United States Patent

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[72] Inventor **Dieter Keck**
Laggenbeck, Germany

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[73] Assignee **C. Keller & Co.**
Laggenbeck, Germany

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[33] **Germany**
[31] **P 19 24 516.0**

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[54] **APPARATUS FOR SETTING GREEN BRICKS IN GAPPED ROWS**
7 Claims, 2 Drawing Figs.

[52] **U.S. Cl.** **214/89,** 198/34, 198/106, 198/135
[51] **Int. Cl.** **B66b 17/00**
[50] **Field of Search** ..... 214/89, 147 G; 198/34, 221, 224, 24, 106, 135

[56] **References Cited**
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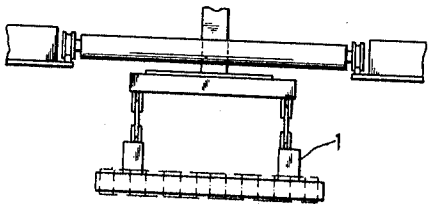
Primary Examiner—Albert J. Makay
Attorney—Kelman and Berman

ABSTRACT: Green molded bricks released from a molding machine are set by a gripper hoist on a slotted platform in continuous columns longitudinal of the slots. Pusher arms pivotally mounted on a carriage under the platform project from the slots and push the columns of molded bricks to a continuous conveyor which travels away from the platform in the direction of slot elongation. The carriage position is sensed by a control cam and switches which operate the drives of the carriage and of the conveyor to produce gaps in the columns of bricks pushed onto the conveyor by the arms. The gapped columns of bricks are transferred by another gripper hoist to a kiln car for firing.



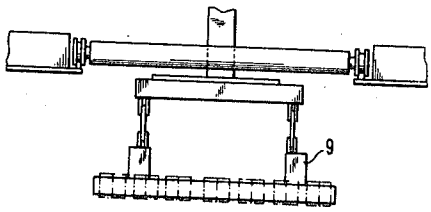


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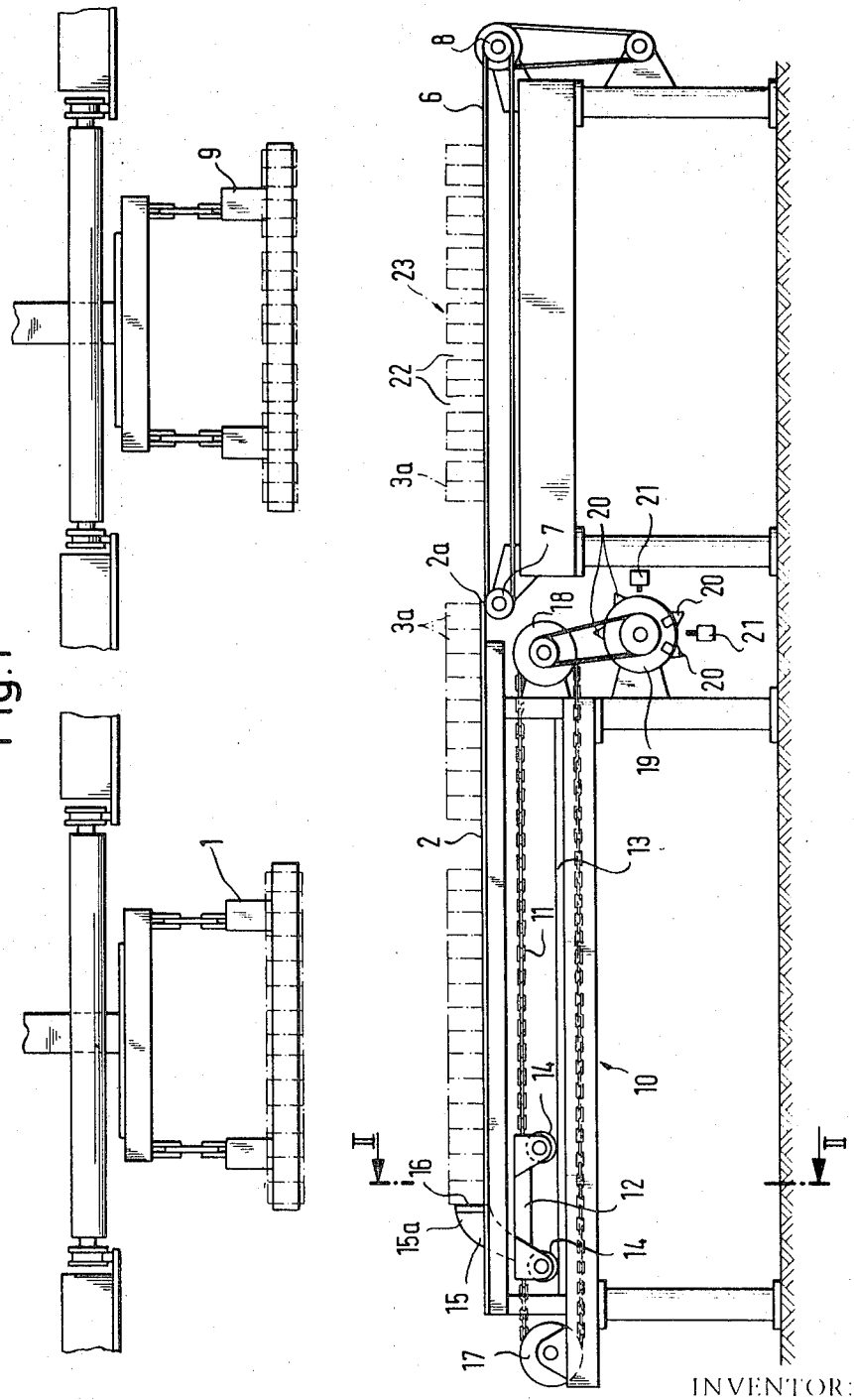
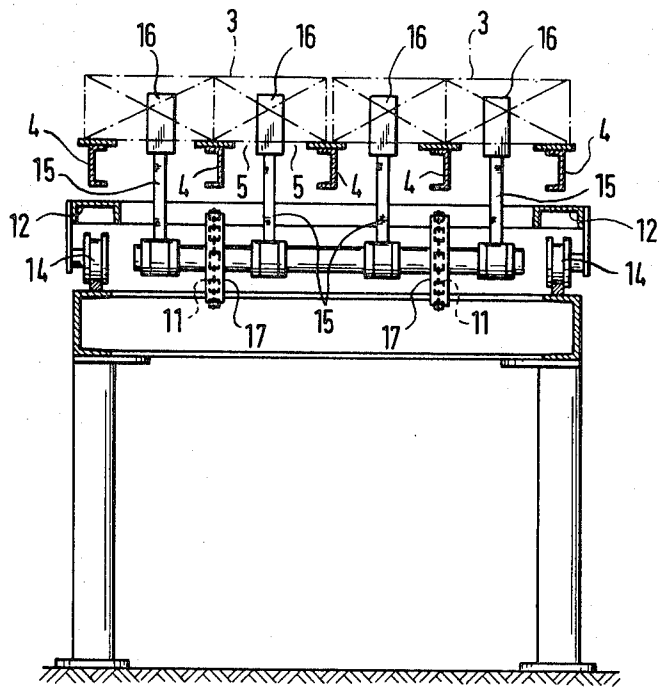
Fig.1



INVENTOR:
Dieter Keck
BY: Kilman and Berman
AGENTS

Fig. 2



INVENTOR:
Dieter Keck
BY: Kelman and Berman
AGENTS

APPARATUS FOR SETTING GREEN BRICKS IN GAPPED ROWS

This invention relates to the setting up of green molded bricks or similar objects in gapped columns, and particularly to apparatus for setting up such objects of substantially uniform dimensions in a plurality of gapped alignedly juxtaposed columns.

Green bricks are normally received from automatic molding machinery in continuous columns. Yet, during subsequent firing in a kiln, the bricks need to be spaced sufficiently to give reasonably uniform access to the heat of the kiln, and setting-up devices are employed for converting the continuous columns of molded bricks to juxtaposed gapped columns which may then be transferred to kiln cars without disturbing their spatial relationship. The known setting-up devices are not capable of maintaining the desired alignment of the bricks under unfavorable operating conditions.

The shortcomings of the known devices are due, in part, to insufficient control over the movement of individual bricks. Some of the known devices rely on friction for moving the bricks during setting-up, and the results achieved vary with the shape of the bricks or with the position of a brick in a batch. Setting-up devices which rely on friction for moving the bricks are least effective with bricks that are very narrow. Yet, highest numerical capacity is expected from setting-up devices when operating on such bricks.

A primary object of the invention is the provision of setting-up apparatus for green molded brick which forms precisely aligned, uniformly gapped columns from bricks received in continuous columns without intervention of a human operator.

With this object and others in view, as will hereinafter become apparent, the invention provides a stationary platform formed with a plurality of spacedly juxtaposed slots extending in a common direction. A horizontally extending continuous conveyor is contiguously adjacent the platform in the direction of slot elongation. A first gripper hoist sets the bricks on the platform in continuous columns extending in the direction of the slots. A carriage is mounted under the platform and is equipped with a drive mechanism which causes reciprocating movement of the carriage in the direction of the slots.

Pusher arms are movably mounted on the carriage and respectively aligned with the slots. An actuating mechanism responds to the carriage movement while bricks are on the platform for holding the pusher arms in respective first positions during movement of the carriage toward the conveyor. In this position, the pusher arms project from the slots for engagement with the bricks on the platform. During movement of the carriage away from the conveyor, the pusher arms are in a second position and withdrawn from the platform. The conveyor may be moved away from the platform by its drive mechanism, both drive mechanisms being operated in timed sequence by a common control device. The gapped columns of bricks formed on the conveyor by suitable operation of the two drive mechanisms are lifted by a second gripper hoist.

Other features, and many of the attendant advantages of this invention will readily become apparent from the following detailed description of a preferred embodiment when considered in connection with the appended drawing in which:

FIG. 1 shows a setting-up apparatus of the invention in side elevation; and

FIG. 2 illustrates the apparatus of FIG. 1 in fragmentary, front elevational section on the line II—II.

Referring now to the drawing in detail, there is seen a travelling gripper hoist 1 known in itself, which transfers a batch of green molded bricks in continuous columns 3 horizontally juxtaposed from a nonillustrated discharge conveyor of an automatic molding machine to a platform 2. The platform essentially consists of steel bars or beams 4 mounted on supporting structure in parallel spaced relationship so as to define slots 5 therebetween.

At the end of the platform 2 longitudinally of the slots 5 a continuous, horizontal belt conveyor 6 is mounted between an idler pulley 7 and a drive pulley 8 in such a manner that the terminal portion of the platform 2 contiguously adjacent the conveyor 6 is slightly higher than the latter. A second travelling gripper hoist 9 is provided for transferring the suitably arranged bricks from the conveyor 6 to a nonillustrated kiln car for subsequent firing.

The green molded bricks are moved from the platform 2 to the conveyor 6 by a transport mechanism 10 which includes two continuous chains 11 attached to a carriage 12. The carriage moves along tracks 13 under the platform 2 on wheels 14 in the direction of elongation of the slots 5. A transverse row of pusher arms 15 is pivotally mounted on the carriage 12, each arm 15 being aligned with a respective slot 5. The arms are biased by nonillustrated springs or counterweights toward engagement with fixed abutments (not shown) in the illustrated position in which the enlarged free ends 15*a* of the arms 15 project upward between the bars 4 from the slots 5. Planar faces 16 of the arms are directed toward the conveyor 6.

During one stroke of the reciprocating movement of the carriage 12 on the tracks 13, the faces 16 engage the columns 3 of bricks superimposed on respective slots 5, and push the bricks to the conveyor 6. The chains 11 which drive the carriage 12 are each trained over an idler sprocket 17 and a driven sprocket 18. The reversible, variable-speed electric motor which drives the sprocket 18 by means of a belt and pulleys is obscured in the drawing by a control disc 19 on the motor shaft which carries circumferentially distributed cams 20. The position of the carriage 12 on the tracks 13 is sensed by cam-operated switches 21 fixedly mounted on the supporting structure about the circumference of the disc 19. The cooperating cams and switches control the motor drive for the chains 11 and a nonillustrated variable-speed motor in the drive mechanism for the pulley 8 in such a manner that gaps 22 are formed between the molded bricks 3*a* on the conveyor 6, and gapped columns 23 are formed, the gaps 22 in each column 23 of bricks being transversely aligned with corresponding gaps in juxtaposed columns 23.

The desired configuration of the bricks 3*a* on the conveyor 6 is brought about as follows:

Because of the uniform dimensions of the bricks and the transverse alignment of the pusher arms 15, the bricks in the several columns 3 on the platform 2 are transversely aligned in rows while they are moved toward the conveyor 6. The position of the front row of bricks 3' in the batch on the platform 2 is precisely correlated with the position of the carriage 12.

When the front row of bricks reaches the frontally terminal edge portion 2*a* of the platform 2, one of the cams 20 on the disc 19 operates a switch 21 whereby the conveyor 6 is started at an initial speed which is equal to that of the transport mechanism 10. Shortly thereafter, when two rows of bricks 3*a* have been transferred to the conveyor 6, cooperation of another cam 20 and switch 21 raises the speed of the conveyor 6 and lowers the speed of the carriage 12. The bricks 3*a* fully supported by the conveyor 6 are thereby separated from the third row on the platform 2 and a gap 22 is opened. Because of the slight difference in level between the top surfaces of the platform 2 and of the conveyor 6, the bricks 3*a* do not touch the conveyor until they have been pushed over the edge 2*a* of the platform over more than half their thickness so that gravity causes them to tilt.

When the bricks of the third transverse row are ready to tilt down to the conveyor 6, the speed of the conveyor 6 is reduced and that of the carriage 12 is increased to a common value, and another cycle is begun. This procedure may be repeated until all bricks of the batch on the platform 2 are transferred to the conveyor, and are ready to be lifted by the travelling gripper hoist 9. The gripper hoist 9 may be controlled by an operator or wired into the control circuits of the switches 21 in an obvious manner, and the same holds for the hoist 1. A new batch is transferred to the platform 2 while the carriage 12 reaches the end of its stroke nearest the conveyor 6, and yet another switch is operated.

During the subsequent reversal of the motor driving the chains **11**, the pusher arms **15** cammingly engage the bricks of the newly transferred batch and are depressed into the slots **5** until they pass under all bricks of the columns **3** respectively deposited over the slots **5**. When they clear the last row of bricks, they are returned to the illustrated operative position by their springs or counterweights.

It will be appreciated that the distribution of the individual bricks in the gapped columns **23** and the widths of the gaps **22** may be varied in any desired manner by suitably setting the cams **20** and switches **21** about the circumference of the disc **19**. Regardless of specific details of the arrangement, perfect alignment of the bricks in straight columns and rows is readily achieved, and handling of each load prior to and after firing is greatly facilitated thereby.

The illustrated and described apparatus requires relatively little power for its operation because the speed changes of the transport mechanism **10** and the conveyor **6** are minor. The bricks, once started, do not stop until they are ready to be transferred to the kiln car. The platform **2** is completely cleared before the next batch is set down, and the entire apparatus is empty of bricks when it is to be shut down at the end of a work period.

It should be understood, of course, that the foregoing disclosure relates only to a preferred embodiment of the invention, and that it is intended to cover all changes and modifications of the example of the invention herein chosen for the purpose of the disclosure which do not constitute departures from the spirit and scope of the invention set forth in the appended claims.

What is claimed is:

1. Apparatus for setting up green molded bricks and like objects of substantially uniform dimensions in a plurality of gapped, juxtaposed columns comprising, in combination:

a. a stationary platform formed with a plurality of spacedly juxtaposed slots extending in a common direction;

b. a horizontally extending continuous conveyor contiguously adjacent said platform in said direction;

c. first gripper means for setting said objects on said platform in continuous columns extending in said direction;

d. a carriage mounted under said platform;

e. first drive means for causing reciprocating movement of said carriage in said direction;

f. a plurality of pusher members movably mounted on said carriage and aligned with said slots respectively;

g. actuating means responsive to said movement of said carriage while said objects are set on said platform for holding said pusher members in respective first positions in which they project from said slots for engagement with said objects when the carriage moves toward said conveyor, and for holding said pusher members in respective second positions and withdrawn from said platform when said carriage moves away from said conveyor;

h. second drive means for moving said conveyor in said direction away from said platform;

i. drive control means for operating said first and second drive means in timed sequence and for thereby forming gapped columns of said objects on said conveyor; and

j. second gripper means for lifting said objects in gapped columns from said conveyor.

2. Apparatus as set forth in claim **1**, wherein said pusher members are mounted on said carriage for pivoting movement between said first and second positions thereof.

3. Apparatus as set forth in claim **2**, wherein said platform is constituted by a plurality of bar members extending in said direction and defining said slots therebetween.

4. Apparatus as set forth in claim **3**, further comprising a set of tracks under said platform extending in said direction, and wheels on said carriage in rolling engagement with said tracks.

5. Apparatus as set forth in claim **4**, wherein said pusher members have enlarged free end portions remote from said carriage in said first positions of said pusher members, each end portion having a substantially planar face directed toward said conveyor.

6. Apparatus as set forth in claim **1**, wherein said control means include sensing means for sensing the position of said carriage, and operating means responsive to said position for operating said second drive means.

7. Apparatus as set forth in claim **1**, wherein said platform and said conveyor have respective closely juxtaposed terminal portions extending transversely of said direction, the terminal portion of said platform being higher than the terminal portion of said conveyor.

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