R. C. PENFIELD.

METHOD AND APPARATUS FOR HANDLING BRICKS IN BULK FOR DRYING AND BURNING.

APPLICATION FILED OCT. 7, 1908.

1,121,658.

Patented Dec. 22, 1914.

4 SHEETS—SHEET 1.

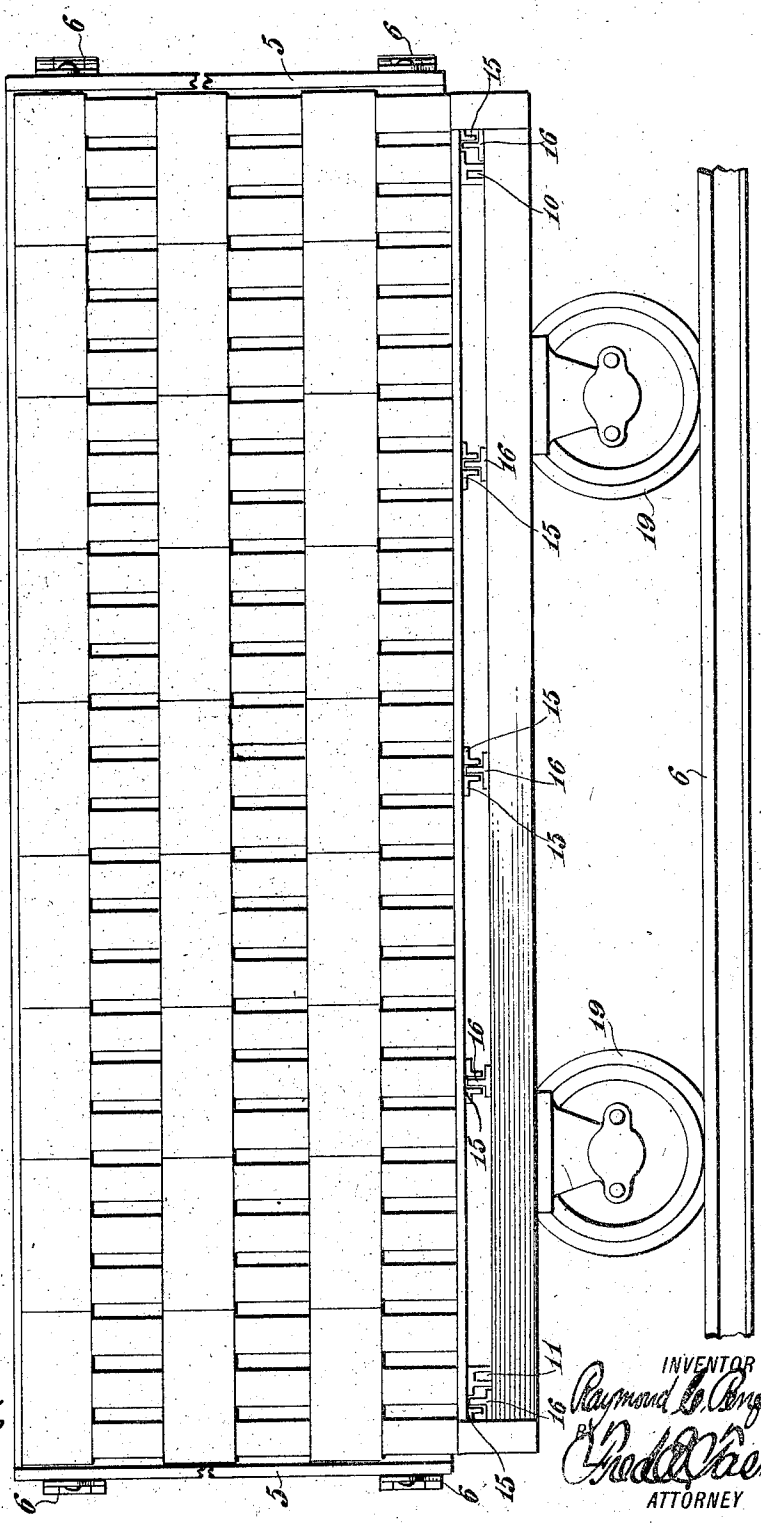

Fig. 1

WITNESSES

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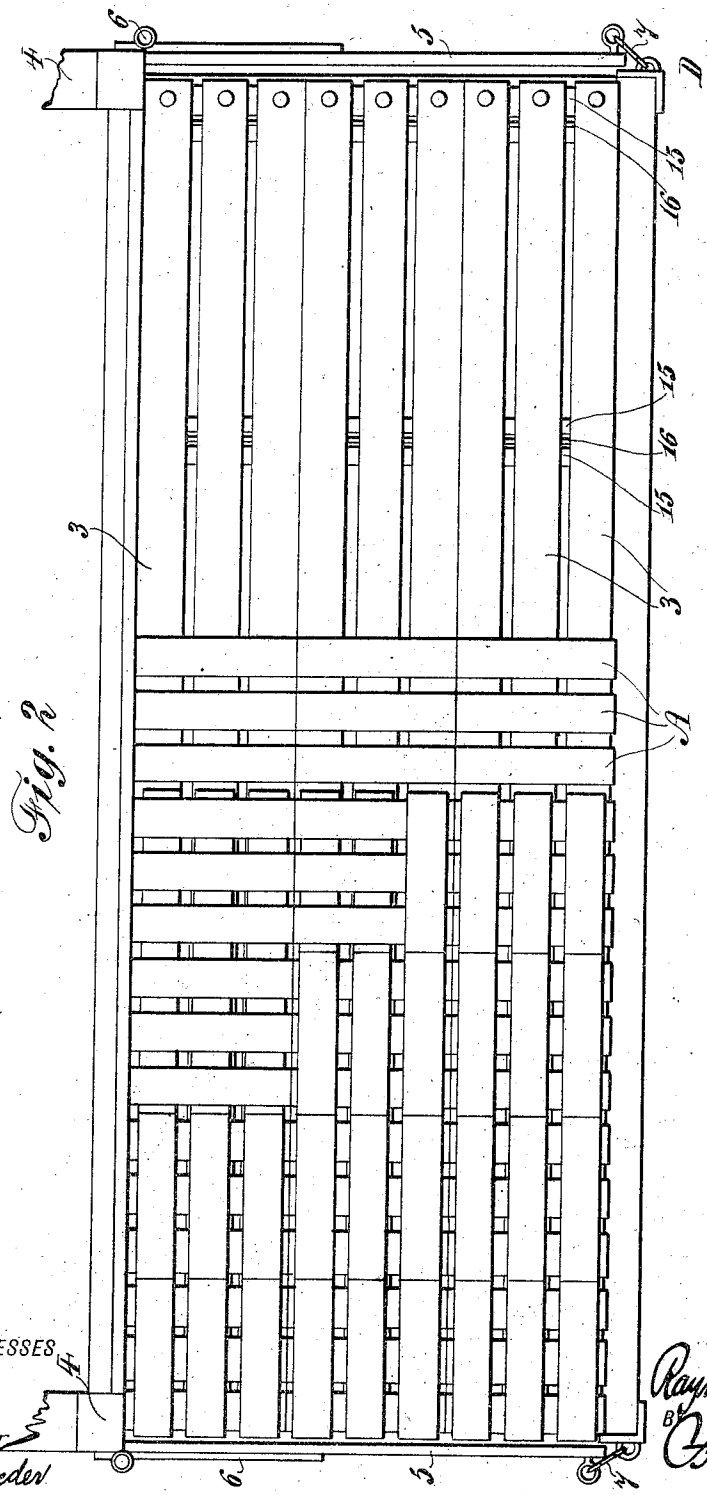

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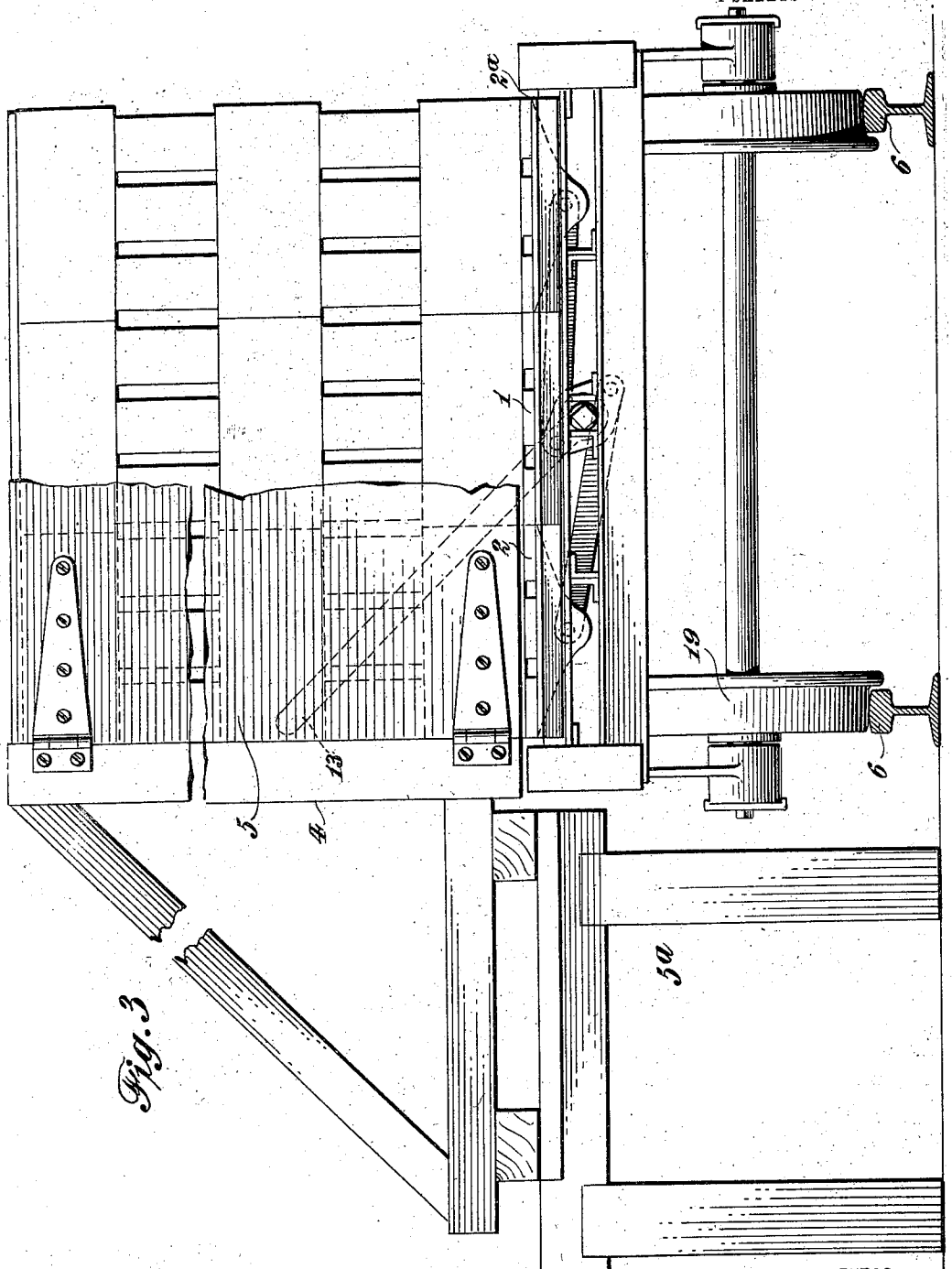

Fig. 3

WITNESSES

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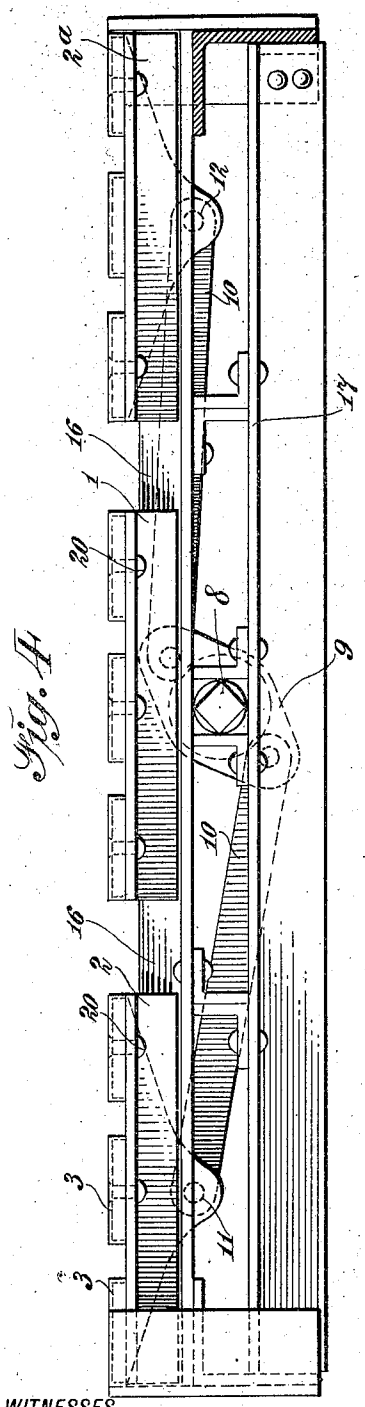

Fig. 4.

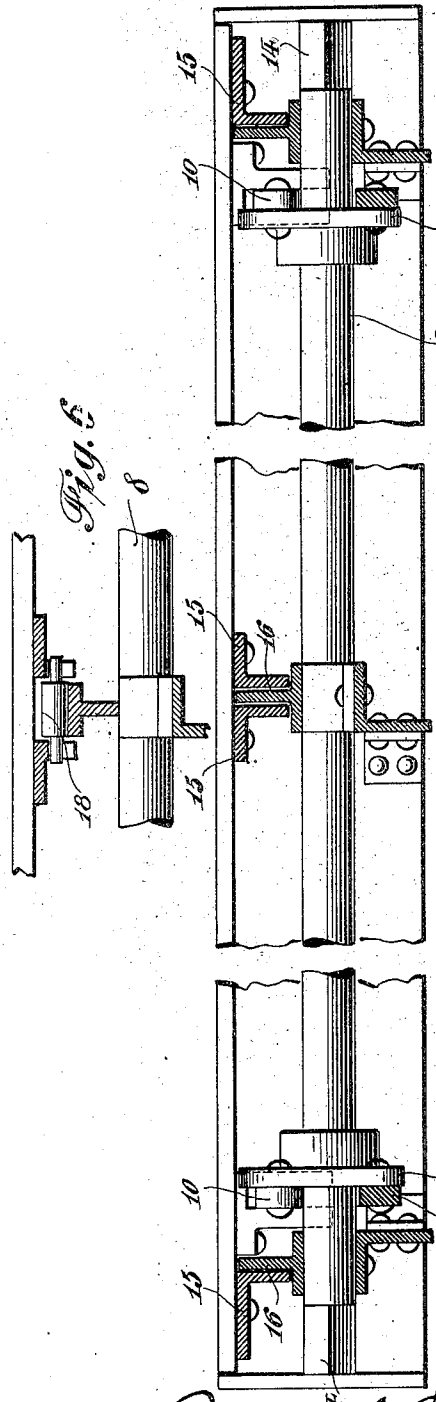

Fig. 5.

Fig. 6.

WITNESSES

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METHOD AND APPARATUS FOR HANDLING BRICKS IN BULK FOR DRYING AND BURNING.

1,121,658. Specification of Letters Patent. Patented Dec. 22, 1914.

Application filed October 7, 1908. Serial No. 456,626.

To all whom it may concern:

Be it known that I, RAYMOND C. PENFIELD, a citizen of the United States of America, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Methods and Apparatus for Handling Bricks in Bulk for Drying and Burning, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to a method of and apparatus for handling bricks and similar articles during their manufacture.

It is designed primarily to be employed in handling the bricks after they leave the brick machine, and while they are undergoing the drying process and being made ready for burning in the kiln, but before the kiln is reached.

It becomes important in the successful prosecution of brick manufacturing, and in order to obtain the best results in the other part of the manufacture, that a method of the kind to which this invention relates should be employed, and accordingly I have devised the same so that it may be used in conjunction with other processes and apparatus, or as an independent system, according as the needs of each particular case may require.

An approved modern system of handling bricks in the course of manufacture, from the time they leave the molding or forming machine until they are burned and delivered from the kiln ready for use, consists in initially arranging the bricks in large unit stacks in proper spaced or hacked relation and subsequently handling them, without disarrangement of this stacked formation, in such unit stacks from one stage and station to the next, usually by means of mechanical lifters adapted to engage the unit stack from beneath and transfer the same as required, while maintaining undisturbed the assembled stack formation.

A prime object of the present invention is to provide a method adapted to materially facilitate and contribute to this general stack-handling scheme by providing a way whereby the step of drying the bricks can be carried out expeditiously and effectively by providing adequate spaces for air circulation between the portions of a unit stack, and the stack thereafter brought together again to its former assembled state so that the subsequent handling thereof for transportation to the kiln may be carried out with the bricks in the standard unit stacks by the same mechanism which handles them in the other steps of manufacture.

The invention therefore comprises essentially a method of so stacking the bricks in the unit stacks that the portions of the stack are capable of the requisite separation to provide adequate air circulatory spaces, separating the stack into such portions with air spaces therebetween, and again bringing the portions of the stack together into close coherent formation without in any way breaking up the stack arrangement.

The invention further has to do with a special construction of table or platform support adapted to carry out such method.

A further idea of the invention is first to set the brick in open stack formation; then when said stack is to be properly placed to receive the application of heat for drying, my plan is to separate certain parts of the stack from each other; or, in other words, I enlarge the openings or interstitial spaces between some of the bricks, so that certain portions or sections of the stack may be more widely spaced than when originally set, to the end that the drying action may be more faithfully, adequately and uniformly performed thereon; and my invention then includes the restoring of the bricks to the position occupied when originally set, this restoration taking place by bringing the sections close together again that were previously moved apart, or, in other words, contracting the interstitial openings or spaces from their enlarged size to the former size. When the bricks are originally set according to the principle of this method, they are hacked in open or loose formation suitable for kiln burning, though not sufficiently wide apart (when the stack is quite large) everywhere for even and expeditious drying, and hence when ready to be placed in the drier or brought under the action of the drying heat, it is found essential to spread them wider apart at certain places; but after the drying process is complete they are restored to the position in which they were originally set, that of open or loose formation suitable for burning, and are then ready

to be immediately transferred to the kiln. Furthermore, it is to be noted in connection with this method that the bricks of the lower layer of the stack formation are spaced apart to allow of the entrance of fingers or plates of some suitable lifting mechanism by which the stack of bricks is lifted as a whole from one point to another.

The apparatus whereby the bricks after being originally set in loose or open formation are spread more widely apart during the drying process, and are then brought together again into the original setting, is represented in the drawings and forms a part of this invention, the latter comprising therefore not only the method but also the apparatus. While this apparatus is shown as portable, it is not necessarily so; and when portable its portability may be achieved not only in connection with a tramway or line, but in any other manner found acceptable.

The invention, therefore, may be said to consist essentially in the steps of the method herein described, and also in the construction, combination and arrangement of the parts of the apparatus, and in manifold details and peculiarities thereof, substantially as will be hereinafter set forth and claimed.

In the accompanying drawing illustrating my invention, Figure 1 is a side elevation of my improved car for handling brick in accordance with the method herein specified. Fig. 2 is a top plan view of the same. Fig. 3 is an end elevation with the rear gate partly broken away. Fig. 4 is a cross-section of the car, with its sectional platform spread apart for the purpose of thereby separating certain parts of the stack of bricks from each other. Fig. 5 is a sectional side elevation of a part of the mechanism for separating the sections of the car. Fig. 6 is a detail view showing anti-friction means adapted to be used in connection with the movable sections of the car.

Similar characters of reference designate corresponding parts throughout the different figures of the drawing.

The car which forms one example of portable apparatus, belonging to the present invention, may, for example, as shown in Fig. 4, have a platform which consists of three equal longitudinal sections, the central one of which, 1, is relatively stationary, while the other two, 2 and 2^a, are movable away therefrom and then back again into contact therewith, according as it is desired to separate positions of the brick pile on said platform from each other, and then again to rejoin them together. Simply for purposes of illustration, therefore, I have represented three sections (without being confined to that number), and each section 1, 2 and 2^a is provided with three pallets, each marked with the reference numeral 3, on which pallets the bricks can rest. These pallets run the length of the car as shown in Fig. 2, and the three of them on each section are so placed that the width from the outer edge of one on one side to the outer edge of the one on the other side is about equal to the length of a brick. These pallets must, of course be straight and true so that they will not warp or bend when loaded up to their full capacity. They are secured on the platform sections by means of screws or bolts 20, and are hence adjustable and removable. Their length in the present example is preferably such as to accommodate nine bricks, and the bricks may obviously be hacked up to any height, say eight.

In hacking the bricks upon my improved handling apparatus, I preferably employ a back-stop or vertical longitudinal alining board 4 supported in a stationary manner upon a frame alongside of a track on which the car moves, or it may be attached to the car. Hence, when the car is being loaded, the bricks on the pallets of the first section, *i. e.* section 2, can be placed in accurate position thereon by causing their ends to lie against the back-stop 4, which stands vertically and in exact line with the outer edge of a pallet as shown in Fig. 3; and when the bricks are being so placed, they will be put at right angles to the stop 4, and spaced apart a uniform distance, the intervals between the bricks being large enough for the insertion of lifting devices. This placing of bricks is seen clearly at A, Fig. 2. Of course, when the car is being loaded the sections 1, 2 and 2^a are close together, as seen in Fig. 3, so that transversely on the car there will be three bricks to a row accurately alined with and against each other, and there will be a large number of parallel rows between all of which there will be open spaces as seen in the lower layer represented in Fig. 1. This spacing of the members of the lower row of bricks a uniform distance apart makes it possible to insert the lifting fingers of any convenient and effective lifting mechanism, whereby the entire stack formation may at the proper time be removed from the car or other portable apparatus and placed in the burning kiln, or moved about from point to point as may be required in any of the manufacturing processes. One example of lifting mechanism is that shown and described in the patent of William H. Francis, No. 859,445, dated July 9, 1907, and another that shown and described in the patent of W. H. and C. Francis, No. 890,586, dated June 9, 1908. I cite these merely as sample machines without any intention of being limited to their use. In addition to the longitudinal alining board 4, it will be found convenient to employ means at one or both ends of the car having the same function as the alining

board 4. These end means may consist of hinged gates 5. In the drawings these gates 5 are hinged at 6 to the ends of the back-stop 4, and their free ends are preferably fastened by hooks or clamps 7 to the opposite parts of the car. In lieu of the movable gates at the ends of the car, permanent frames on the car may be utilized. Said gates when in proper position to permit the piling of the bricks will obviously be at right angles to the upright vertical faces of the alining board 4 and the bricks can be set accurately within the rectangular space thus formed.

Further describing the platform of the car which I have stated consists of sections 1, 2 and 2ª adapted to be held closely together, as shown in Fig. 3, or to be spread away from each other, as shown in Fig. 4, I show in the drawings one form of mechanism for accomplishing the spreading apart of said sections. This mechanism consists essentially of a longitudinal shaft 8 situated below the platform of the car and supported in suitable bearings. This shaft is provided at certain points, say near the ends thereof, with crank arms 9, to which are pivoted links 10, one of which has its opposite end pivotally connected to the underside of the movable platform-section 2 at 11, while the other is pivotally connected to the underside of the movable platform-section 2ª at 12. Each crank 9 projects in two directions so that it will provide pivotal points on opposite sides of the axis of the shaft 8 for the attachment of the two links 10 to said oppositely projecting portions of the crank 9. The longitudinal shaft 8 is susceptible of being rocked by means of a lever which is applied to either end of said shaft 8, as, for example, at the squared part 14 shown in Fig. 5. The sections 1, 2 and 2ª of the platform of the car are provided with angle pieces 15 securely bolted thereto and designed to slide upon and alongside of corresponding angle pieces 16 which are supported rigidly in the general framework 17 of the car. In view of the fact that the weight on the sections at times may be considerable, it may be found convenient to employ anti-friction rollers or ball-bearings or the like, as indicated at 18 in Fig. 6, in order to reduce the friction of these sliding sections as they move from side to side. Obviously, moreover, the platform of the car may be supported upon the usual trucks as shown at 19 in Fig. 3.

In the present example of car or portable apparatus, I have represented it as consisting of three longitudinal sections, the center of which is stationary, while the side ones are movable. I do not wish, however, to be restricted to arrranging the sections in this way, for obviously one of the side ones may be stationary and the others movable, and obviously there may be more or less than three sections, and several may be stationary and several removable. It will be an easy matter, however, to arrange the proper leverage for spreading apart whatever number of sections may be utilized. Further, it is not essential that trucks should be employed in every case as a means for transporting the platform and its load from point to point, but I wish to reserve the liberty of employing a sectional platform or surface for carrying a load of bricks for the purpose specified however the platform may be supported and moved about.

From the foregoing it will be perceived that when the sectional platform is properly placed alongside of the alining board, and the end gates or alining devices have been turned at right angles to said longitudinal alining board, the bricks may be laid in place. In Fig. 1, the arrangement of these bricks is clearly shown viewed from the side; while in Fig. 2 they are seen viewed from the top. At the right in Fig. 2 several courses of three each are seen, said courses running across the car at right angles thereto, and said courses being spaced apart sufficiently to allow the introduction thereinto of the lifting parts of whatever lifting apparatus is employed. It will be noted that on each section of the platform there is one brick on each transverse course. As the bricks are piled upon those lower courses each section of the platform will carry a series of transverse bricks at the bottom and preferably three courses of longitudinally-placed bricks as the next layer, then above them other bricks are transversely placed to form the third layer, and so on all as clearly indicated in Figs. 1, 2 and 3. Thus the whole car load is in stack formation and may be termed a unit stack. The parts thereof on the separate sections of the platform are also smaller units and are complete in themselves, for it is obvious that the bricks on each section of the platform abut closely against the bricks on the adjacent section or sections, that is to say the rows of brick on one platform-section are not tied into the rows of brick on the adjacent platform section, so that there is a more or less solid formation of these points, and while this is not objectionable for burning purposes, it is bad for drying, but by opening up the stack along these planes of division the drying is made effectual. Taking the entire car-load as a whole, therefore, it will be seen that the mass is built up loosely or in open formation suitable for burning and also suitable for drying except where the sub-units meet so that the hot air or other drying agency may easily pass through the openings thereof; and furthermore that the whole mass is built with distinct lines of vertical longitudinal cleavage so that the

longitudinal portions or smaller units of the mass are easily separable from each other by the separating movement of the supporting platform on which the entire pile of bricks is mounted. In thus arranging the bricks to be carried through the drier and in applying thereto the steps of the present process of spreading apart the mass on lines of predetermined cleavage and then recombining the sections into an entire single mass again, it must be noted that all the while there is to be borne in mind the idea of the ultimate destination of the bricks in the burning kiln and the necessity of placing them in the burning formation in the original setting, and maintaining their burning formation until the burning chamber of the kiln is reached.

The method which I am describing is to be construed broadly therefore as a method of taking a mass of material, the members of which have originally been set in loose or burning formation with portions thereof adapted to be separated by predetermined lines of longitudinal cleavage, and carrying this mass to the drier, when it is opened on said lines of cleavage in order to expose a greater surface to the drying action, and then at the conclusion of the drying action re-combining the separated parts together again without destroying the loose or burning formation so that the mass may be picked up and placed in the burning chamber.

Obviously the method is capable of being changed within considerable limits in its details without departing from the essence of the invention, and also the mechanism whereby the mass of bricks is carried about can be changed greatly without going outside of the scope of my claims. It is essential, however, that the original building of the entire stack should be in kiln formation suitable for burning but with detachable smaller units that are not tied together so that these smaller units may be separable from each other for drying or for any other purpose. The means whereby the stack is transported into the drier may be a car or any other mechanical device, but it is important that when the stack is submitted to the action of the drying agent, or submitted to some other operation to which it may be necessary to subject a mass of material, the entire stack will be separated into its individual detachable smaller unit stacks to remain in this segregated state until after the car or other device has passed through the drier and the mass of material issued in a dried or treated state ready to go to the kiln to be burned. In actual practice, moreover, it will be found that the entire stack should have a perfectly rectangular form and that the complete mass of material or unit may be five or six hundred bricks which is about the capacity of the ordinary drier car.

A modification of my improved method consists in hacking the mass of material such as bricks in open or loose formation suitable for burning, and instead of predetermined planes of division, arranging the sub-units or stacks with open spaces between them so that the initial step of opening the sections of the mass along predetermined planes will be omitted, and the original setting of the bricks will be such that they can be immediately transported to the drier, or brought under the influence of the drying agency, whatever it may be and wherever situated, whether in a drier proper or in the atmosphere, or some apartment. But after the drying action is concluded the sections of the mass will be brought into close association with each other in the manner fully described and set forth in my main description, this being essential in order that the various sections may be properly placed in the kiln for the successful burning of the brick and so that a lifting mechanism may take hold of the entire mass on the car or sectional platform for the purpose of transferring the same to the kiln for burning. It will be clearly understood, therefore, that my invention may take this form as well as the other, and may omit the initial active step of spreading apart certain sections which have been piled up with predetermined lines of division, the piling, as I have stated, being with open spaces and the method then consisting essentially of the closing up step of the process. In hacking the brick, however, with open spaces between the sub-units, instead of predetermined lines of separation or cleavage or planes of division, it must be understood that said open spaces are located in the same places as the planes of division and that when, after the drying operation is performed, the sections are brought together there will exist the lines or planes of cleavage similarly as explained in the main description.

By the term "bricks" as herein used, I mean to include, not only ordinary standard building bricks, but any blocks of regular form for building or other purposes adapted or requiring to be handled and treated according to the method set forth.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. The method of treating bricks, which consists in arranging the same in regular stack formation adapted for definite lines of separation, separating such stack along the lines of separation into sub-stacks with air circulatory spaces therebetween, and again, bringing said sub-stacks together to restore the stack to a unit formation, whereby it

may be handled *en masse* by a mechanical lifter, all with a preservation of the stack formation.

2. The method of treating bricks, which consists in arranging the same in regular stack formation adapted for definite lines of separation in vertical and substantially parallel planes, separating the stack along said lines of separation into sub-stacks with vertical air circulatory spaces between the sub-stacks, and again bringing the sub-stacks of the stack together to restore its unit formation while preserving the stacked relation of the bricks, whereby the stack may be further handled *en masse*.

3. The herein described method, which consists in hacking green bricks in open formation for kiln burning in unit stacks adapted to be handled *en masse*, with the stack formation arranged for vertical lines of cleavage, separating the stack into sub-stacks with vertical air spaces therebetween for drying, and again bringing the sub-stacks of the stack close together to restore the unit stack for further handling *en masse* by a mechanical lifter.

4. The herein described method, which consists in piling green bricks on top of one another in definite relation and loose formation suitable for kiln burning, with each pile forming a unit stack adapted to be handled *en masse*, separating such unit stack into parts with vertical air spaces between parts for drying, and again bringing the parts of the stack together into close formation, whereby the stack may again be handled as a unit for transfer to the kiln.

5. The herein described method, which consists in hacking green bricks in loose or open formation suitable for burning and in unit stacks, with planes of division adapted to separate the stack into sections, separating said sections along said planes during the drying operation to provide air circulatory spaces between sections, and then bringing the sections back to original close formation to restore the unit stack without disturbing the loose burning arrangement, whereby the unit stack may be subsequently handled *en masse* for transfer to a kiln.

6. An apparatus of the kind described, comprising a platform composed of separable sections adapted to each receive a portion of a unit brick stack, and means permanently associated therewith for positively separating the platform portions with their stack and positively bringing them together again at will while still loaded to restore the unit formation of a stack thereon.

7. An apparatus of the kind described, comprising a platform composed of separable sections, each section adapted to support a plurality of layers, each a plurality of bricks wide and long, and all in a unit stack formation, and positively operating connections to certain of said sections adapted to effect relative movement thereof for spacing apart portions of said brick stack piled thereon, said connections being formed to thereafter positively bring said sections together again at will for restoring the unit stack formation.

8. In apparatus for handling brick, a surface composed of a plurality of sections lying in the same plane, means for moving said sections relatively to each other consisting essentially of a leverage mechanism, and alining means placed longitudinally in a vertical position alongside of the said surface.

9. In an apparatus for handling bricks in the course of manufacturing the same, the combination of a platform composed of a plurality of sections, means for moving said sections relatively to each other, a vertical longitudinal stop device for enabling the bricks to be properly placed, and alining means at the ends of the platform for enabling the bricks to be properly placed.

10. An apparatus of the kind described, comprising a platform composed of a plurality of separable sections each composed of a plurality of spaced-apart pallets adapted to receive transversely thereon the lower layer of a sub-stack of spaced-apart bricks superposed in stack-formation, and positively operating connections to certain of said sections for positively separating the sections and bringing them together again at will to separate the sub-stacks with air circulatory spaces therebetween and to bring said sub-stacks together again into unit stack formation.

11. An apparatus of the kind described, comprising a platform composed of a plurality of separable sections each composed of three separated pallets so placed that the width from the outer edge of the one on one side to the outer edge of the one on the other side is approximately equal to the length of a brick, each section being adapted to receive transversely thereon the lower layer of a sub-stack of spaced-apart bricks superposed in stack-formation, and positively operating connections to certain of said sections for positively separating the sections and bringing them together again at will to separate the sub-stacks with air circulatory spaces therebetween and to bring said sub-stacks together again into unit stack formation.

12. An apparatus of the kind described, comprising a platform composed of a plurality of separable sections each composed of a plurality of relatively fixed and spaced-apart pallets extending lengthwise of the platform and adapted to receive a series of spaced-apart bricks placed thereon transversely of the pallets and of the platform, and operating connections for positively

separating said separable sections and positively bringing them together again, said sections and their pallets being so positioned as to bring the bricks thereon into approximately touching engagement with each other when the sections are brought together.

13. An apparatus of the kind described, comprising a platform composed of a plurality of separable sections, each section having a width corresponding approximately to the length of a brick and having a length adapted to receive in spaced-apart relation the lower layer of transversely arranged bricks of a sub-stack, and connections directly connected to certain of said sections for positively separating all of the sections with their superimposed sub-stacks of bricks and for positively bringing together again said sections and their sub-stacks into a single unit stack formation.

14. An apparatus of the kind described, comprising a platform composed of a plurality of separable sections, each section having a width corresponding approximately to the length of a brick and having a length adapted to receive in spaced-apart relation the lower layer of transversely arranged bricks of a sub-stack, and spreading mechanism for said sections, comprising crank arms spaced apart lengthwise of said sections, and rigid link mechanisms similarly spaced apart and connecting at one end to certain of the sections and at the other end to the respective crank arms, and means for simultaneously operating said crank arms and link mechanisms to spread said sections from closed position or to retract the sections from spread position.

15. An apparatus of the kind described, comprising a platform composed of a plurality of separable sections, each section having a width corresponding approximately to the length of a brick and having a length adapted to receive in spaced apart relation the lower layer of transversely arranged bricks of a sub-stack, and spreading mechanism for said sections, comprising crank arms spaced apart lengthwise of said sections, and rigid link mechanisms similarly spaced apart and connecting at one end to certain of the sections and at the other end to the respective crank arms, means for simultaneously operating said crank arms and link mechanisms to spread said sections from closed position or to retract the sections from spread position, the apparatus having transversely extending bearings for the platforms to travel upon in their aforesaid movements, and said platforms having transversely arranged guiding members to coöperate with said bearings in maintaining the platforms in proper alinement.

In testimony whereof I affix my signature in presence of two witnesses.

RAYMOND C. PENFIELD.

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