To all whom it may concern:

Be it known that I, John Coryell, a citizen of the United States, residing at Coryell, in the county of Macomb and State of Michigan, have invented a certain new and useful Improvement in Multiple-Screw Jacks, of which the following is a specification.

This invention relates to multiple screw lifting jacks of the type in which a plurality of concentric screws are mounted telescopically of each other and of a base or standard in which they operate. The object of this invention is to provide a mechanism of this class in which the device can be so adjusted at the will of the operator that when it reciprocates the usual lifting lever successive swings of the lever in each direction will continuously operate the jack in the direction he has previously selected it shall move, and that he can reverse at will this direction of motion.

The invention consists in mechanism for carrying out these objects which can be very easily and cheaply made, which is satisfactory in operation and is not readily liable to get out of order. More particularly, the invention consists in a special form of shiftable ratchet mechanism readily operated by which the operator can convert the operation of the jack from continuous elevating to continuous lowering. More particularly, the invention consists in many features and details of construction which will be hereafter more fully set forth in the specification and claims.

Referring to the drawings in which like numerals represent the same parts throughout the several views,

Fig. 1 is a side elevation partly in section illustrating the jack in its preferred form.

Fig. 2 is a sectional plan view taken on the line 2—2 of Fig. 1.

Fig. 3 is a similar view on the line 3—3 of the same figure.

Fig. 4 is a changed position view of the mechanism of Fig. 1, showing the screws extended from the base.

Fig. 5 is a sectional plan view taken on approximately the line 5—5 of Fig. 2.

Fig. 6 is a side view taken on approximately imaginary upward extension of the line 6 of Fig. 4.

Fig. 7 is a corresponding view taken on approximately the imaginary upward extension of line 7 of the same figure.

Fig. 8 is a plan view through a moveable ratchet and its casing showing the pin and slot connection between the two.

The jack of this invention is like all jacks of this class mounted in a cylindrical case 10 having an enlarged base 12 adapted to rest upon the floor or ground 14 and a convenient handle 16 for ready transportation in the hand of the user. This case 10 is recessed to receive, in screw threaded engagement, a larger or external screw 18 of the device which screw is in turn recessed to receive in screw threaded engagement, the interior screw 20 carrying at its upper end the usual work engaging block 22. The first mentioned set of screw threads 14 between the case and the larger screw is, as usual, cut in the opposite direction from the second set of threads 26 between the two screws. The interior screw 20 is provided at its top with the usual lifting bar 28 adapted for rotation in a horizontal plane in the ordinary manner to rotate the screw 20.

Extending from the top of the case 10 is an annular rim 30 carrying a set of ratchet teeth 32 pointed in one direction. Rigidly secured to the top of the outer screw by screws 34 is a collar 36 carrying on its upper circumference a set of fixed ratchet teeth 38 pointed in the opposite direction from teeth 32. Slidably mounted vertically of the external screw 18 is a plate or ratchet rider 40 carrying, on its under surface, ratchet teeth 42 adapted to detachably engage the teeth 32, herefore referred to. This plate or rider 40 is held against rotation with reference to the screw 18 through a non-circular spline connection 44 which does not interfere with the free vertical movement of the rider up and down of the screw.

In similar manner, the interior screw 20 is provided with a slidable ratchet rider 48 held in non-rotatable relation with the screw 20 by the spline or equivalent connection 50. On the underside of this rider 48 is placed a set of ratchet teeth 52 adapted to detachably engage the teeth 38, herefore referred to. It is entirely obvious, from the foregoing construction, particularly in the light of the teaching of my prior Patent No. 1,075,769, that when the teeth 52 are in mesh...
with teeth 38 and teeth 42 are in mesh with teeth 82 and the operator reciprocates handle 28 in a horizontal plane, motion of this handle in one direction will cause one screw to move in a given longitudinal direction with reference to the case 10 and that the reverse movement of the lever 23 will cause the other screw to move in the same direction with reference to the case 10, with the result that reciprocation of handle 23 causes a continuous movement in the given direction of block 22, that direction of motion depending upon the way the sets of teeth referred to are at manufacture pointed.

The problem of this invention is to provide mechanism which will convert a jack having the foregoing parts so that this general direction of motion of the lifting block 22 may be reversed at the will of the operator. This may be accomplished by the following mechanism:

The rider 40 is extended outside of the ratchet teeth 42, heretofore described, and is provided outside said ring of teeth 54 in a horizontal plane, a second ring of teeth 54 reversed in angular position to the first set of teeth 42.

Loosely surrounding the portion 30 of the screw and below these teeth 54 is a ratchet ring 56 having, on its upper circumference, a set of ratchet teeth 58 adapted to interfit with the teeth 54 just described, all as clearly shown in Fig. 7.

At suitable points around the circumference of the ring 56 are diagonal cam slots 60. These slots are entered respectively by studs or pins 62 supported rigidly on the inside of a cap or case 64. At other points in the reciprocating member 56 between the slots 60 are other vertical slots 66 entered by screw studs 68, shown in Fig. 1 mounted in the case member 10. These screw studs being stationary on the frame, it is obvious that the ratchet member 56 can move upward and downward with reference to the case in distance equal to the length of the slots 66 and can not move in any other direction with reference to the jack case. These pins or studs 68, just referred to, extend out beyond the member 56 into horizontally disposed cir-

merential slots 70 in cover 64. These slots are provided at their ends with locking notches 72 in which the pins rest for locking purposes. From the foregoing, it will be seen that when the operator takes hold of cover 64 and gives it a horizontal rotation, the length of slots 70 by which forces studs 62 carried by that cover to travel along slots 66. As cover 64 can only rotate in the plane of slots 70 due to the guiding action of fixed studs 68 and, as member 56 is free to reciprocate a distance equal to slot 60, it is obvious that this rotation of cover 64 forces member 56 to reciprocate a distance equal to the lengths of slots 66, i.e., the stud 62 travels the length of slot 60. This length of vertical movement of the member 56 is sufficient so that when it is in its extreme elevated position, it lifts the plate 40 to a sufficient height so that teeth 42 always clear teeth 38, and that teeth 54 mesh with teeth 58, and that when this member is in its extreme lower position teeth 42 are in mesh with teeth 38, and teeth 58 are so low down that they can never mesh with teeth 54. The result of this construction is that all the operator has to do to make the screw 18 rotate in a direction which he desires, is to select whichever set of teeth 54—58 or 42—38 should be in mesh under the original construction of the jack to effect that rotation.

A substantially similar construction is present in connection with effect continuation heretofore described. At this point, a ring 72 corresponding to member 56 is provided, there being on the upper edge of this ring ratchet teeth 74 meshing with teeth 76 on the outer circumference of plate 48 extending around the teeth 72, heretofore described and pointed in the teeth with direction of motion of the lifting block 20 may be reversed at the will of the operator. This may be accomplished by the following mechanism: The rider 40 is extended outside of the ratchet teeth 42, heretofore described, and is provided outside said ring of teeth 54 in a horizontal plane, a second ring of teeth 54 reversed in angular position to the first set of teeth 42.

Loosely surrounding the portion 30 of the screw and below these teeth 54 is a ratchet ring 56 having, on its upper circumference, a set of ratchet teeth 58 adapted to interfit with the teeth 54 just described, all as clearly shown in Fig. 7.

At suitable points around the circumference of the ring 56 are diagonal cam slots 60. These slots are entered respectively by studs or pins 62 supported rigidly on the inside of a cap or case 64. At other points in the reciprocating member 56 between the slots 60 are other vertical slots 66 entered by screw studs 68, shown in Fig. 1 mounted in the case member 10. These screw studs being stationary on the frame, it is obvious that the ratchet member 56 can move upward and downward with reference to the case in distance equal to the length of the slots 66 and can not move in any other direction with reference to the jack case. These pins or studs 68, just referred to, extend out beyond the member 56 into horizontally disposed cir-

merential slots 70 in cover 64. These slots are provided at their ends with locking notches 72 in which the pins rest for locking purposes. From the foregoing, it will be seen that when the operator takes hold of cover 64 and gives it a horizontal rotation, the length of slots 70 by which forces studs 62 carried by that cover to travel along slots 66. As cover 64 can only rotate in the plane of slots 70 due to the guiding action of fixed studs 68 and, as member 56 is free to reciprocate a distance equal to slot 60, it is obvious that this rotation of cover 64 forces member 56 to reciprocate a distance equal to the lengths of slots 66, i.e., the stud 62 travels the length of slot 60. This length of vertical movement of the member 56 is sufficient so that when it is in its extreme elevated position, it lifts the plate 40 to a sufficient height so that teeth 42 always clear teeth 38, and that teeth 54 mesh with teeth 58, and that when this member is in its extreme lower position teeth 42 are in mesh with teeth 38, and teeth 58 are so low down that they can never mesh with teeth 54. The result of this construction is that all the operator has to do to make the screw 18 rotate in a direction which he desires, is to select whichever set of teeth 54—58 or 42—38 should be in mesh under the original construction of the jack to effect that rotation.

The result of this construction is that assuming the jack in collapsed position of Fig. 1 and that the operator desires to have each opposite stroke of handle 28 effect continuous elevating of block 22, he takes hold of the covers 80 and 64 one after the other and moves them to set the particular set of teeth as 76—74, 54—58 to mesh with each other which will, in accordance with the original design of the jack effect elevating operation. When he has reached the elevated position of Fig. 4 and desires to lower, all he has to do is to take hold of these covers and move them so that the ratchet teeth, which were formerly out in mesh, are now out of mesh and the sets of teeth as 52—38 and 42—38, which were formerly out of mesh, are now in mesh, whereupon reciprocation of the handle will cause the block 22 to move continuously downward, regardless of which direction he is swinging the handle.

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

1. In mechanism of the class described, in combination with a case and a plurality of telescoping screws, means for manually rocking one of said screws on its axis, two sets of ratchet teeth oppositely disposed to each other between one screw and the case, corre-
spanding sets of oppositely disposed ratchet teeth between each two screws, and means selectively operable for throwing one set only of each set of ratchets into operative engagement whereby the operator can, by properly selecting the combination of operating teeth, make the jack operate continuously in a given direction with each stroke of the operating lever.

2. In mechanism of the class described, the combination of a case, one screw threaded into the case, a second screw inside the first screw threaded therein, the screw threads between the case and the first screw being in one direction and the other sets of screw threads being in the opposite direction, a ratchet mechanism for selectively connecting the case to the outer screw, another ratchet mechanism for selectively connecting the outer screw to the inner screw, the ratchet teeth of each of said ratchet mechanisms being reversed with reference to each other whereby rocking of the inner screw will cause said screws to be moved continuously in a given direction with each rocking movement, and a supplemental set of ratchet teeth adjacent to each of the first mentioned sets of ratchet teeth, each reversed with reference to the set with which it is placed, and out of engagement of the first set which is in operation, and mechanism for selectively disengaging each first set of ratchet teeth and simultaneously engaging each second set of ratchet teeth, for the purposes set forth.

3. In mechanism of the class described, two telescoping screw threaded members, an annular set of ratchet teeth on one of said members, a ratchet rider plate rotatable with, but reciprocably mounted upon, the telescoping member, a set of ratchet teeth on said ratchet rider meshing with the first set of ratchet teeth, a second set of ratchet teeth on the ratchet rider reversed in direction to its first set of ratchet teeth, and a reciprocable member between two different positions in one of which it holds the ratchet rider where the second pair of teeth mesh with each other and the originally mentioned pair are disengaged and vice versa.

4. In mechanism of the class described, two telescoping members, screw threaded with reference to each other, a ratchet rider reciprocable with reference to the inner member, and non-rotatable with reference thereto, two circles of oppositely disposed ratchet teeth on said ratchet rider, a set of ratchet teeth interfitting with one of said sets of teeth on the ratchet rider carried by a part rigid with the external telescoping member, another set of ratchet teeth interfitting with the other set of teeth on the ratchet rider carried by a member so movable on the external telescoping member which is movable longitudinally of the external telescoping member, and mechanism for selectively moving said reciprocable member to determine which set of teeth on the ratchet rider shall be in operative relation with its opposing set of teeth, for the purposes described.

5. In mechanism of the class described, two telescoping members, screw threaded with reference to each other, a ratchet rider reciprocable with reference to the inner member, and non-rotatable with reference thereto, two circles of oppositely disposed ratchet teeth on said ratchet rider, a set of ratchet teeth interfitting with one of said sets of teeth on the ratchet rider carried by a part rigid with the external telescoping member, another set of ratchet teeth interfitting with the other set of teeth on the ratchet rider carried by a member, a member so movable on the external telescoping member which is movable longitudinally of the external telescoping member, and mechanism for selectively moving said reciprocable member to determine which set of teeth on the ratchet rider shall be in operative relation with its opposing set of teeth, and means for detachably locking the member in each of its positions.

6. In mechanism of the class described, a pair of telescoping screw threaded members, a ratchet rider slidable lengthwise of the internal telescoping member, two concentric rows of oppositely disposed ratchet teeth on the ratchet rider, a set of ratchet teeth rigid on the external telescoping member meshing with one set of teeth on the ratchet rider, a member reciprocable parallel to the telescoping member having a set of teeth meshing with the other set of teeth on the ratchet rider, a cover member enclosing the ratchet rider and attached part, a pin and diagonal slot connection between said reciprocable member and a cover member, and a pin circumferential and slot connection between the cover and the exterior telescoping member whereby rotation of the cover member reciprocates said reciprocable member a sufficient distance to determine which set of teeth on the ratchet rider will be in operative position.

7. In mechanism of the class described, in combination with an external case, two telescoping screws inside the case, the outer screw engaging the case with threads in one direction and engaging the inner screw with threads in the opposite direction, means for manually rocking the outer screw on its axis in opposite directions, and two selectable operating mechanisms, one between the case and adjacent screw, the other between the...
two screws, positionable at the will of the operator to make the jack operate continuously in a given direction with each successive movement of the operating means.

3. In mechanism of the class described, in combination with an external case, two telescoping screws inside the case, the outer screw engaging the case with threads in one direction and engaging the inner screw with threads in the opposite direction, means for manually rocking the outer screw on its axis in opposite directions, and two selectable ratchet mechanisms, one between the case and adjacent screw, the other between the two screws, positionable at the will of the operator to make the jack operate continuously in a given direction with each successive movement of the operating means.

In witness whereof I have hereunto subscribed my name in the presence of two witnesses.

JOHN CORYELL.

Witnesses:
Dwight B. Cheever,
Anna Rosenthal.