

Dec. 28, 1937.

W. J. SULLIVAN

2,103,649

METHOD OF BRICK HACKING FOR UNIT HANDLING

Filed Nov. 5, 1936

4 Sheets-Sheet 1

Fig. 1.

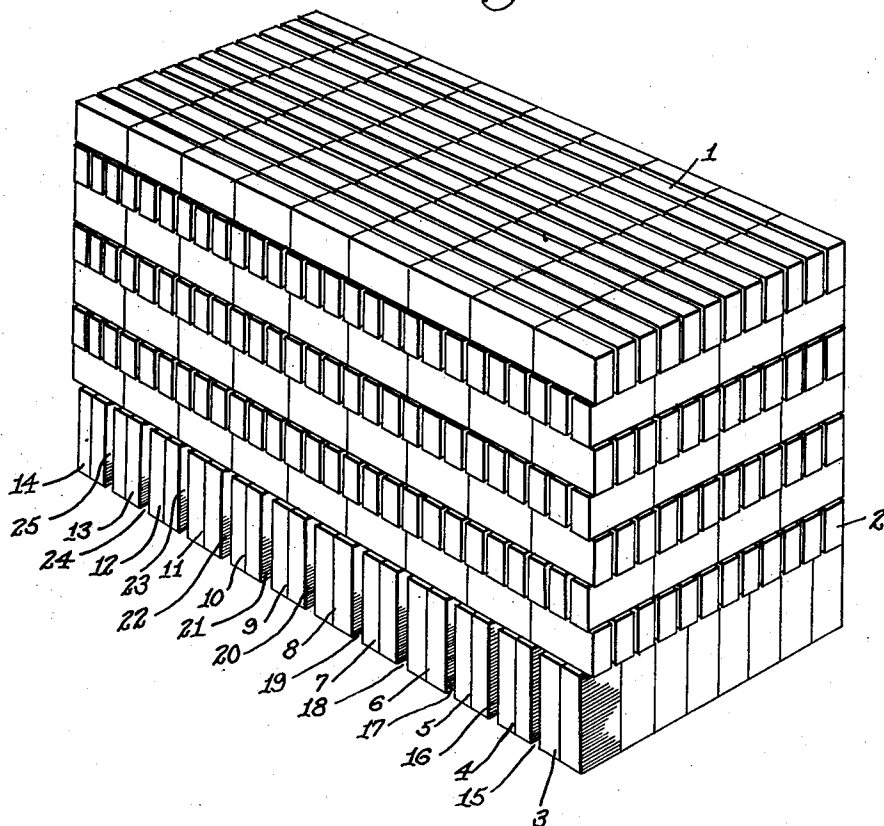


Fig. 2.

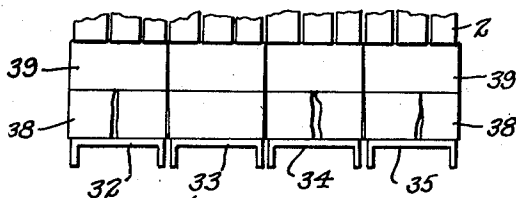


Fig. 4.

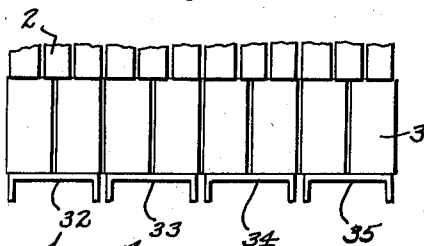


Fig. 3.

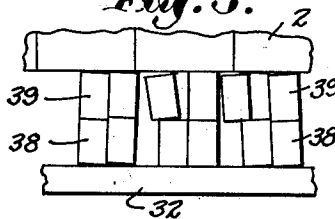
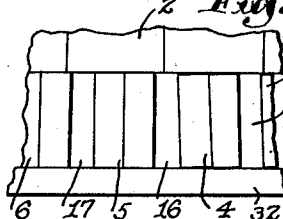


Fig. 5.



Inventor
William J. Sullivan
by James A. Hodges
Attorney

Dec. 28, 1937.

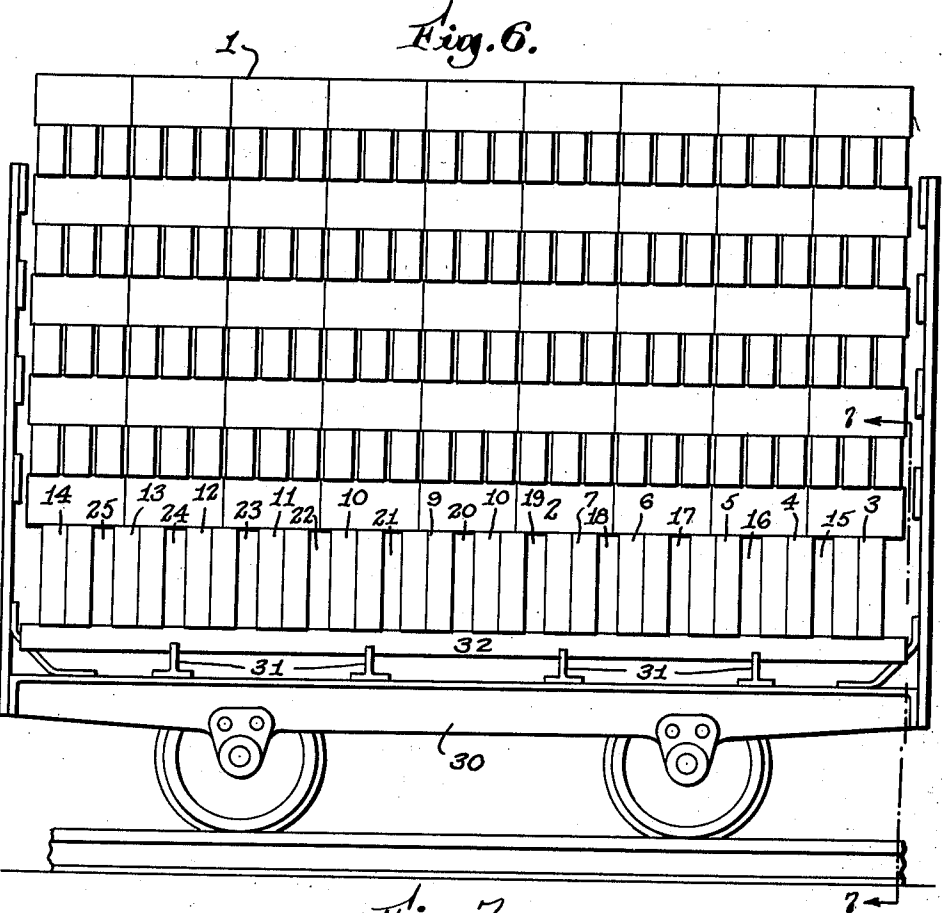
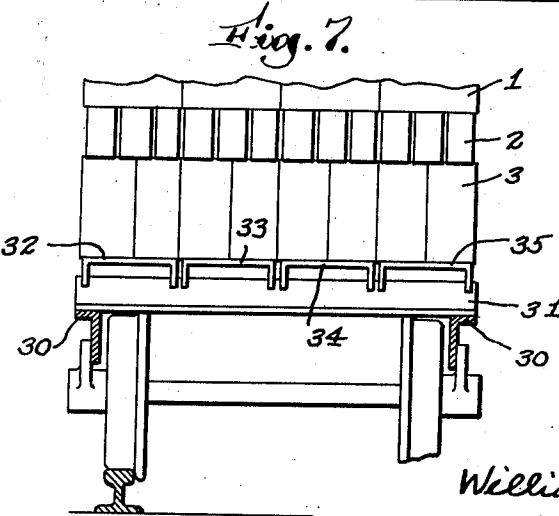
W. J. SULLIVAN

2,103,649

METHOD OF BRICK HACKING FOR UNIT HANDLING

Filed Nov. 5, 1936

4 Sheets-Sheet 2



Inventor
William J. Sullivan
by James R. Hodder
Attorney

Dec. 28, 1937.

W. J. SULLIVAN

2,103,649

METHOD OF BRICK HACKING FOR UNIT HANDLING

Filed Nov. 5, 1936

4 Sheets-Sheet 3

Fig. 8.

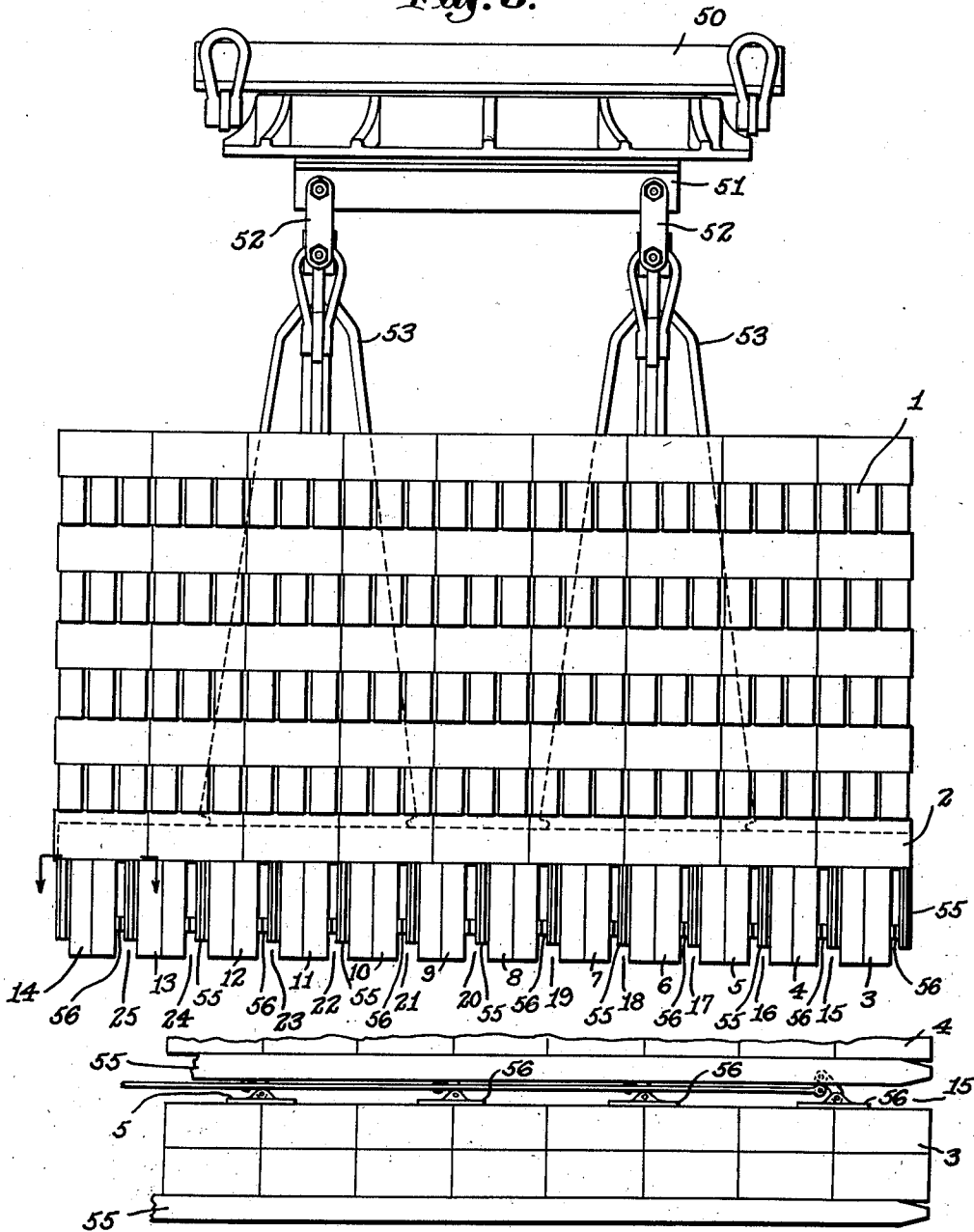


Fig. 9.

Inventor
William J. Sullivan
by James R. Hodder
Attorney

Dec. 28, 1937.

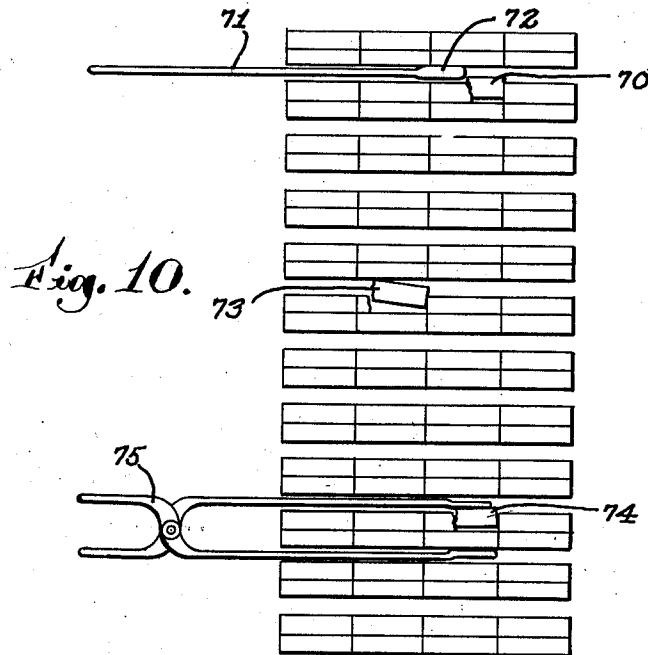
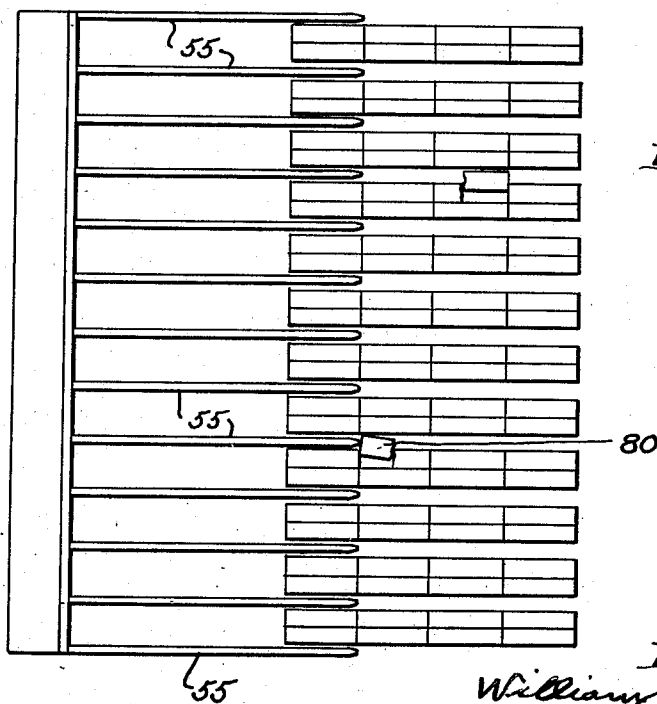
W. J. SULLIVAN

2,103,649

METHOD OF BRICK HACKING FOR UNIT HANDLING

Filed Nov. 5, 1936

4 Sheets-Sheet 4



Inventor
William J. Sullivan
by James R. Hodde
Attorney

UNITED STATES PATENT OFFICE

2,103,649

METHOD OF BRICK HACKING FOR UNIT HANDLING

William J. Sullivan, Chicago, Ill., assignor of one-half to Cyril P. Mertens, Chicago, Ill.

Application November 5, 1936, Serial No. 109,243

1 Claim. (Cl. 214—152)

My present invention is directed to improve and perfect the hacking or setting of brick in unit formation for subsequent handling by mechanical brick-lifting machines.

5 Important objects of the present invention are to eliminate the breakage at present occasioned in the "finger courses", or lowermost row of a brick unit; to enable a larger unit to be built upon the finger course when the brick is "green" preparatory to drying; to obviate the danger of the lowermost part of the finger course rows failing to be gripped by the clamps on the fingers of the brick setter and, hence, dropping out, endangering the setting down and unloading of the unit; 10 to save the present necessity of straightening the finger course brick by "padding" tongs or other devices to draw up the finger course rows preparatory to threading the fingers of the setting machine therein.

20 By my present invention I overcome the present difficulty of the expanding of the metal pallet setters during drying while the brick is shrinking and, hence, occasioning distortion of the finger rows and breakage of the brick, and finally to improve the brick machine handling operations throughout the entire processes of drying green brick, lifting, transporting, and setting the dried brick, building same into a kiln for burning, and subsequently unloading the burnt brick by mechanical handling forks and maintaining the unit brick formation throughout these operations. 30

35 Heretofore it has been standard practice to build up a unit of brick with the lowermost, or finger course, rows spaced for the subsequent handling by setting machines, such for example as shown in U. S. patent to R. C. Penfield, No. 1,013,683, dated Jan. 2, 1912, with the brick in the finger course laid in horizontal position, the 40 finger course row being two-brick wide and two-brick high, and spaced from the adjacent row to provide proper width and height to receive the lifting fingers and brick-engaging clamps of the setting machine.

45 These finger courses have been built by belt boys, taking one green brick in each hand from the off-bearing belt of a brick-forming die machine and setting the brick two at a time, laid horizontally, building up the lowermost, or finger course, row by spacing the bottom brick; and thereupon setting two more brick also laid horizontally on top of the first horizontally laid brick; and thereafter alternately crossing the layer of 50 brick so that they will be set three-over-three, or

other spacing units, all as shown in said Patent No. 1,013,683, and as is the customary practice.

With the green brick thus laid horizontally, the entire unit rested on the finger courses and as the unit was built before the brick were dried, only a limited height could be built up in a unit because of the crushing action on the finger courses. 5

Thus, in the standard type of brick which would be formed approximately $8\frac{1}{2}'' \times 4\frac{3}{8}'' \times 2\frac{3}{8}''$ when green to allow for shrinkage in the drying and burning operations, which would result in the burnt brick size of approximately $8'' \times 4'' \times 2\frac{1}{4}''$, it was impractical to build a unit more than seven rows high, or possibly eight, particularly in yards where the clay is relatively soft, as the carrying capacity or weight-resisting strength of the green brick when laid horizontally could not support a higher unit. 10 15

In my present invention I am enabled to build a unit nine or ten layers high without crushing the finger course in a similar soft clay; whereas a much higher unit can be built proportionately where a stiffer mud is used. 20

A most serious difficulty in the present practice of building the finger course in a unit with the brick laid horizontally is the high percentage of breakage in the lowermost course, to an extent often of 30% to 40%. This seems to result largely from the expansion of the metal dryer car on which the unit is usually built during the simultaneous shrinking of the brick during drying and burning. Thus, with the finger course held in contact with the metal pallets of the dryer car by the total weight of the unit above the same, and being subjected to the shrinking action of the clay during heat while the metal is necessarily expanding in the heat of the dryer, this seems to disrupt and distort the lowermost finger course row, causing breakage. 25 30 35

Thus, when the brick setting machine is applied to the unit to lift and transport same, a broken brick will frequently drop out, causing difficulty in the subsequent operation of setting the unit down on the finger course for releasing the setting machine. 40

Also, a prior and present difficulty is that the finger course rows when laid horizontally often have the second layer of the finger course disaligned or distorted during the drying and handling, the two layers simply resting upon each other and in spaced pairs without any cooperating side support. Thus it was often necessary to straighten the rows of the finger courses before the brick-setting machine could be fitted underneath the same, a disaligned brick at any 45 50 55

point in the finger course rows blocking the threading of the fingers of the brick-setting machine under the unit, and great difficulty was experienced in straightening up such disaligned rows of broken or blocking brick, necessitating the operation of "paddling" or the use of long tongs, which were provided for the purpose of straightening out a disaligned or broken brick.

My present invention eliminates all the prior difficulties above briefly outlined and enables the unit to be set as quickly and readily as formerly; furthermore permitting a higher unit to be set with the same clay; eliminates almost entirely the danger of breakage in the finger course; provides automatically for the contraction of the brick during shrinking while the pallets on which the same rest are expanding; obviates the dropping of brick in the finger course owing to the clamps not catching same, and also overcomes the necessity of paddling or using tongs to straighten up the rows preparatory to fitting the setting machine therein.

I have discovered that by changing the old method of horizontally setting the finger course brick and by up-ending the brick in the finger course row, I eliminate the difficulties above briefly outlined and accomplish the highly desirable results without added expense, delay, time, or operation.

By my new method of up-ending finger course brick I first eliminate the necessity of the operator aligning the top row on the lower row when building the finger course as the up-ended brick afford proper height for the finger course equal to two brick laid horizontally. Also green brick are much stronger endwise prior to drying and burning because of the texture secured thru forcing the clay out of a die machine. Therefore, a green brick has greater load-carrying capacity endwise than sidewise and, hence, with the same clay I can build a unit by my method of up-ended finger course rows from one to three layers higher than with the old method of horizontally set finger courses. This is particularly important where the clay is relatively soft.

A further feature is that by up-ending the brick in the finger course, the clamps of the setting machine will always engage the entire finger course and the danger of the dropping of the lowermost brick of the row when set horizontally is eliminated. Thus it is immaterial where the clamps pinch the finger course brick; and this fact also enables us to make the fingers narrower in the setting machine or fork when stacking or unloading the brick, thus still further facilitating speed in positioning the machine and inserting the fingers under the unit. This is important since, when pushing the setting machine under the unit, the fingers are often tilted as it is difficult to hold them level, and the narrower fingers eliminate the danger of their tilting and catching.

A still further advantage of my present method is that the finger course when set up-ended seems to provide an automatic separation in the pair forming each row of the finger course to permit the expansion of the metal pallet or car floor on which the unit rests without disrupting or fracturing the finger course brick. This desirable result probably is because of the fact that the area of the end of the brick, viz. 2" x 4", equalling 8 sq. in., resting on the metal pallet affords less possibility of breakage during the ex-

pansion of the pallet and the shrinkage of the brick than where the side of a brick, presenting an area of 8" x 4", viz. 16 sq. in., rests on the metal pallet and is subjected to the diverging action of simultaneous shrinkage of the brick and expansion of the metal.

A still further advantage of my present invention is that the up-ended brick has less tendency to be disaligned in the finger course than where the course is built of two brick, set horizontally, and with the top row resting on the lower row; and even if the up-ended brick are somewhat disaligned during drying and shrinking, and subsequent burning of the unit, it is much easier to straighten up the same by paddling than it is to effect a straightening with the brick laid horizontally. This will be readily appreciated when it is realized that the up-ended brick are standing on a relatively small area of approximately 8 sq. in., whereas the horizontally laid brick are resting on an area of 16 sq. inches.

Another advantage in my present invention and process of building a unit is that the unit built with the finger course of up-ended brick will withstand the disturbing and disrupting rough handling to which the unit is subjected in mechanical brick handling. Thus when a unit is being built into a kiln it is customary for the setting machine to pick up an entire dryer car load of a thousand or more brick, and consequently of considerable weight, which unit is swung or spotted into position for unloading in the kiln being built; and in order to have the unit as close as practical in the side row or corner in which it is being set, the entire unit is "bumped" against the wall already built, and then the setter lowered until the finger courses pick up the weight of the unit, whereupon the machine is "backed off" and withdrawn and a second unit "bumped" into position. This bumping action very often disrupts the entire brick formation, particularly the first layer and the top row of the finger course.

By my invention of building the finger course with up-ended brick this distorting action is largely eliminated, as the entire finger course is a single brick in height and, hence, the prior danger of disrupting the finger course by distorting the layers and consequently blocking the spaces for the subsequent insertion of an unloading fork is eliminated.

My invention is suitable for use with any of the well-known types of mechanical brick setters, lifting, loading, and unloading forks, particularly for example such as shown in R. C. Penfield Patent No. 1,205,562, of November 21, 1916, or my prior Patent No. 2,033,746, dated Feb. 11, 1936.

Referring to the drawings illustrating preferred embodiments of the present invention and my improved method,

Fig. 1 is a view in perspective of a unit of brick embodying my present invention;

Figs. 2 and 3 are fragmentary views, respectively, illustrating the prior finger course structure with the bricks laid horizontally;

Figs. 4 and 5 are fragmentary views illustrating my improved finger course construction;

Fig. 6 is a side view of a dryer car with a unit embodying my finger course structure;

Fig. 7 is a fragmentary end view of the dryer car and unit of Fig. 6;

Fig. 8 is a side view of my improved unit being

lifted and transported by a mechanical brick setter;

Fig. 9 is a fragmentary view of one of the finger courses with the side gripping clamps in engagement with the finger course of my present invention.

Fig. 10 is a diagrammatic plan view showing a typical finger course with disaligned or broken brick in rows when set horizontally and showing the operation of paddling and straightening by tongs; and

Fig. 11 is a corresponding view illustrating how a single disaligned or broken brick in either layer of the finger course rows will block the position of the entire setting machine under the unit.

Referring to the drawings, Fig. 1 illustrates in perspective a typical unit of brick, each being shown as of conventional size, viz. approximately 8" x 4" x 2" when burned, or 8½" x 4¾" x 2¾" when "green" to allow for shrinkage, although of course any size brick can be made, stacked, and handled in a unit, properly spaced for drying and burning as desired, when originally setting the brick in hacked relation in the unit. The important structure in unit hacking or mechanical handling consists in the formation of the finger courses.

I have herein designated the unit of brick as a whole with the reference character 1, and the lowermost layer of the unit with the reference character 2, designating the finger course comprising pairs of brick arranged endwise with the row of each pair as 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, and 14, giving the intermediate spaces for the fingers of the brick setter as 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, and 25. Thus, in the unit shown for illustrative purposes, a nine-brick unit has eleven openings in the finger course for the lifting device and side clamps, as best shown in Fig. 8, wherein a mechanical setter with thirteen fingers to clamp the pairs of brick in the bottom courses is provided.

It is customary in forming wire-cut brick by the stiff-mud process to have the same travel down an off-bearing belt from the die machine a sufficient distance to give space and time for the belt boys to take off the brick and build them into hacked relation in a unit for drying and burning, building same on dryer cars which are adjacent the off-bearing belt, and are constantly moving to keep in timed relation with the entire conveyor apparatus.

The belt boys, often twenty to thirty in number, take the brick off the belt, one brick with each hand, and build them into the unit on the series of dryer cars as the latter are moved along. These dryer cars, of the present standard type, are illustrated in Figs. 6 and 7, built of metal, with floor frames 30—30, cross-bars 31—31, supporting metal pallets 32, 33, 34, and 35 on which the finger courses 3 to 14, comprising pairs of brick, are set in spaced relation as shown in Figs. 1, 6, and 8, whereupon the unit 1 is built on top of the finger courses by alternately setting the rows of brick crosswise, usually three-over-three, as shown.

In my present invention I set the finger courses 3 to 14 up-ended or vertically positioned, as previously explained, and thereby gain the benefits of freedom from breakage, greater carrying capacity due to the endwise strength and texture of the clay, eliminate the danger of brick dropping from the finger clamps during transporting,

and obviated the necessity of straightening the rows by tongs or "paddling".

I have illustrated in Figs. 2 and 3 the old or present method of setting finger courses, wherein the stack 1 is built over the finger course rows with the brick arranged horizontally and in pairs, two-brick high, and spaced to provide height and width to receive the fingers and clamps of the setting machine. Thus, as will be seen in Fig. 2, the prior method included finger courses comprising upper rows 39 and lower rows 38 resting on the pallets 32 to 35 in the dryer car.

As these rows were thus set with the brick laid horizontally edgewise by hand and at high speed occasioned by the necessity of keeping up with the conveyor belt and moving dryer cars the first difficulty was non-uniformity in placing the brick of the top row 39 correctly in alignment with the bottom row 38, which difficulty has of course been eliminated by my new method of up-ending each pair of brick.

The next difficulty was that occasioned by the shrinkage of brick during drying and the expansion of the metal pallets 32 to 35 when subjected to the drying heat. With the brick laid longitudinally and the pallets expanding under heat relatively quicker than the brick would dry, and with the pressure of the longer unit one on top of the finger course, often resulted in fracturing and distortion of the finger course brick, as shown in Fig. 2. A relatively large area of the brick when laid horizontally in the old process was in contact with the metal pallets and hence, the same was subjected to greater friction and, during the expansion of the pallets and under the pressure of the unit, resulted in fracture of the finger course brick than is the case in my present formation with the brick endwise.

A standard type of brick, for example, 8" x 4" x 2", when resting edgewise on the metal pallets presents a much greater area subject to the distorting action of the expanding metal plates during the shrinking action of the brick than with each individual brick mounted endwise.

Thus, the end being 2" x 4" in the size brick being used as an example, the old horizontally set brick had an area of 16 sq. in. in contact with the metal support, whereas by my new up-ended setting only 8 sq. in. of each brick was resting on the metal. Furthermore, by my present method of placing the brick up-ended, I have discovered that the brick of each pair affords a natural and normal line of division to automatically take care of the expansion of the metal pallets between the separate rows of individual brick, permitting each brick to move slightly with the expanding metal pallet on which it rests without danger of fracturing same, this action being illustrated in Fig. 4 wherein the up-ended brick 3 may be separated at the bottom without injuring the unit formation and without breakage or damage to the finger course brick.

This feature of my present invention is of the greatest importance and seems to take care automatically of the difference in expansion and contraction between the pallets and the brick when subjected to heat in the dryer. My discovery eliminates almost entirely the damage to the finger course and even permits a higher and, hence, heavier unit to be built on the up-ended brick than was practically feasible on the horizontally laid brick, thus still further improving and benefiting unit construction and mechanical handling of the unit.

With my improved unit, having the finger course built of up-ended brick for drying and burning, the same supporting area is presented for the unit 1. Also, the texture of dye-formed and wire-cut brick when "green" is substantially stronger for endwise strains, as is well known, than when laid horizontally.

Thus, a higher unit than formerly can be built and the entire unit is more even and more unified and maintains these advantageous features throughout the entire operations of forming, drying, handling, building into a kiln, burning, and unloading.

In Figs. 8 and 9, I have shown diagrammatically a typical mechanical brick handling or setting fork, the apparatus having a frame 50, turntable 51, and suitable links 52, 52 to carry the lower frame 53 supporting the fingers 55, which are threaded into the openings between the finger course, and actuate the side clamping plates 56 when the apparatus is raised, thus lifting the bottom row of the unit which includes the finger courses on which the unit is set and rested when the fork is withdrawn.

Referring to the diagrammatic view in Fig. 10, I have therein illustrated the old method using a horizontally set finger course, as shown in Figs. 2 and 3 with a plan view of the same, wherein a broken portion of a brick 70, in either the top or bottom portion of the finger course row, is straightened by paddling, a paddle 71 with a broadened end 72 being run into the space between the finger course row to clear the same so that the fingers of the setting machine will be threaded through. A similar distorted brick is shown at 73 and a still further method of straightening a broken and disaligned portion 74 by the use of a pair of tongs 75 is shown. A very large percentage of breakage in the lowermost rows in the finger course caused during drying and burning arises, therefore it is usually necessary to "paddle" each row or to use tongs on the same.

As shown in Fig. 11, I have illustrated the lower portion of the brick setter with the fingers 55 being threaded thru the spaces between the finger courses of a unit, and the entire setter being blocked by a disaligned broken brick portion 80. These difficulties occur when the finger course is set horizontally as heretofore univer-

sally practiced; whereas in my present invention of building the finger course with the brick up-ended the breakage and disalignment difficulties are practically entirely eliminated and, in addition, a higher unit structure is supported by the finger course.

My present invention results in the numerous advantages and improved features above briefly outlined, and, furthermore, enables the setting fork to be more quickly threaded into the openings in the finger course, as the endwise set brick present a smoother and better channel for sliding the fingers into the same than in the former and prior method with the brick set horizontally, as shown in Figs. 2 and 3, which will be readily appreciated.

Also, the difficulties of paddling and tong operation, as shown in Fig. 10, and the necessity for the same to clear the spaces in the finger courses for threading thru the lifting fingers 55 of the setting machine are eliminated, saving these operations and the time, delay, and difficulties involved, in addition to the danger of the dropping out of one of the lowermost bricks in a row, owing to the clamps not catching same or owing to breakage; whereas in my up-ended finger course structure the brick-engaging clamp may contact with the brick at any point throughout the height of the finger course.

I believe that my invention utilizing a single brick in height, vertically positioned, and up-ended instead of two-brick high, horizontally positioned for the finger course in unit stack construction, is distinctly new, and I wish to claim the same broadly.

Furthermore, my invention, insuring the catching of the finger course by the clamps and permitting improvement in the setting machine, or the unloading fork, by having the fingers narrower is a great advantage in speeding up work and facilitating the mechanical handling of unit brick.

I claim:

A unit brick stack built with spaced finger courses and formed with pairs of brick up-ended to automatically compensate for the expansion of pallets on which the brick rest and the shrinking of the brick when both are subjected to the heat of drying.

WILLIAM J. SULLIVAN.