United States Patent [19]

Schwarz

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[54] **BRICK GRIPPING APPARATUS**

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[73] Assignee: **Lingl Corporation,** Paris, Tenn.

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[52] **U.S. Cl.**..... **294/63 R,** 214/6 A, 294/67 BB

[51] **Int. Cl.**..... **B66c 1/30**

[58] **Field of Search**..... 294/62, 63, 67 R, 67 B, 294/67 BB, 87; 214/6 R, 6 A, 8.5 C, 377, 653–655, DIG. 6

[56] **References Cited**

UNITED STATES PATENTS

3,270,897	9/1966	Lingl	294/63 R X
3,700,274	10/1972	Paschal et al.	294/63 R

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[57] **ABSTRACT**

Apparatus for gripping a column of block-shaped articles such as bricks arranged in an end-to-end relationship to one another with at least some of the articles being initially spaced from one another to form at least one corresponding intermediate gap in the column. Intermediate tongues are provided for insertion into the intermediate gaps thus providing intermediate support for the gripped column. The intermediate tongues are mounted in a novel manner and cooperate with novel apparatus to provide a positive return motion to the intermediate tongues for positively, accurately and quickly positioning the tongues in proper predetermined positions when the gripper is in an open condition such that the intermediate tongues are readily insertable into the gaps of the column. Then, when the gripper is closed, the positive return force is released thus permitting the intermediate tongues to float or move as required into gripping engagement with the adjacent bricks of the column thus providing the required intermediate support.

6 Claims, 3 Drawing Figures

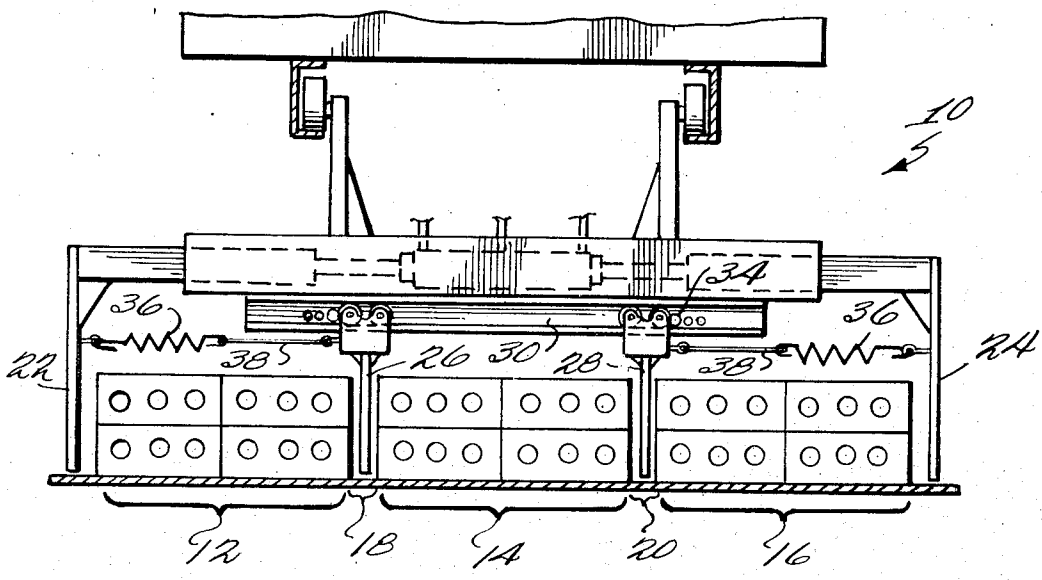


Fig. 1

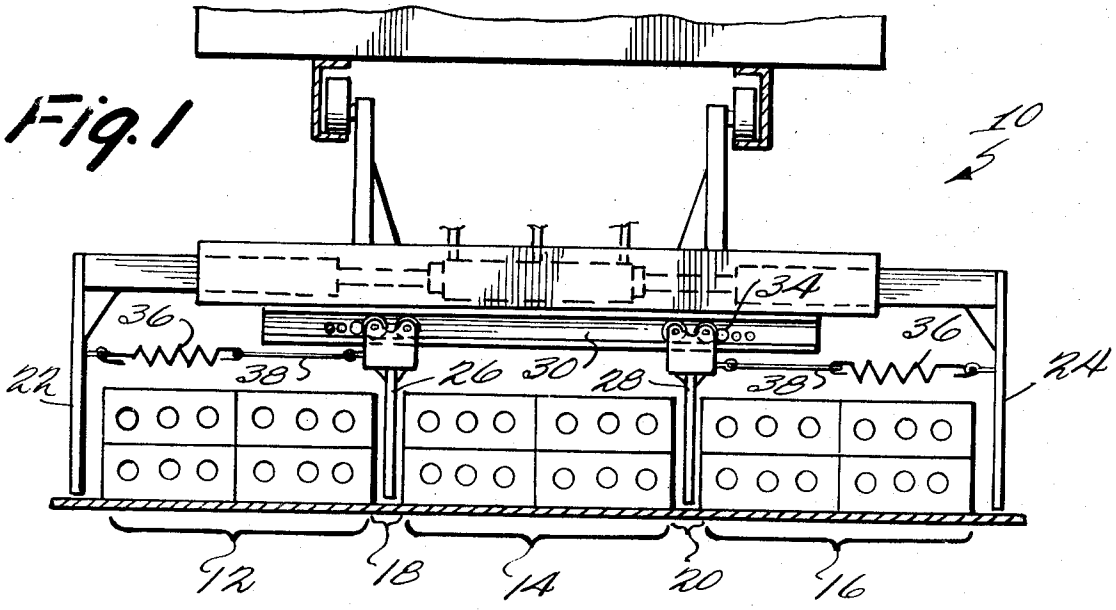


Fig. 2

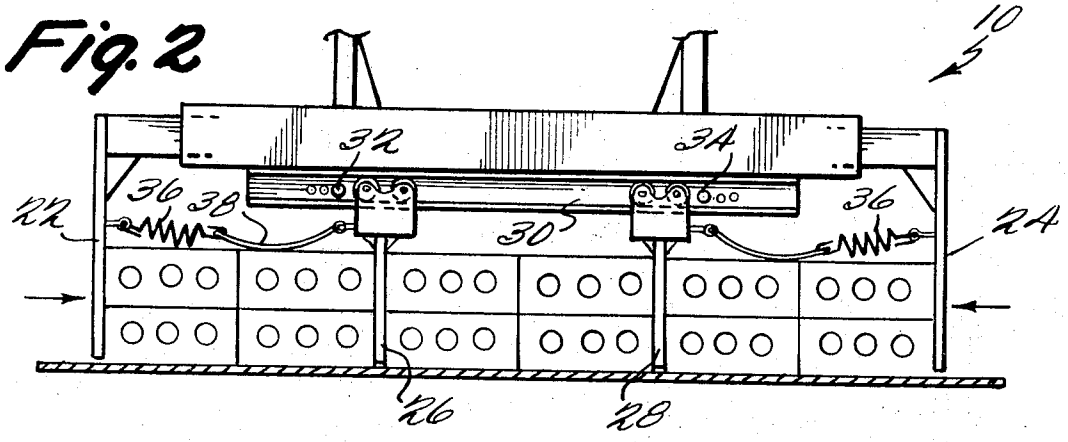
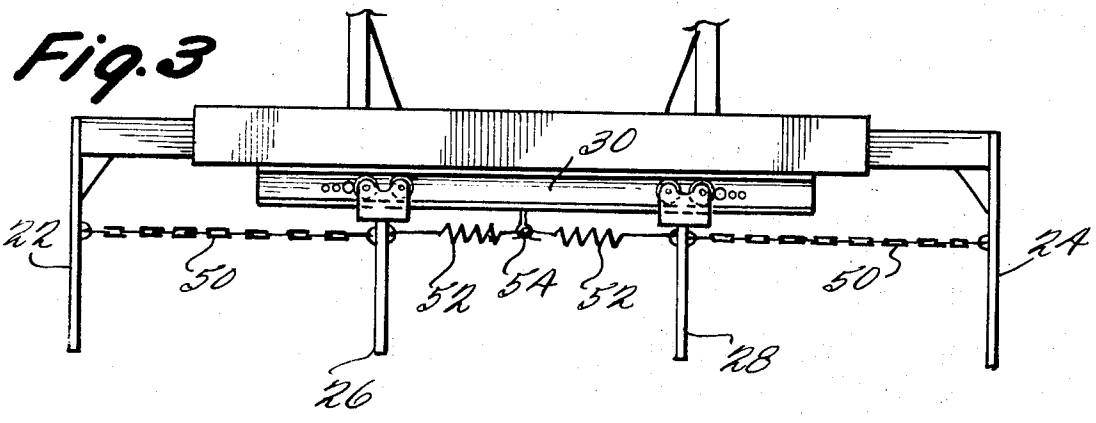


Fig. 3



BRICK GRIPPING APPARATUS

This invention generally relates to an improvement for the mounting and movement of the intermediate tongues of brick gripping apparatus such as is generally disclosed in prior U.S. Pat. No. 3,270,897 — Lingl and U.S. Pat. No. 3,700,274 — Paschal et al. and/or in other prior art patents such as those cited as references in either of these prior patents.

In many brick making processes, it becomes necessary and/or desirable to mechanically grip groups of bricks and transfer them to another location such as in hacking bricks on a kiln car. Here, the usual practice is to grip one or more flats (each flat may be more than one layer) from a conveyor or table, etc., and to transfer these gripped flats onto a kiln car while simultaneously spacing the bricks as appropriate for firing purposes.

A more detailed description of the general overall operation of the gripping apparatus may be had by reference to the earlier referenced U.S. patents wherein it will be observed that intermediate tongues are provided for insertion into corresponding intermediate gaps in the brick flats to be gripped. The whole gripping apparatus normally has at least two states, namely, an open state wherein the arms are extended to pass around the overall group of bricks to be lifted and a closed state wherein the arms are moved inwardly to exert a force compacting the bricks against each other and against the intermediate tongues which thus provide intermediate support for the gripped bricks. Since the positions of the interfaces between the bricks to be gripped change their location during the gripping process, it is apparent that the intermediate tongues must be permitted to make corresponding movements if they are to effectively engage the intermediate bricks and to provide the desired intermediate support.

U.S. Pat. No. 3,270,897 — Lingl shows an exemplary embodiment where the desired tongue movements are permitted by mounting the tongues upon rods that are either pivotable or resilient. U.S. Pat. No. 3,700,274 — Paschal has attempted to improve upon this particular feature by mounting the intermediate tongues for free reciprocal movement longitudinally of each column of bricks to be gripped with a complex and cumbersome mounting arrangement.

Now, however, a much better mounting arrangement for the intermediate tongues have been discovered. First, the intermediate tongue is mounted for slidable movement in a direction generally parallel to the length of a brick column to be gripped. As the gripping apparatus attains its open position, a positive return motion force is exerted on the intermediate tongues for positively moving them to proper predetermined locations corresponding to the anticipated locations of the intermediate gaps in the column of bricks to be gripped. Then, as the gripping apparatus attains its closed position, the positive return motion force is released to permit the intermediate tongues to move along the column length as required to engage the intermediate bricks and provide the desired intermediate support therefor.

In a first exemplary embodiment, the intermediate tongues are slidably mounted upon a track which includes a stop adjustably disposed at a predetermined location corresponding to the expected location of the intermediate gaps for stopping movement of the tongues at that position when a positive return force is applied. The positive return force itself, in the first exemplary embodiment, is provided by a chain and spring combination connected to the outside arms of the gripper such that a positive spring force is exerted on the tongues to move them against the stops whenever the gripper arms are extended but which force is automatically released as the gripper arms are closed.

In another examplary embodiment, the intermediate tongues are also slidably mounted upon a track. However, the stop for defining the desired location of the intermediate tongues when the gripper is in an open position takes the form of an extensible flexible material such as a chain connected to exert a force in one direction on the intermediate tongue while a spring is connected to exert a force in the opposite direction on the intermediate tongue when the gripper arms are in an open condition. Then, when the gripper arms are in a closed position, the inextensible flexible member automatically relaxes or releases its force thus permitting the intermediate tongues to move along the column length as required.

These and other features and objects of the invention will become more clearly apparent from the following detailed description taken in conjunction with the accompanying drawings, of which:

FIG. 1 is a schematic cross section of the first exemplary embodiment of the improved gripper of this invention shown in an open condition;

FIG. 2 is a similar schematic cross section of the first embodiment shown in a closed position; and

FIG. 3 is a schematic cross section of a second exemplary embodiment of the invention.

As shown in FIG. **1**, the gripper assembly **10** is in its open state and has been positioned over a double layered flat of bricks to be gripped comprising segments **12, 14** and **16.** For purposes of describing the invention, a cross section of the flat showing only a single column of the bricks in end-to-end relationship with one another with some of the bricks being spaced from one another to form the intermediate gaps **18** and **20** is shown in FIG. **1.** Accordingly, as the gripper **10** is lowered over the bricks to be gripped, the outside gripper arms **22** and **24** are lowered about the opposite ends of the column and, when retracted towards one another (by conventional means shown in phantom lines) these outside gripper arms exert a compacting force against the opposite ends of the column.

In addition, intermediate tongues **26** and **28** are also positioned for insertion into the intermediate gaps **18** and **20** as shown in FIG. **1.** Thus, when the outside gripper arms **22, 24** compact the brick column, the positions of the intermediate gaps **18** and **20** will narrow and change their locations until the intermediate tongues **26, 28** are engaged with the intermediate bricks as shown in FIG. **2** to provide the desired intermediate support for the gripped brick column.

As should now be apparent, the intermediate tongues **26, 28** will have to make compensating movements in a direction generally parallel to the length of the column during the gripping process. These movements are permitted by slidably mounting the intermediate tongues **26, 28** in a rail or track **30.** While the intermediate tongues are free to move inwardly along the track, each is prevented from moving past a predetermined outward position by adjustable stops **32, 34.** The stops **32, 34** are, of course, adjusted so that the inter-

mediate tongues **26, 28** are properly positioned to be inserted within the intermediate gaps **18** and **20** when they are pulled outwardly against the stops **32, 34.**

In the first exemplary embodiment as shown in FIGS. **1** and **2,** the outward positive return motion is applied to the intermediate tongues by a series connected spring **36** and inextensible but flexible means such as a cable **38** which is connected between the intermediate tongue and a corresponding outward gripper arm as shown in FIGS. **1** and **2.** Thus, when the gripper arms **22** and **24** are extended as shown in FIG. **1** in the open position, the spring and cable combination cooperates with the respectively associated gripper arms and intermediate tongues to provide a positive return for positively moving the intermediate tongues to their predetermined stop locations and for positively maintaining each such tongue in that location while the gripper arm is in its open state. Subsequently, as the gripper arms **22** and **24** are closed to the closed position shown in FIG. **2,** the spring and chain arrangement automatically relaxes thus freeing the intermediate tongue means to move along the track **30** inwardly as required when the gripper arm means is in its closed state as shown in FIG. **2.**

As will now be appreciated, the improved gripper apparatus as shown in FIGS. **1** and **2** positively maintains the intermediate tongues **26** and **28** in a predetermined fixed position when the gripper is opened and automatically permits those tongues to float or slide along track **30** when the gripper is closed up. The arrangement is both simple, inexpensive and extremely accurate and reliable.

A further exemplary embodiment is shown in FIG. **3** where the intermediate tongues **26** and **28** are again slidably mounted within a track **30.** Here, however, instead of positioning a stop along the track **30,** an inextensible but flexible member such as a cable or chain **50** acts as the stop means and is connected between gripper arm **22** and the intermediate tongue **26** while a spring **52** is connected on the opposite side of the tongue **26** to some inward location **54.** A similar arrangement is shown in FIG. **3** for intermediate tongue **28.** Accordingly, as will now be appreciated in view of the above discussion, when the gripper arms are extended, the inextensible but flexible member **50** will pull the intermediate tongue **26** to the left against the force of spring **52** thus positively moving the intermediate tongue to its desired predetermined location and positively maintaining it at that location while the gripper arm is in its open state. Then, when the gripper arms are closed, the inextensible but flexible member **50** will become relaxed thus permitting the intermediate tongue **26** to move as required to engage and support the intermediate bricks. Furthermore, it is possible to interchange the positions of the spring **52** and inextensible but flexible member **50** with respect to the intermediate tongues as should now be apparent.

Although only a few embodiments of this invention have been described in detail above, those in the art will recognize that many modifications of the exemplary embodiments are possible without in any way departing from the true spirit and scope of the improvement afforded by the novel arrangement described. Accordingly, all such modifications are intended to be included within the scope of this invention.

What is claimed is:

1. Apparatus for gripping a column of block-shaped articles arranged in end-to-end relationship to one another with at least some of said articles being initially spaced from one another to form at least one intermediate gap in the column, said apparatus comprising:

gripper arms means having an open state for movement about said column and a closed state for engaging the opposite ends of said column and exerting a compacting force thereagainst,

intermediate tongue means for insertion into said intermediate gap when said gripper arm means is in its open state thereby providing intermediate support for said articles when the column is compacted by said gripper arm means in its closed state to thereby move the articles in the column toward one another and into engagement with said intermediate tongue means,

slide means operatively connected to said intermediate tongue means for permitting the intermediate tongue means to move in a direction generally parallel to the length of said column,

stop means operatively connected for stopping movement of said tongue means at a predetermined location opposite the location of said intermediate gap, and

positive return motion means operatively connected to said intermediate tongue means for positively moving said intermediate tongue means to said predetermined location, for positively maintaining it in that location when said gripper arm means is in its open state, and for automatically freeing said intermediate tongue means to move when said gripper arm means is in its closed state.

2. Apparatus as in claim **1** wherein said positive return motion means comprises a spring means operatively connected for movement with said gripper arm means to exert a force on said intermediate tongue means in the direction of said stop means when the gripper arm means is in its open state.

3. Apparatus as in claim **2** wherein said spring means includes an interconnected spring section and inextensible flexible section to relax said force on the intermediate tongue means when the gripper arm means is in its closed state.

4. Apparatus as in claim **1** wherein

said slide means comprises a track upon which said intermediate tongue means is slidably mounted.

5. Apparatus as in claim **4** wherein said stop means comprises an adjustably positioned obstruction attached to said track for blocking further movement of the intermediate tongue means.

6. Apparatus as in claim **1** wherein:

said stop means comprises an inextensible flexible section connected to exert a restraining force on said intermediate tongue means in a first direction, and

said positive return motion means comprises a spring connected to exert a restoring force on said intermediate tongue means in an opposite second direction when said gripper arm means is in its open state.

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