

July 15, 1952

J. C. BONGIOVANNI

2,603,363

WARE PILING APPARATUS

Filed Dec. 1, 1948

3 Sheets-Sheet 1

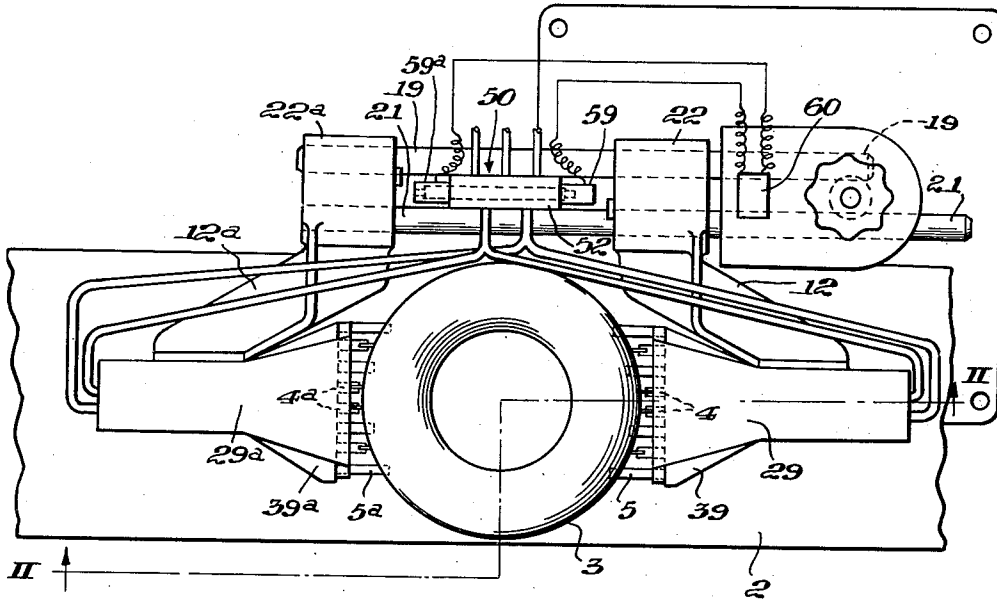


Fig. 1.

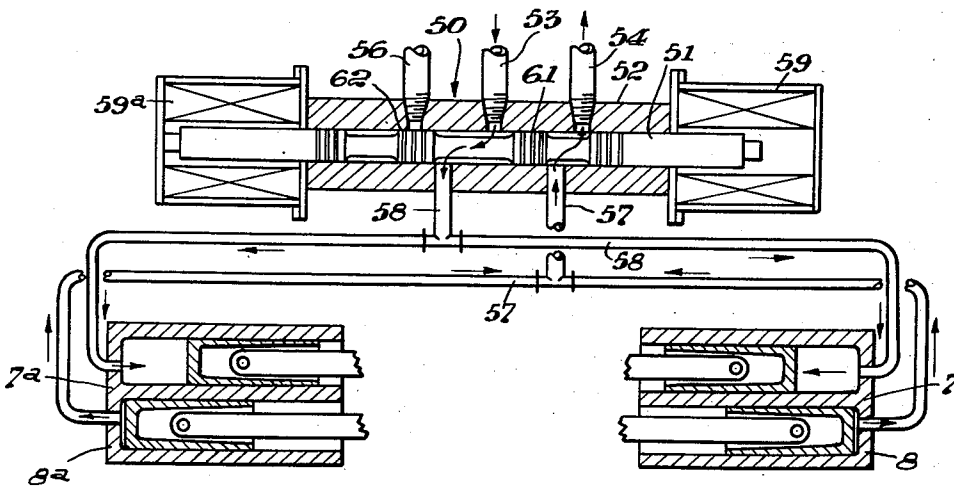


Fig. 5.

INVENTOR.
JOHN C. BONGIOVANNI.

BY

Brown, Britchlow, Flick & Peckham
his
ATTORNEYS.

July 15, 1952

J. C. BONGIOVANNI
WARE PILING APPARATUS

2,603,363

Filed Dec. 1, 1948

3 Sheets-Sheet 2

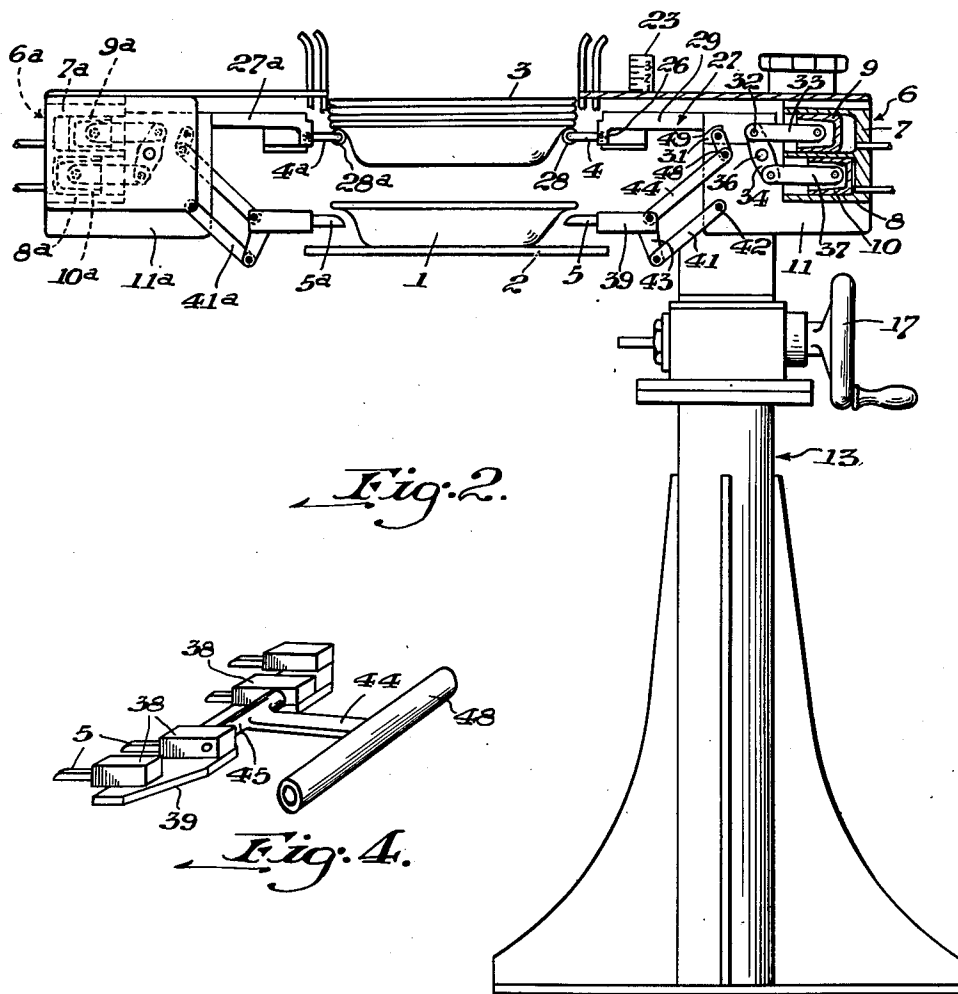
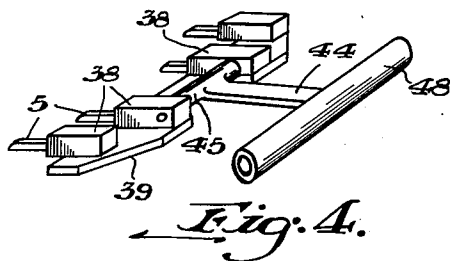


Fig. 2.



INVENTOR.
JOHN C. BONGIOVANNI.

BY
Brown, Britchlow, Slick & Beckham
his ATTORNEYS.

July 15, 1952

J. C. BONGIOVANNI
WARE PILING APPARATUS

2,603,363

Filed Dec. 1, 1948

3 Sheets-Sheet 3

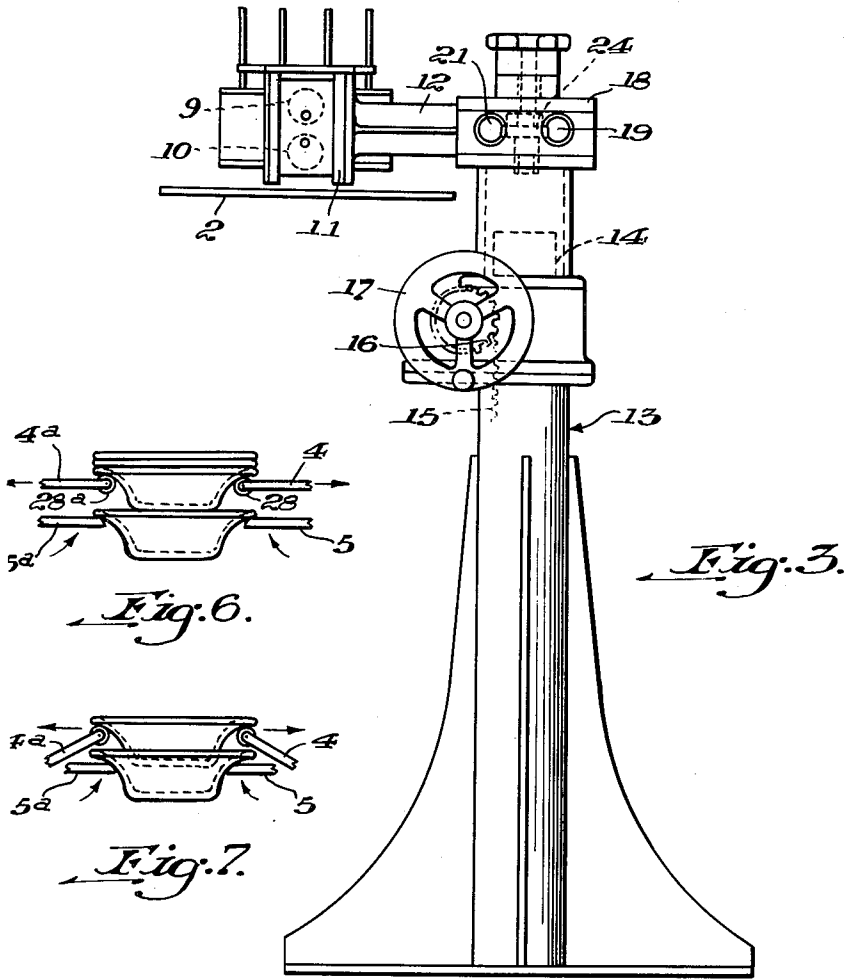


Fig. 3.

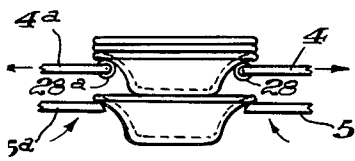


Fig. 6.



Fig. 7.



Fig. 8.

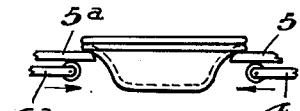


Fig. 9.

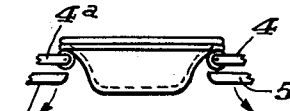


Fig. 10.

INVENTOR.
JOHN C. BONGIOVANNI.

BY

Brown, Britchlow, Slick & Beckham
ATTORNEYS

UNITED STATES PATENT OFFICE

2,603,363

WARE PILING APPARATUS

John C. Bongiovanni, Sewickley, Pa., assignor to
The Edwin M. Knowles China Company, Newell,
W. Va., a corporation of West Virginia

Application December 1, 1948, Serial No. 62,866

8 Claims. (Cl. 214-6)

1

2

This invention relates to apparatus for handling pottery ware and, in particular, to apparatus for removing such ware piece-by-piece from a conveyor and placing each piece upon a supported pile thereof.

After some of the operations in the manufacture of pottery ware, such as those of brushing or glazing, it becomes necessary to pick up the ware from the conveyor and gather it into piles so that it may be carried to another station for a subsequent operation. Customarily, this piling has been by hand, this, however, being objectionable since it is not only relatively expensive in that it requires the full time of one or two workers, but also, quite slow.

It is therefore an object of this invention to provide automatically operating apparatus capable of rapidly removing pottery ware piece-by-piece from a conveyor and placing each piece on the bottom of a pile.

Another object is to provide such an apparatus which is simple, sturdy, relatively inexpensive and which is capable of handling pottery ware of different sizes and shapes.

A further object is to provide such an apparatus in which the speed of the piling can be adjusted to coincide with the rate of travel of the conveyor from which the ware is to be lifted.

According to the invention, the apparatus includes a pair of oppositely-disposed, horizontal reciprocable arms each of which are provided with a plurality of fingers that engage and support the pile of pottery ware. Below these arms are supported a pair of oppositely-disposed frames each of which also is provided with a plurality of fingers that, in operation, engage the bottom of a piece of pottery ware supported by the conveyor and lift it up to the pile. These frames are pivotally supported in a casing and means are provided (1) for swinging the oppositely-disposed frames upwardly and toward each other to lift the pottery ware to the bottom of the pile supported by the first-named fingers and to raise the thus augmented pile above these upper fingers and (2) for simultaneously moving the first-named fingers outwardly from their supporting engagement with the pile; and (3) for thereafter moving the arms inwardly to pile-engaging position and for swinging the frame downwardly. Preferably, such frame and arm-actuating means are a pair of oppositely-disposed, pneumatically-reciprocating motors each of which is connected to one of the pairs of arms. Also, the frames include a flat plate on which

the fingers are mounted and the plate is connected by a toggle-link mechanism to the casing. In addition, the toggle-link mechanisms each are connected by a pivotal link to its vertically adjacent arm, this linkage being such that, when the motors are reciprocated, the described piling actions ensue.

The preferred embodiment of the invention is illustrated in the accompanying drawings of which Fig. 1 is a plan view; Fig. 2 a section on line II-II of Fig. 1; Fig. 3 a right-hand end elevation of the apparatus shown in Fig. 1; Fig. 4 a perspective view of one of the lower finger-holding frames and a portion of the toggle mechanism for actuating it; Fig. 5 a suitable valve for controlling the reciprocations of the pneumatic motors, the valve being shown in a much enlarged scale with respect to the motors; and Figs. 6 to 10 somewhat diagrammatic views illustrating a cycle of a piling operation.

Referring to the drawings, the apparatus as a whole is designed to pick up pieces of pottery ware such as a bowl 1, from a traveling conveyor 2 and place the ware in a supported pile 3. However, it should be pointed out at this point that the drawings merely illustrate one manner in which the apparatus can be used and that it is equally suitable for other uses. Thus, for instance, instead of picking up and piling ware that is being carried on belt conveyor 2, it may be desired to pile ware after it has undergone certain fabricating steps on a rotary table, and the use of the word "conveyor" is intended to include such other tables. Also, it is possible that the ware may be handled in an inverted position, in which event it is intended that the downwardly facing side of each piece be considered as its "bottom side." Further, it will be recognized that the apparatus is suitable for handling other than "pottery ware," and could, for example, be used to pile aluminum plates, or such items as "setters" on which pottery ware is carried when in a green state. Consequently, the term "pottery ware," as used herein, should be given a sufficiently broad interpretation to include such other items.

As shown in Fig. 2, the pile is supported by oppositely-disposed, horizontally-extending fingers 4 and 4a and other, lower groups of fingers 5 and 5a are provided to engage bowl 1 and bring it up to the pile. Each of these groups of fingers are linked, in a manner to be described, to the pistons of oppositely-disposed pneumatic motors 6 and 6a, each of which has an upper and a lower cylinder 7, 7a and 8, 8a in

3

which pistons 9, 9a and 10, 10a are reciprocated. Each of the motors is mounted in a supporting box-like casing 11 and 11a and support for the casing is provided by rigid beams 12 and 12a (Figs. 1 and 3) which, in turn, are carried in such a way that the groups of fingers that they indirectly support can be moved up and down or laterally toward and away from each other to position them for handling pottery ware of different sizes and shapes.

The principal support for the apparatus is provided by a pedestal 13 and, to permit the referred-to vertical adjustments of the fingers, a shaft 14 (Fig. 3) is telescopically mounted in the pedestal, one side of the shaft being provided with rack teeth 15 which mesh with the teeth of a pinion 16, rotatably secured to a handwheel 17. The shaft, of course, is movable up and down by rotating the handwheel and, rigidly secured to its upper portion is a rack bar bearing member 18 that is provided with a pair of parallel, horizontal openings in which are slidably mounted a pair of rack bars 19 and 21. The support for these bars is provided by this bearing member and also by enlarged portions 22 and 22a (Fig. 1) of the two beam members 12 and 12a through which the bars project. With such an arrangement, it is apparent that rotation of handwheel 17 moves the whole finger-supporting structure up or down, and, preferably, an index arm 23 (Fig. 2) is secured to the pedestal for the purpose of indicating to the operator the particular height at which the apparatus is set.

The movement of the fingers toward and away from each other is for the purpose of adjusting their position to act on dinnerware of different diameters and this adjustment is obtained by another pinion and rack bar arrangement. Briefly, pinion 24 (Fig. 3) is positioned centrally between rack bars 19 and 21, and each of these bars is secured to a separate one of enlarged beam portions 22 and 22a. In the apparatus illustrated in Fig. 1, rack bar 21 is intended to be secured to the right-hand enlarged beam portion 22, and the other rack bar 19 to the left-hand enlarged beam portion 22a so that when the ratchet wheel is rotated by means of any suitable handwheel, the bars move in opposite directions and carry the fingers toward or away from each other.

As mentioned above, each of the groups of fingers are linked to the pneumatic driving means so that reciprocation of the motors will effect the necessary piling movements. Since this linkage is the same at both sides of the apparatus, its description will refer only to that shown at the right-hand side of Figs. 1 and 2. As there seen, upper fingers 4 are carried in lugs 25 extending downwardly from the inner end of a laterally-extending arm 27, and are so pivoted or hinged to these lugs that they can be swung upwardly from the horizontal position in which they are shown. Also, it is desirable to mount small, freely-rotatable wheels 28 in the outer end of the fingers to avoid possible marking of the pottery ware, it being recognized that such objectionable marking might otherwise occur during piling after the ware has been glazed. Preferably, these fingers are detachably mounted so that any number or shape of fingers may be substituted to best suit the particular ware being piled.

Arm 27 is formed of a top wall 29 and a pair of downwardly-extending side walls 31, these

4

latter walls providing the necessary bearing space for the linkage to be described. At the extreme outer end of the arm the side walls mount a transverse pivot pin 32 which is engaged by a piston connecting rod 33 of upper piston 9. Also, connected to pin 32 in a manner which will be understood, is another vertically inclined link 34 which is adapted to pivot about another pivot pin 36 borne in the side walls of box-like motor casing 11. This pivotal link, also, is connected at its lower end to a piston connecting rod 37 of lower piston 10. Upper and lower pistons 9 and 10 are cup-like in shape and the connecting rods are swingably mounted on pins carried in the pistons, such swinging piston connecting rods being necessary since, as the pistons reciprocate, the arms to which they are linked swing in an arc about fixed pin 36.

Lower fingers 5, as shown in Figs. 2 and 4, are carried, as shown in Fig. 4, in lugs 38 secured to a wide, flat plate 39 and are mounted in a fixed, horizontally-extending position. Plate 39, in turn, is so linked to finger-carrying arm 27 that movement of that arm produces the desired picking up movement of the lower finger. This linkage, preferably, is obtained through toggle mechanism which includes (Fig. 2) a lower link arm 41 mounted on a pin 42 supported in side walls of the motor casing 11 and this lower arm, in turn, is pivotally connected to a second link arm 43 which is secured to the bottom of plate 39. The toggle is completed by a third link arm 44, which, as best seen in Fig. 4, is pivotally connected at one end to a pin 45 carried between a pair of finger-bearing lugs 38, and at the other to another pivot pin 48 carried in the side walls of casing 11. Finally, in order that the motion of arm 27 be transmitted to the toggle, a short link arm 49, Fig. 2, connects finger bearing arm 27 to pivot pin 48. As a consequence, it will be noted that, as the pistons reciprocate, arm 27 moves toward or away from the pile of ware and, in so doing, causes the toggle link to pivot about its fixed pivot pin 48 and finger-bearing plate 39 to swing upwardly toward or away from the pile in the described manner. As will be appreciated, an advantage of the toggle arrangement is that it keeps plate 39 and its fingers disposed in a horizontal plane.

The pneumatic pressure for driving the pistons is supplied through a control valve 50 which is constructed so as to supply the pressure alternately to upper and lower cylinders 7, 7a and 8, 8a.

The particular valve illustrated in Figs. 1 and 5 is one that has been simplified for purposes of illustration, and it will be understood that there are numerous types of commercial valves which would serve the purpose just as well. Referring to Fig. 5, the valve includes a stem 51 mounted in a casing 52 which is provided with a single inlet line 53 and a pair of exhaust lines 54 and 56 positioned on either side of the inlet. Leading through the casing from the opposite side of the inlet and exhaust are another pair of pipes 57 and 58 which, a short distance from the casing, divide and lead to cylinders at the opposite sides of the apparatus, pipe 57 leading to lower cylinders 8 and 8a and the other pipe 58 to the upper cylinders 7 and 7a. Were stem 51 is slidably mounted in the casing and reciprocates in response to energization of solenoids 59 and 59a carried one at each end of casing 52. Also, the valve stem is provided with

valve seats 61 and 62 so spaced with respect to the inlets and exhausts of the casing that the pressure flows alternately through one or the other of said conduits 57 and 58. Thus, in the position in which the valve is shown in Fig. 5, pressure will flow, as indicated by the arrows, from inlet 53 through the central portion of casing 52 and through conduit 58 to upper cylinders 7 and 7a. Simultaneously, lower cylinders 8 and 8a are being exhausted through the conduits indicated, this being through conduit 57, the right-hand portion of casing 53 and through exhaust 54. When the valve stem is reciprocated to the right, the valve seats come to such a position that the flow is opposite to that indicated in Fig. 5. As has been stated, such a valve is well known and should need no further detailed description.

The reciprocations of the valve stem are controlled by a timing mechanism 60 (Fig. 1) which is electrically connected to the solenoids and which operates to alternately energize them. Such timing mechanisms also are well known commercially and should need no detailed description. However, the use of such mechanism is an important feature of the invention since it permits the frequency of reciprocations of the finger-actuating pistons, and therefore, the lifting of pieces of ware from a conveyor to a pile, to be varied to suit the speed of the conveyor.

The operation of the apparatus is more or less diagrammatically illustrated by Figs. 6 to 10. In such an operation, it is first necessary to carefully synchronize the reciprocation-controlling timing mechanism with the speed of travel of the conveyor so that lower groups of fingers 5 and 5a swing upwardly at the precise moment that a piece of potteryware reaches the pick-up station. The position of the fingers at this moment will be that as shown in Fig. 2, in which these lower fingers are about to make their first contact with bowl 1. From this position, the bowl is raised to the position shown in Fig. 6 in which it is just about to be brought into contact with the bottom piece of the pile of ware supported by upper fingers 4 and 4a. At this point, upper pistons 9 and 9a are being driven outwardly to move upper fingers 4 and 4a horizontally away from the pile, but the upper fingers still engage and support the pile. As the lower fingers continue their upward and inward swing, the bowl comes into contact with the upper fingers and, as shown in Fig. 7, swings these hinged fingers upwardly. At the same time, these upper fingers still are being moved outwardly and still contact the bottom of the lowest piece of ware in the pile. In Fig. 8 upper fingers 4, 4a are approaching their extreme outer position and, having parted contact with the pile, the sole pile-support is provided by the lower fingers. Also, in Fig. 8, the upper fingers are shown swung upwardly which would be a position held only for an instant, since they would immediately drop by gravity back to their normal horizontal position. In Fig. 9, the upper fingers are shown after they have so dropped back to position and it will be noted that the pile has been carried upwardly by the lower fingers to a height well above the horizontal plane of the upper fingers.

In Fig. 10, timing mechanism 60 has caused control valve 50 to shift so that the reverse reciprocations to those above-described has commenced. The upper fingers are shown as having been moved back inwardly to supporting contact with the pile, while the lower fingers are shown

swinging downwardly and away from the pile toward the position in which they are shown in Fig. 2. It will be understood that this cycle (movements progressively illustrated in Fig. 2 and Figs. 6 to 10) is repeated until all of the pieces of pottery ware on the conveyor have been raised. From time to time, as the pile grows too large, it may be necessary to remove part or all of it from the apparatus, but such a manual operation is far simpler and quicker than manually placing each piece in a pile, which heretofore has been the practice.

One advantage of the apparatus is, of course, its speed of operation which allows all of the pottery making operations to be speeded up and therefore increases the output of pottery. However, it also is important to note that the speed at which the two sets of fingers move is independent of the rate, or frequency, of piston reciprocations so that this frequency of reciprocations can be varied to suit the speed of the conveyor on which the ware is being transported or, in other words, if it is desirable to run the conveyor at a low speed, the lower fingers still can be moved rapidly in their arcuate direction and the upper fingers in their horizontal direction while the low conveyor speed can be compensated for by lengthening the delay period between each piling cycle. It is desirable to have rapidly moving fingers so that the possibility of ware being dropped is reduced and so that there will be a rapid pickup. The timing mechanism as well as the linkage shown in the drawings, is adapted to provide such a rapid movement, although it will be understood that other suitable linkages could be used. Another advantageous feature of the apparatus lies in its adaptability for use in handling various sizes and shapes of ware by making the simple finger adjustments described. Also, the fingers being detachably mounted, other sizes and shapes of fingers can be substituted as needed.

According to the provisions of the Patent Statutes, I have explained the principle of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. An apparatus for removing pottery ware piece-by-piece from a conveyor and placing each piece on the bottom of a pile thereof, comprising a pair of horizontally-reciprocable arms each provided with a plurality of fingers for normally engaging the bottom piece of a pile of ware and for supporting the pile, a pair of oppositely-disposed plates normally positioned below said arms, each of said plates bearing a plurality of fingers for engaging the bottom of a piece of ware supported by said conveyor, a horizontally-reciprocating motor connected to each of said finger-carrying arms, a frame for supporting said arms and plates, an arm and plate connecting pin mounted in said frame between each vertically adjacent arm and plate, a link connecting each of said arms to each of said connecting pins, and other linkage connecting each of said plates to each of said connecting pins, said plates being swingably carried by said supporting frame and said swinging movement being effected by the horizontal reciprocations of the arms, the linkage between the arms and the plates being such that reciprocations of said motors (1) swing said plates upwardly and towards each other to lift a piece of

7

ware to the bottom of the pile supported by said first-named fingers and to raise the thus augmented pile above said first-named fingers and (2) move said first-named fingers outwardly from supporting engagement with said pile, and (3) thereafter move said arms inwardly to pile-engaging position and swing said plates downwardly.

2. An apparatus for removing pottery ware piece-by-piece from a conveyor and placing each piece on the bottom of a pile thereof, comprising a pair of horizontally-reciprocable arms each provided with a plurality of fingers for normally engaging the bottom piece of a pile of ware and for supporting the pile, a pair of oppositely-disposed plates normally positioned below said arms, each of said plates bearing a plurality of fingers for engaging the bottom of a piece of ware supported by said conveyor, a horizontally-reciprocating motor connected to each of said finger-carrying arms, a frame for supporting said arms and plates, an arm and plate connecting pin mounted in said frame, a link connecting each of said arms to each of said connecting pins, other linkage connecting each of said plates to each of said connecting pins, said plates being swingably carried by said supporting frame and said swinging movement being effected by the horizontal reciprocations of the arms, the linkage between the arms and the plates being such that reciprocations of said motors (1) swing said plates upwardly and towards each other to lift a piece of ware to the bottom of the pile supported by said first-named fingers and to raise the thus augmented pile above said first-named fingers and (2) move said first-named fingers outwardly from supporting engagement with said pile, and (3) thereafter move said arms inwardly to pile-engaging position and swing said plates downwardly, and timing mechanism for controlling the frequency of the motor reciprocations.

3. Apparatus for removing pottery ware piece-by-piece from a conveyor and placing each piece on the bottom of a pile thereof, comprising a pair of oppositely-disposed horizontally-reciprocable arms each carrying a plurality of horizontally-projecting fingers for normally engaging the bottom piece of a pile of pottery ware and for supporting the pile, a pair of oppositely-disposed plates normally positioned below said arms each of said plates bearing a plurality of fingers for engaging the bottom of a piece of pottery ware supported by said conveyor, a horizontally-reciprocating motor connected to each of said finger-carrying arms, a frame for supporting said arms and plates, an arm and plate connecting pin mounted in said frame between each vertically adjacent arm and plate, toggle link mechanism supported by said frame and connecting each of said plates to each of said connecting pins, and a pivotal link connecting each of said arms to each of said connecting pins, said plates being swingably carried by said supporting frame and said swinging movement being effected by the horizontal reciprocations of the arms, the linkage between the arms and the plates being such that reciprocations of said motors (1) swing said plates upwardly and towards each other to lift a piece of ware to the bottom of the pile supported by said first-named fingers and to raise the thus augmented pile above said first-named fingers and (2) move said first-named fingers outwardly from supporting engagement with said pile, and (3) thereafter move said arms inwardly

8

to pile-engaging position and swing said plates downwardly.

4. Apparatus for removing pottery ware piece-by-piece from a conveyor and placing each piece on the bottom of a pile thereof, comprising a pair of oppositely-disposed horizontally-reciprocable arms each carrying a plurality of horizontally-projecting fingers for normally engaging the bottom piece of a pile of pottery ware and for supporting the pile, a pair of oppositely-disposed plates normally positioned below said arms each of said plates bearing a plurality of fingers for engaging the bottom of a piece of pottery ware supported by said conveyor, a horizontally-reciprocating motor connected to each of said finger-carrying arms, a frame for supporting said arms and plates, an arm and plate connecting pin mounted in said frame between each vertically adjacent arm and plate, toggle link mechanism supported by said frame and connecting each of said plates to each of said connecting pins, and a pivotal link connecting each of said arms to each of said connecting pins, said plates being swingably carried by said supporting frame and said swinging movement being effected by the horizontal reciprocations of the arms, the linkage between the arms and the plates being such that reciprocations of said motors (1) swing said plates upwardly and towards each other to lift a piece of ware to the bottom of the pile supported by said first-named fingers and to raise the thus augmented pile above said first-named fingers and (2) move said first-named fingers outwardly from supporting engagement with said pile, and (3) thereafter move said arms inwardly to pile-engaging position and swing said plates downwardly, and timing mechanism for controlling the frequency of the motor reciprocations.

5. Apparatus for removing pottery ware piece-by-piece from a conveyor and placing each piece on the bottom of a pile thereof, comprising a pair of oppositely-disposed horizontally reciprocable arms each carrying a plurality of horizontally-projecting fingers for normally engaging the bottom piece of a pile of pottery ware and for supporting the pile, said fingers being pivotally carried on a horizontal axis so as to be swingable upwardly, a pair of oppositely-disposed plates normally positioned below said arms each of said plates bearing a plurality of fingers for engaging the bottom of a piece of pottery ware supported by said conveyor, a horizontally-reciprocating motor connected to each of said finger-carrying arms, a frame for supporting said arms and plates, an arm and plate connecting pin mounted in said frame between each vertically adjacent arm and plate, toggle link mechanism supported by said frame and connecting each of said plates to each of said connecting pins, and a pivotal link connecting each of said arms to each of said connecting pins, said plates being swingably carried by said supporting frame and said swinging movement being effected by the horizontal reciprocations of the arms, the linkage between the arms and the plates being such that reciprocations of said motors (1) swing said plates upwardly and towards each other to lift a piece of ware to the bottom of the pile supported by said first-named fingers and to raise the thus augmented pile above said first-named fingers and (2) move said first-named fingers outwardly from supporting engagement with said pile, and (3) thereafter move said arms inwardly to pile-engaging position and swing said plates

downwardly, and timing mechanism for controlling the frequency of the motor reciprocations.

6. An apparatus for removing ware piece-by-piece from a conveyor and placing each piece on the bottom of a pile thereof, comprising a pair of oppositely-disposed horizontally-reciprocable arms each provided with a plurality of fingers for engaging the bottom piece of a pile of ware and for supporting the pile, a pair of oppositely-disposed plates normally disposed below said arms, a frame supporting each of said plates for vertical swingable movement toward and away from said ware, a plurality of fingers carried by each plate in position to engage opposite bottom edges of said ware upon said upward swing of the plates, a pair of oppositely-disposed horizontally reciprocating motors each connected to one of said pairs of arms, linkage pivotally connecting each plate to its vertical adjacent arm, said linkage being such that reciprocations of said motors (1) swing said plates upwardly and towards each other to lift a piece of ware to the bottom of the pile supported by said first-named fingers and to raise the thus augmented pile above said first-named fingers and (2) concurrently move said first-named fingers outwardly from supporting engagement with said pile, and (3) thereafter move said arms inwardly to pile-engaging position and concurrently swing said plates downwardly, and timing mechanism for controlling the frequency of said motor reciprocations.

7. An apparatus for removing ware piece-by-piece from a conveyor and placing each piece on the bottom of a pile thereof, comprising a pair of oppositely-disposed horizontally-reciprocable arms each provided with a plurality of fingers for engaging the bottom piece of a pile of ware and for supporting the pile, said fingers being pivotally carried on a horizontal axis so as to be swingable upwardly, a pair of oppositely-disposed plates normally disposed below said arms, a frame supporting each of said plates for vertical swingable movement toward and away from said ware, a plurality of fingers carried by each plate in position to engage opposite bottom edges of said ware upon said upward swing of the plates, a pair of oppositely-disposed horizontally reciprocating motors each connected to one of said pairs of arms, and linkage pivotally connecting each plate to its vertical adjacent arm, said linkage being such that reciprocations of said motors (1) swing said plates upwardly and towards each other to lift a piece of ware

to the bottom of the pile supported by said first-named fingers and to raise the thus augmented pile above said first-named fingers and (2) concurrently move said first-named fingers outwardly from supporting engagement with said pile, and (3) thereafter move said arms inwardly to pile-engaging position and concurrently swing said plates downwardly.

8. An apparatus for removing ware piece-by-piece from a conveyor and placing each piece on the bottom of a pile thereof, comprising a pair of oppositely-disposed horizontally reciprocable arms each provided with a plurality of fingers for engaging the bottom piece of a pile of ware and for supporting the pile, said fingers being pivotally carried on a horizontal axis so as to be swingable upwardly, a pair of oppositely-disposed plates normally disposed below said arms, a frame supporting each of said plates for vertical swingable movement toward and away from said ware, a plurality of fingers carried by each plate in position to engage opposite bottom edges of said ware upon said upward swing of the plates, a pair of oppositely-disposed horizontally reciprocating motors each connected to one of said pairs of arms, linkage pivotally connecting each plate to its vertical adjacent arm, said linkage being such that reciprocations of said motors (1) swing said plates upwardly and towards each other to lift a piece of ware to the bottom of the pile supported by said first-named fingers and to raise the thus augmented pile above said first-named fingers and (2) concurrently move said first-named fingers outwardly from supporting engagement with said pile, and (3) thereafter move said arms inwardly to pile-engaging position and concurrently swing said plates downwardly, and timing mechanism for controlling the frequency of said motor reciprocations.

JOHN C. BONGIOVANNI.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,663,288	Ulrich -----	Mar. 20, 1928
1,904,198	Brand -----	Apr. 18, 1933
1,958,845	Burns -----	May 15, 1934
1,963,621	Geyer -----	June 19, 1934
2,251,197	Nestmann -----	July 29, 1941
2,385,267	Franz -----	Sept. 18, 1945