, that is inseparable.

The object of the present invention is to provide an improved process of the type described hereinbefore. To this end the process is designed in such a way that, while the silo is located in a storage yard or in a storage space for aggregate and binder, the containers of the silo are filled, the silo is then conveyed to the building site, where the volumetric flows of aggregate and binder are adjusted, whereupon aggregate and binder are mixed together with water, yielding the mortar ready for use at the building site.

A further object of the present invention is to provide an apparatus for the preparation of mortar according to the process mentioned above, comprising a silo, which is provided at the bottom with a funnel shaped section and which has been mounted on an undercarriage, such that the silo can stand upright, wherein the silo has at least one partition for the separate storage of aggregate and binder in individual compartments, each compartment having one outlet, the outlets leading to a mixer in a mixing chamber, as is known from FR—A—2 357 400. According to the invention, the outlet for the aggregate is provided with a conveyor screw, the axle of which also forms the axle of the mixer in the mixing chamber, whilst the outlet of the binder compartment is provided with another conveyor screw, in such a way that the two conveyor screws discharge into the mixing chamber and that the speeds of the conveyor screws for the binder and for the aggregate are adjustable relative to one another.

The process with associated apparatus has the following advantages:

- the silo does not have to be "rebuilt" at the site of the operation;
- the silo requires no filling at the site of the operation, since this is done at the storage yard;
- the silo can be transported, while partially or completely filled;
- therefore the silo does not have to be

cleaned out completely, before being reverted to transport mode again;

— as the silo is equipped with fittings and accessories that facilitate loading, transport and unloading of the apparatus on or from container-transporting trucks, the silo can easily be loaded on a truck and transported as a container;

— the silo is an independent unit that only needs water and electricity;

— the apparatus is relatively simple and inexpensive, and can therefore remain at the site of operation for a longer period, and even be left idle.

Further advantages are:

— The aggregate need not be predried.

— The composition of the mix is not attained by weighing, which obviates the use of fairly expensive weighing equipment.

— At the building site the quantities of mortar needed for immediate use can at all times be mixed.

— The volumetric flows can be mutually adjusted by very simple means, and the set value can be maintained effectively.

— There is no need for dosing auxiliary substances such as retarder and air-entraining agents, hence no risk of adding too large doses of retarder and air-entraining agents.

The mixing chamber may be provided with a metering valve for water discharging into it. In addition, the outlet for the aggregate may be provided with a mechanically operated slide, safeguarded against freezing fast by heating, with a further heating element mounted high up in the silo compartment for the aggregate, so that in the event of slight night frost jamming of the slide and clogging together of the aggregate can quickly be undone through heating.

Moreover, in order to prevent any arching in the binder, the shaft of the conveyor screw for the binder has been provided with a cam against which a plunger rod rests; this rod terminates in the binder compartment and carries transverse projections.

It is noticed that US—A—4 298 288 describes an apparatus for the preparation of special mortars for swimming pools, that consists mainly out of drive and mixing units, and has a limited load capacity. The possibility of refilling at the building site is explicitly indicated. The apparatus constitutes a complete mortel factory, located on a trailer for mobility.

The apparatus according to the invention can be loaded and transported on and unloaded from a truck. It is filled in a storage yard and can be used completely independent of its means of transport. The drive and mixing units form a minor part, as the storage spaces forms the major part of the apparatus. It is especially intended for refilling only at the storage yard.

To elucidate the invention, an embodiment will be described by way of example, with reference to the attached drawings, where:

Figure 1 shows a top view of a silo;

Figure 2 shows a front view of the silo;

Figure 3 shows a lateral view of the silo;

Figure 4 presents a detailed view of two conveyor screws and a mixing chamber, drawn to a larger scale than in Figure 3;

Figure 5 presents a detailed top view, also drawn to a larger scale, of the conveyor screw for the aggregate and the mixing chamber following the section at III—III in Figure 3; and

Figure 6 is a lateral view of the mixing chamber.

The apparatus comprises a silo 1 with a funnel-shaped section 2 which is provided with an undercarriage 3. The silo is divided by means of a partition 4 into the compartments 5 and 6. Compartment 5 has a filling hole 7 for the aggregate and compartment 6 a filling hole 8 for the binder. At the bottom of the funnel-shaped section 2 there is a conveyor screw 9 with a mixing chamber 10, the said conveyor screw 9 being driven by an electric motor 11 at a constant speed of rotation. At the bottom of compartment 6 a second screw 12 is mounted which communicates through a transfer line 13 with the mixing chamber 10. The conveyor screw 12 is driven by an electric motor 14 with an infinitely variable speed regulator. The mixing chamber 10 is provided with a branch 15 which has a metering valve for the supply of water.

Mortar of the desired composition is prepared in the following way. From compartment 5, aggregate passes onto the conveyor screw 9 which transports the aggregate at a constant speed to the mixing chamber 10. At the same time, the binder is led from compartment 6 to the second conveyor screw 12 which transports the binder also to the mixing chamber 10 through line 13. The conveying speed of the conveyor screw 12 can be selected at will with the aid of the infinitely variable speed regulator of the electric motor 14. The magnitude of the adjusted speed at which the second conveyor screw 12 is driven should be determined experimentally in such a fashion that the desired mixing ratio of aggregate to binder for the jointing or concrete mortar is obtained. The speed of the conveyor screw 9 and the mixer in mixing chamber 10, however, remains constant at all times.

Mortar can be prepared in the way outlined above by a continuous process. Dosing of the aggregate and the binder can be effected without valves. In consequence, the two conveyor screws 9 and 12 fulfil the dual function of dosing and conveying.

The outlet at the bottom of the aggregate compartment can be closed with a slide 20 in order to permit the mixing chamber to be emptied. After slide 20 has been closed and the supply of binder stopped, the mixing chamber 10 is emptied and flushed clean with water.

To permit operation of slide 20 in frosty weather, an electric heating cable has been mounted near the supporting edge of the slide. In addition, a heating element 21 is provided high up in the aggregate compartment so as to eliminate or prevent any clogging together of the aggregate.

Arching in the binder compartment is obviated by the provision of a plunger rod 16 with transverse projections 17 moving up and down in the said compartment. Up and down movement of the rod 16 is brought about by means of cam 18.

#### Claims

1. Process for the preparation of mortar, using a mobile silo (1) for aggregate and binder, which are contained in separate compartments (5, 6) within the silo (1), wherein the volumetric flows of aggregate and binder are mutually adjusted, whereupon the aggregate and the binder are mixed together with the addition of water, characterised in that, while the silo (1) is located in a storage yard or in a storage space for aggregate and binder, the containers (5, 6) of the silo (1) are filled, the silo (1) is then conveyed to the building site, where the volumetric flows of aggregate and binder are adjusted, whereupon aggregate and binder are mixed together with water, yielding the mortar ready for use at the building site.

2. Apparatus for the preparation of mortar according to the process mentioned above, comprising a silo (1); which is provided at the bottom with a funnel shaped section (2) and which has been mounted on an undercarriage (3), such that the silo (1) can stand upright, wherein the silo has at least one partition (4) for the separate storage of aggregate and binder in individual compartments (5, 6), each compartment having one outlet, the outlets leading to a mixer in a mixing chamber (10), characterised in that the outlet for the aggregate is provided with a conveyor screw (9), the axle of which also forms the axle of the mixer in the mixing chamber (10), whilst the outlet of the binder compartment is provided with another conveyor screw (12), in such a way that the two conveyor screws (9, 12) discharge into the mixing chamber (10) and that the speeds of the conveyor screws (9, 12) for the binder and for the aggregate are adjustable relative to one another.

3. Apparatus according to claim 2, characterised by fittings and accessories that facilitate loading, transport and unloading of the apparatus on or from container-transporting trucks.

#### Patentansprüche

1. Verfahren zur Herstellung von Mörtel unter Verwendung eines mobilen Silos für Zuschlagstoff und Bindemittel, die in voneinander getrennten Abteilen (5, 6) innerhalb des Silos (1) enthalten sind, bei welchem der mengenmässige Abgabedurchsatz von Zuschlagstoff und Bindemittel gegenseitig eingestellt wird, worauf Zuschlagstoff und Bindemittel unter Zugabe von Wasser vermischt werden, dadurch gekennzeichnet, dass die Behälter (5, 6) des Silos bei auf einem Lagerplatz oder einem Lagerraum für Zuschlagstoff und Bindemittel abgestellten Silo gefüllt werden, dass Silo (1) dann an die Baustelle gebracht wird, wo der mengenmässige Abgabedurchsatz von Zuschlagstoff und Bindemittel ein-

gestellt wird, und worauf unter Herstellung des an der Baustelle verwendungsfertigen Mörtels Zuschlagstoff und Bindemittel unter Zugabe von Wasser miteinander vermischt werden.

2. Vorrichtung zur Herstellung von Mörtel nach dem vorstehenden Verfahren, mit einem Silo (1), das an seinem Boden mit einem trichterartigen Teil (2) ausgebildet ist, und welche auf einem Untergestell (3) montiert ist, sodass das Silo aufrecht steht, wobei das Silo wenigstens eine Zwischenwand (4) für die voneinander getrennte Anordnung von Zuschlagstoff und Bindemittel in gesonderten Abteilen (5, 6) aufweist, wobei jedes einzelne Abteil eine Austrittsöffnung umfasst, welche Austrittsöffnungen zu einem in einer Mischkammer (10) befindlichen Mischer führen, dadurch gekennzeichnet, dass der Auslass für den Zuschlagstoff mit einer Förderschnecke (9), deren Achse gleichzeitig auch die Achse des Mixers in der Mischkammer (10) bildet, versehen ist, während der Auslass der Bindemittelkammer mit einer weiteren Förderschnecke (12) versehen ist, derart, dass die beiden Förderschnecken (9, 12) in die Mischkammer (10) fördern, und dass die Fördergeschwindigkeit der Förderschnecken (9, 12) für das Bindemittel und den Zuschlagstoff relativ zueinander einstellbar sind.

3. Vorrichtung nach Anspruch 2, gekennzeichnet durch Montage- und Zubehörteile zur Erleichterung des Beladens, des Transportes und des Entladens eines bzw. mit einem bzw. von einem Lastkraftwagen für den Containertransport mit der Vorrichtung.

#### Revendications

1. Procédé pour la préparation de mortier utilisant un silo mobile (1) pour l'agrégat et le liant, lesquels sont contenus dans des compartiments séparés (5, 6) à l'intérieur du silo (1), dans lequel les débits volumétriques de l'agrégat et du liant

sont ajustés mutuellement, après quoi l'agrégat et le liant sont mélangés ensemble avec addition d'eau, ledit procédé étant caractérisé en ce que pendant que le silo (1) est disposé dans un dépôt de stockage ou dans un lieu d'emmagasinage de l'agrégat et du liant, les réservoirs ou compartiments (5, 6) du silo (1) sont remplis, le silo (1) étant ensuite transporté vers le site de construction où les débits volumétriques de l'agrégat et du liant sont ajustés, après quoi ledit agrégat et ledit liant sont mélangés l'un à l'autre avec de l'eau, produisant le mortier prêt à l'emploi sur le site de construction.

2. Appareil pour la préparation de mortier selon le procédé de la revendication 1, comprenant un silo (1) qui est prévu vers sa base avec une section formée en entonnoir (2) et qui est monté sur un bâti (3) de telle sorte que le silo (1) puisse être maintenu verticalement, ledit silo comportant au moins une paroi de séparation (4) pour le stockage séparé de l'agrégat et du liant dans des compartiments individuels (5, 6), chaque compartiment ayant une sortie, les sorties débouchant sur un mélangeur dans une chambre de mélange (10), ledit appareil étant caractérisé en ce que la sortie de l'agrégat est prévue avec un convoyeur de type à vis (9) dont l'axe constitue également l'axe du mélangeur dans la chambre de mélange (10), tandis que la sortie du compartiment récepteur du liant est prévue avec un autre convoyeur à vis (12), de telle sorte que les deux convoyeurs à vis (9, 12) déchargent dans la chambre de mélange (10) et que les vitesses des convoyeurs à vis (9, 12) destinés au liant et à l'agrégat soient ajustables l'une par rapport à l'autre.

3. Appareil selon la revendication 2, caractérisé en ce qu'il comporte des équipements et accessoires qui facilitent le chargement, le transport, et le déchargement de l'appareil sur ou du camion transporteur-réservoir.

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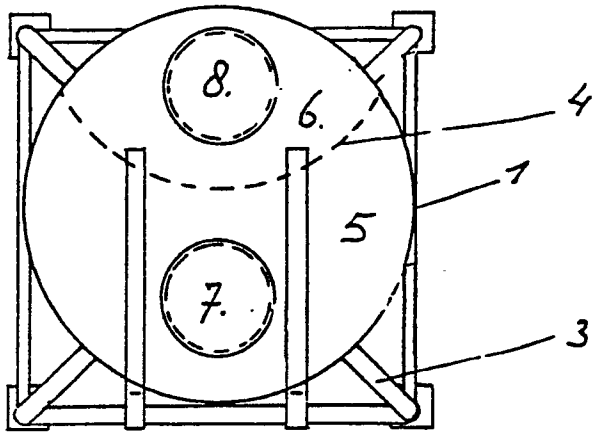


FIG. 1.

FIG. 2.

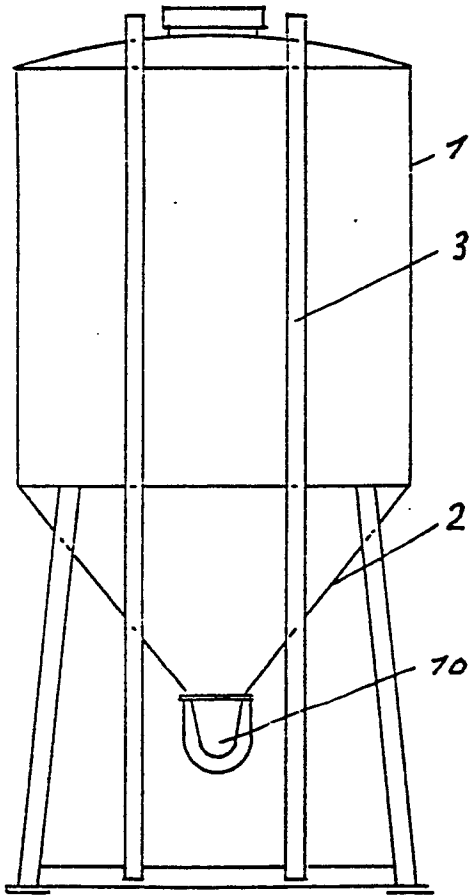
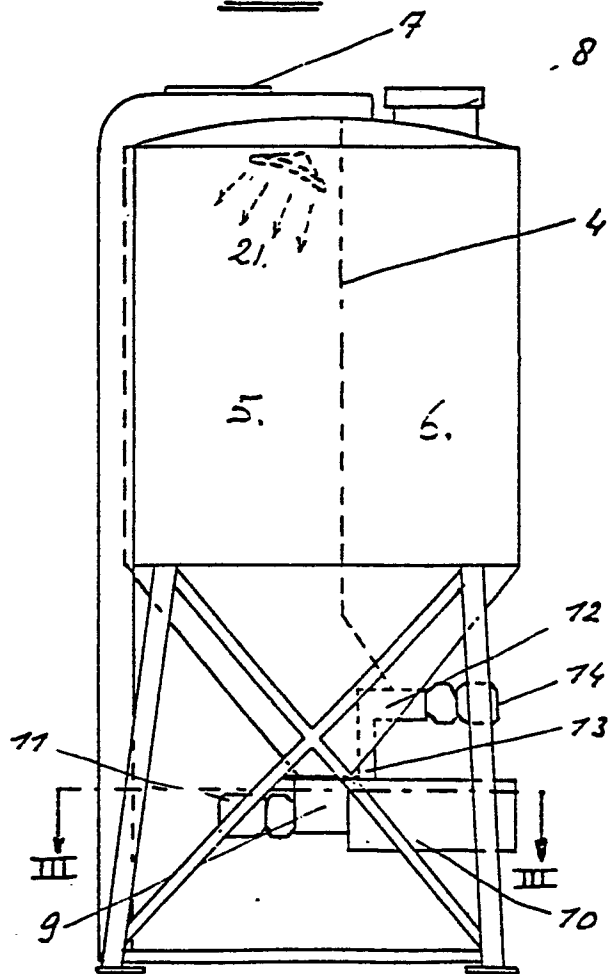


FIG. 3.



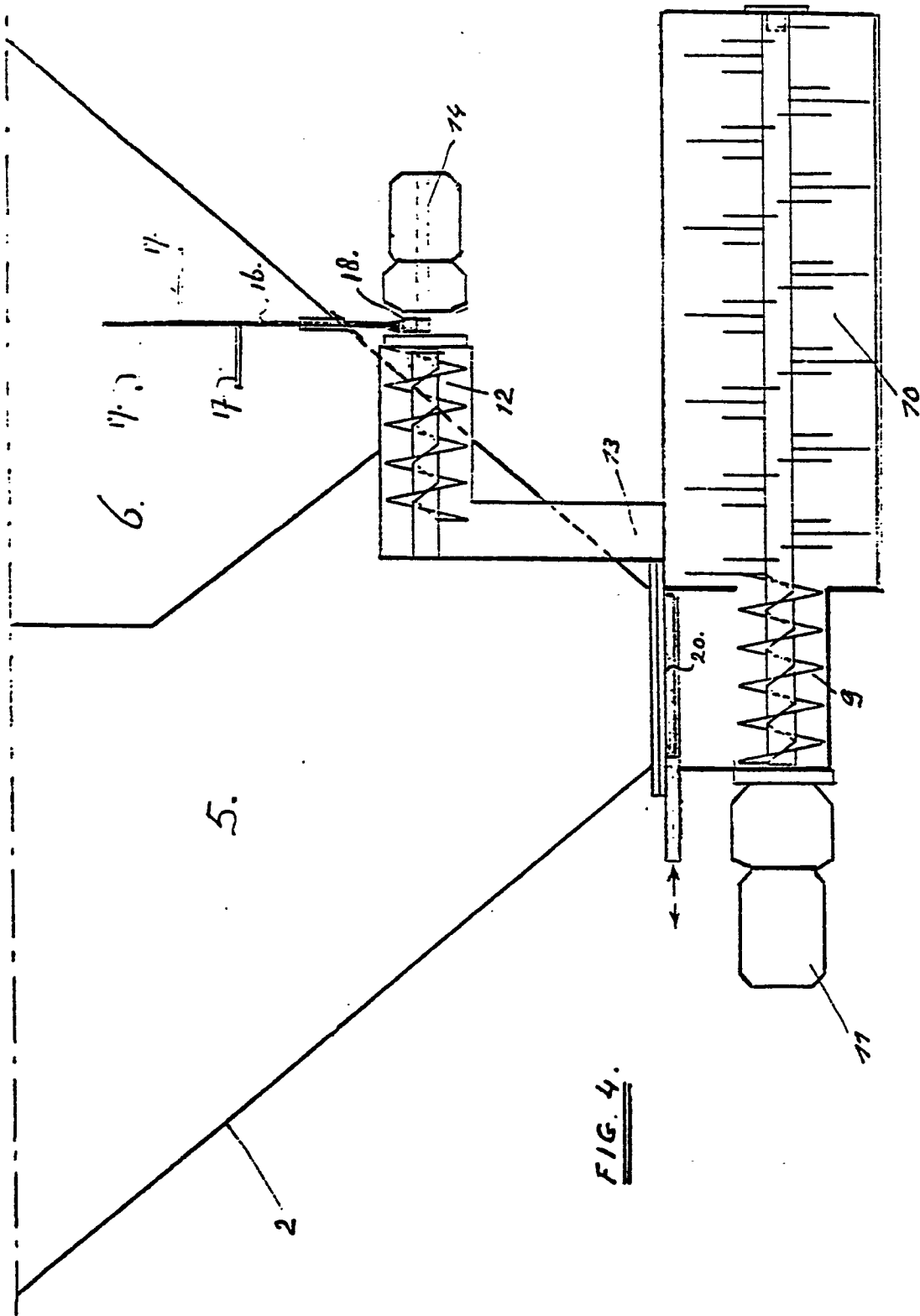


FIG. 4.

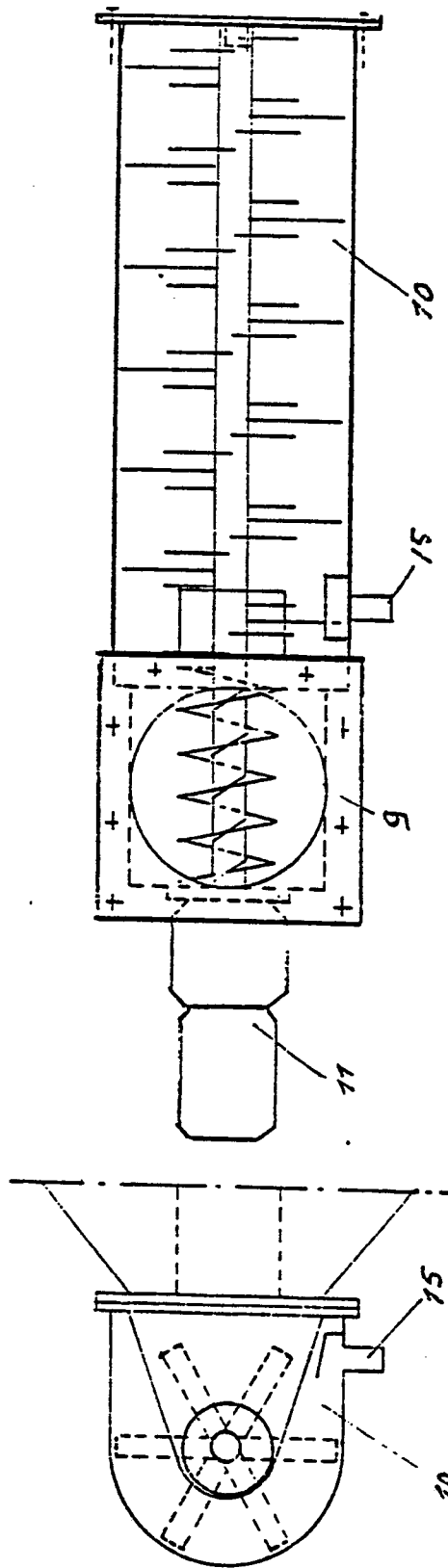


FIG. 5.

FIG. 6.