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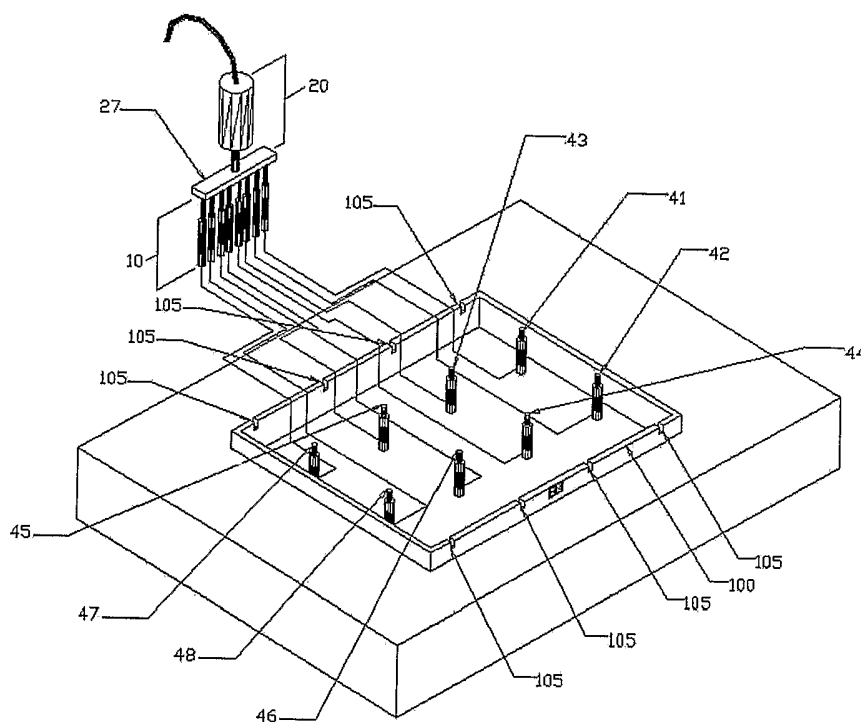
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(54) Title: HOUSE LIFTING AND LOWERING DEVICE



(57) Abstract: A device for raising and lowering a house supported by carrier beams and skate beams, utilizing hydraulic jacks positioned on the basement floor within the foundation upon which the house is to be placed. The hydraulic jacks are independently of one another extended to engage the carrier beams supporting the house, and then together and in unison with all of the hydraulic jacks used to lift the house, are further extended the same distance and at the same rate to raise the house, allowing for the removal of the skate beams, and thereafter allowing for the lowering of the house onto the foundation by retracting all of the hydraulic jacks, together and in unison, the same distance and at the same rate until the house rests on the foundation.

WO 2004/065712 A1

## HOUSE LIFTING AND LOWERING DEVICE

### FIELD OF INVENTION

The present invention relates to a device and process for raising and lowering a structure, and particularly, a device and process for raising and lowering a building or house.

### BACKGROUND OF THE INVENTION

In the manufacturing of buildings, and particularly houses, it is well-known to manufacture a completed or partially completed buildings or houses within a factory (referred to herein as a "house" or "houses"), for subsequent relocation of the house by means of a truck trailer or transporter, to a subdivision or other location in which the house will be positioned and installed on top of a foundation.

United States Patent Number 5,402,618 (Biffis *et al*) discloses one such manufacturing process, and the use of a mobile crane at the foundation site to remove the house from the truck trailer or transporter onto the foundation. The use of a mobile crane in the manner described in Biffis *et al* requires the mobile crane to be available for each move, and requires an elaborate lifting frame, cables, straps and attachment elements to secure the house during the lifting, placement and lowering processes. Furthermore, the process described in Biffis *et al* requires the use of a steel base member upon which the house is assembled to support the house so that the house will not flex or bend during movement.

United States Patent Number 4,187,659 (Blachura) also discloses the use of a mobile crane at the foundation site to remove a house from the truck trailer or transporter onto the foundation and the use of lifting rods which extend through the walls of the house to engage beams located beneath the house. The rods extend through the roof of the house, being attached to a rigid rectangular frame harness located above the house, from which cables or chains extend for lifting by the mobile crane.

These processes require the use of a variety of elaborate apparatuses for slinging and supporting the house during the move, and the use of a mobile crane on site during the move. The use of a mobile crane has several disadvantages, namely, the expense of acquiring, operating and maintaining such equipment in the field, the need for expansive areas in which to place and operate such equipment during the installation process, and the requirement that the equipment be situated on stable ground sufficient to support the crane and its related equipment and outriggers, and the house.

#### SUMMARY OF THE INVENTION

The object of the present invention is to provide a device for raising and lowering a building or house in a precise manner, so that it can be precisely and easily positioned, without damage.

Accordingly, the present invention relates to a device for lifting and lowering a house, including, at least three hydraulic jacks, means for releasably engaging each of the at least three hydraulic jacks to the house, at least three positive displacement hydraulic pumps, each of which at least three positive displacement hydraulic pumps being individually hydraulically linked to only one of the at least three hydraulic jacks, a means for actuating each of the at least three positive displacement hydraulic pumps so that each of the at least three hydraulic jacks, and the house, may be raised or lowered at the same rate, by the same amount.

According to a further aspect of the present invention, there is provided a device for lifting and lowering a house, comprising at least three hydraulic jacks, each of the at least three hydraulic jacks being isolated from each other; means for releasably engaging each of the at least three hydraulic jacks to the house; a positive displacement hydraulic pump, the positive displacement hydraulic pump being able to isolate and raise or lower each of the at least three hydraulic jacks separately from any other one of the at least three hydraulic jacks; and a means for actuating the positive displacement hydraulic pump so that each of the at least three hydraulic jacks, and the house, may be raised or lowered at the same rate,

by the same amount.

According to a still further aspect of the present invention there is provided a device for lifting and lowering a house supported on carrier beams onto a house foundation comprising a plurality of hydraulic jacks; valve means for releasably engaging each of the plurality of hydraulic jacks to the house; at least three positive displacement hydraulic pumps, each of which at least three positive displacement hydraulic pumps being individually hydraulically linked to a corresponding one of the plurality of hydraulic jacks; and a means for actuating each of the at least three positive displacement hydraulic pumps so that each of the plurality of hydraulic jacks, and the house, may be raised or lowered at the same rate, by the same amount.

According to a further aspect of the present invention, there is provided a device for lifting and lowering a house supported on carrier beams onto a house foundation comprising a hydraulic reservoir filled with hydraulic fluid; a hydraulic pump; at least three hydraulic jacks; valve means for releasably engaging each of the at least three hydraulic jacks to the house; at least three positive displacement hydraulic pumps, each of which at least three positive displacement hydraulic pumps being individually hydraulically linked to a corresponding one of the at least three hydraulic jacks; and an actuating assembly for actuating each of the at least three positive displacement hydraulic pumps so that each of the at least three hydraulic jacks, and the house, may be raised or lowered at the same rate, by the same amount.

According to a still further aspect of the present invention there is provided a device for lifting and lowering a house supported on carrier beams onto a house foundation comprising a hydraulic reservoir filled with hydraulic fluid; a hydraulic pump; at least three hydraulic jacks; valve means for releasably engaging each of the at least three hydraulic jacks to the house; at least one positive displacement hydraulic pump, the positive displacement hydraulic pump being able to isolate and raise or lower each of the at least three hydraulic jacks separately from any other one of the at least three hydraulic jacks; and an actuating assembly for actuating the positive displacement hydraulic pump so that each of the at

least three hydraulic jacks, and the house, may be raised or lowered at the same rate, by the same amount.

According to a further aspect of the present invention, there is provided a system for raising or lowering a house onto a house foundation comprising providing at least three hydraulic jacks at the house foundation; valve means for releasably engaging each of the at least three hydraulic jacks to the house; providing at least three positive displacement hydraulic pumps, each of which at least three positive displacement hydraulic pumps being individually hydraulically linked to a corresponding one of the at least three hydraulic jacks; actuating means for actuating each of the at least three positive displacement hydraulic pumps so that each of the at least three hydraulic jacks can engage the house; extending the at least three hydraulic jacks to raise the house upwardly; and contracting the at least three hydraulic jacks to lower the house onto the house foundation.

According to a still further aspect of the present invention there is provided a system for raising or lowering a house supported on carrier beams onto a house foundation comprising a beam assembly for supporting the carrier beams upon which the house rests; the beam assembly spanning a foundation of the house; transferring the carrier beams supporting the house along the beam assembly to a position above and in alignment with the house foundation; providing at least three hydraulic jacks at the house foundation; valve means for releasably engaging each of the at least three hydraulic jacks to the house; providing at least three positive displacement hydraulic pumps, each of which at least three positive displacement hydraulic pumps being individually hydraulically linked to a corresponding one of the at least three hydraulic jacks; actuating means for actuating each of the at least three positive displacement hydraulic pumps so that each of the at least three hydraulic jacks, and the house, may be raised at the same rate, by the same amount, to engage the house; extending the at least three hydraulic jacks to engage and raise the carrier beams supporting the house upwardly away from the beam assembly; removing the beam assembly; and contracting the at least three hydraulic jacks to lower the carrier beams supporting the house onto the house foundation.

According to a further aspect of the present invention, there is provided a system for

raising or lowering a house supported on carrier beams onto a house foundation comprising a hydraulic reservoir filled with hydraulic fluid; a hydraulic pump; providing at least three hydraulic jacks at the house foundation; valve means for releasably engaging each of the at least three hydraulic jacks to the house; providing at least three positive displacement hydraulic pumps, each of which at least three positive displacement hydraulic pumps being individually hydraulically linked to a corresponding one of the at least three hydraulic jacks;

an actuating assembly for actuating each of the at least three positive displacement hydraulic pumps so that each of the at least three hydraulic jacks can engage the carrier beams supporting the house; extending the at least three hydraulic jacks to raise the carrier beams supporting the house upwardly; and contracting the at least three hydraulic jacks to lower the carrier beams and the house onto the house foundation.

According to a still further aspect of the present invention there is provided a system for raising or lowering a house supported on carrier beams onto a house foundation comprising a hydraulic reservoir filled with hydraulic fluid; a hydraulic pump; providing at least three hydraulic jacks at the house foundation; valve means for releasably engaging each of the at least three hydraulic jacks to the house; providing at least one positive displacement hydraulic pump, the positive displacement hydraulic pump being able to isolate and raise or lower each of the at least three hydraulic jacks separately from any other one of the at least three hydraulic jacks; an actuating assembly for actuating the positive displacement hydraulic pump so that each of the at least three hydraulic jacks can engage the carrier beams supporting the house; extending the at least three hydraulic jacks to raise the carrier beams supporting the house upwardly; and contracting the at least three hydraulic jacks to lower the carrier beams and the house onto the house foundation.

The advantage of the present invention is that it provides a means for lowering a house or other house onto a foundation without requiring a mobile crane or similar device.

Additionally it is compact, and permits in appropriate circumstances, the use of the basement floor of the house or building as the support for the house or building while it is being lowered onto the foundation.

BRIEF DESCRIPTION OF THE DRAWINGS

A preferred embodiment of the present invention is described herein, with reference to the accompanying drawings, in which:

Figure 1 is a view of eight positive displacement pumps, a positive displacement pump actuator, and eight hydraulic jacks in one embodiment of the device when in the unloaded position;

Figure 2 illustrates an embodiment of eight hydraulic jacks positioned on the basement floor within the foundation for a house or building;

Figure 3 illustrates a house positioned upon carrier beams, and supported by skate beams, positioned above a house or building foundation;

Figure 4 is a view of three skate beams straddling the foundation which together with the eight hydraulic jacks of one embodiment of the present invention being in engagement with four carrier beams supporting the house or building;

Figure 5 is a view of the eight hydraulic jacks of one embodiment of the present invention in a fully raised position supporting the four carrier beams and the house or building;

Figure 6 is a view of the house or building positioned upon the foundation;

Figure 7 is a schematic diagram which depicts in schematic form one embodiment of the device of the present invention; and

Figure 8 is an alternative embodiment of eight positive displacement pumps and a positive displacement pump actuator.

#### DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Referring to the drawings more particularly by reference numerals, which illustrate a

preferred embodiment of the invention, Figure 1 illustrates eight positive displacement pumps generally shown as 10 in Figure 1, a positive displacement pump actuator generally shown as 20 in Figure 1, and eight hydraulic jacks 41, 42, 43, 44, 45, 46, 47 and 48, all in the lower unloaded position.

Referring to Figure 2, the eight hydraulic jacks 41, 42, 43, 44, 45, 46, 47 and 48 are shown positioned on the basement floor 60 of a foundation 100 for the house prior to the installation of the house 50 on the foundation 100. Each pair of hydraulic jacks is positioned to support a carrier beam, it being understood that these hydraulic jacks 41, 42, 43, 44, 45, 46, 47 and 48 may be pre-positioned prior to the arrival of the house 50, or may be positioned once the house 50 is positioned above the foundation 100, as described more fully herein. The base of each of the eight hydraulic jacks 41, 42, 43, 44, 45, 46, 47 and 48 is positioned stably and securely on the basement floor 60. The base of each of the hydraulic jacks 41, 42, 43, 44, 45, 46, 47 and 48 may rest directly upon the ground or basement floor 60, or if necessary, upon hydraulic jack load bearing plates (not shown) to distribute the weight to be loaded thereon.

Skate beam supports 70 are positioned on the basement floor 60, and on the ground outside of the foundation 100, to receive the load of the skate beams 72, 73 and 74, carrier beams 32, 34, 36 and 38 and the house 50 as described more fully herein. Skates or rollers (not shown) may be used between the carrier beams 32, 34, 36 and 38 and skate beams 72, 73 and 74 to permit the movement of the house 50 relative to the foundation 100 prior to lowering the house onto the foundation 100.

Referring to Figure 3, in the preferred embodiment, two or three more generally horizontally oriented skate beams 72, 73 and 74 are positioned parallel to one another across the foundation 100, the skate beams 72, 73 and 74 being supported by skate beam supports 70 suitably positioned on the basement floor and under both ends of the skate beams 72, 73 and 74 which extend beyond and outside of the foundation 100 for additional support.

As illustrated in Figure 3, in the preferred embodiment, carrier beams 32, 34, 36 and 38

are located beneath the house 50, to support and carry the load of the house 50. In the preferred embodiment, the four carrier beams 32, 34, 36 and 38 are oriented generally parallel to one another, and in the preferred embodiment, the carrier beams 32, 34, 36 and 38 are oriented generally perpendicular to the orientation of the joists of the house 50. In one embodiment, the foundation 100 is notched 105 to receive the carrier beams 32, 34, 36 and 38 when the house 50 is lowered onto the foundation 100 as more fully described herein.

In the preferred embodiment two hydraulic jacks are used for each carrier beam, it being understood that more than two hydraulic jacks may be used if necessary to support the weight of the carrier beam and the weight of the house 50 supported thereby.

In the preferred embodiment, four carrier beams 32, 34, 36 and 38 and eight hydraulic jacks 41, 42, 43, 44, 45, 46, 47 and 48 are used, it being understood that, in some circumstances, as few as three hydraulic jacks may be used (ie. the hydraulic jacks being arranged in a triangular pattern, two hydraulic jacks supporting one carrier beam and one hydraulic jacks supporting a second carrier beam), or a large number of hydraulic jacks and carrier beams may be utilized, depending, amongst other things, on the total weight of the house 50, the weight distribution and center of gravity of the house 50, the loading capacity of the hydraulic jacks, the loading capacity of the carrier beams, and the loading capacity of the basement floor 60.

In the preferred embodiment, the base of each of the hydraulic jacks 41, 42, 43, 44, 45, 46, 47 and 48 is securely positioned on the basement floor 60, (with or without hydraulic jack load bearing plates as necessary). In one embodiment, for added structural integrity, two or more of the hydraulic jacks may be connected together by structural links to minimize or eliminate any unstable horizontal or pivoting movement of the hydraulic jacks when loaded with a house 50.

Figure 3 illustrates the house 50, being supported by carrier beams 32, 34, 36 and 38 and skate beams 72, 73 and 74 and positioned immediately above and in alignment with the top of the foundation 100, ready to be lowered onto the top of the foundation 100. At this

time, the carrier beams 32, 34, 36 and 38 are positioned directly beneath the house 50, and are resting on and supported by generally horizontally oriented skate beams 72, 73 and 74. The carrier beams 32, 34, 36 and 38 are in alignment with the notches 105 in the foundation 100, and span across the joists of the house 50, in order to receive the weight of and provide support to the house 50.

### ***Presetting the Actuator to the Top Position for Lifting***

Referring to Figure 7, in the preferred embodiment, prior to lifting the house 50 and carrier beams 32, 34, 36 and 38 off of the skate beams 72, 73 and 74, the actuator piston 23 is set to an upper position generally shown as 22 in Figure 7 by filling each of the positive displacement pumps 10 with hydraulic fluid pumped by the main hydraulic pump 80 from the hydraulic fluid reservoir 90, the hydraulic fluid being pressurized sufficiently to fill each of the positive displacement pumps 10 and to move the actuator piston 23 to an upper position 22. More specifically, with each of the valves in manifold 110, manifold 120, manifold 130, and the valve 140 closed, valve 140 is opened and valve 111 is opened. Each of the valves of manifold 120 are then opened briefly to initially fill each of the positive displacement pumps 10 at a minimum of pressure, setting the actuator piston 23 to the upper position 22, the hydraulic fluid in the actuator 20 returning to the reservoir 90 through the opened valve 140. Valve 140 and the valves of manifold 120 are then closed, maintaining the actuator in the upper position 22.

### ***Loading the Carrier Beams***

With the actuator piston in the upper position 22, in the preferred embodiment, the first hydraulic jack piston 41 (positioned under the first carrier beam 32) is thereafter partially extended, independently of each of the other hydraulic jacks, receiving pressurized hydraulic fluid from the main hydraulic pump 80 (as described in more detail herein) until contact is made between the top of the first hydraulic jack 41 and the underside of the first carrier beam 32. In the preferred embodiment, the first hydraulic jack 41 is thereafter extended incrementally, and independently of the other hydraulic jacks until the first hydraulic jack 41 takes a portion of the load of the house 50 supported by that carrier beam

32 at that loading point. The portion of the load taken by the first hydraulic jack 41 is within a specified range, the lower end of the range being the negligible load of mere contact between the hydraulic jack 41 and carrier beam 32, and the upper range being determined, on a building by building basis, by the structural and loading limits of the house 50 and carrier beam, and the amount of flex or distortion permissible without resulting in structural or other damage to the house 50, it being understood that the flexing and distortion must not extend beyond the structural limits of the house 50 or be such that it would result in any structural or other damage to the house 50.

Thereafter, the second hydraulic jack 42, independently of the other hydraulic jacks, is similarly brought into contact with, and in the case of the preferred embodiment, also loaded with a predetermined portion of the load at that loading point in the same manner as the first hydraulic jack 41. This process continues until each of the hydraulic jacks are individually either brought into contact with their respective carrier beams, or in the case of the preferred embodiment, also loaded to carry a predetermined load of the house at that loading point, in the same manner as the first hydraulic jack 41.

It is understood that throughout this initial phase, the raising of each of the hydraulic jacks occurs independently of one another, by way of, in one embodiment, a positive displacement pump hydraulically linked independently to each hydraulic jack, or in another embodiment the hydraulic jacks being hydraulically isolated from one another such that a single positive displacement pump raises or lowers any individual hydraulic jack without at the same time raising or lowering any of the other hydraulic jacks. When the initial phase is complete, each of the hydraulic jacks is in contact with, and in the preferred embodiment, carrying a pre-determined load of the house, as illustrated in Figure 4.

More specifically, in the preferred embodiment, referring to Figure 7, with the actuator piston 23 in the upper position 22, the pressurized hydraulic fluid from the main hydraulic pump 80 reaches a first manifold 110, having valves 111 and 112 therein. When valve 111 is opened, pressurized hydraulic fluid flows from the hydraulic pump 80 to reach a second manifold 120 containing valve 121, valve 122 and valve 123 which latter valve represents

in the preferred embodiment both the third and also the fourth, fifth, sixth, seventh and eighth valves in manifold 120, each of these valves being of like nature and function as valves 121 and 122.

When valve 111 of manifold 110 is opened and valve 121 of the second manifold 120 is also opened, this permits pressurized hydraulic fluid from the hydraulic pump 80 to flow to valve 131 of the third manifold 130 and positive displacement pump 11. By controlling valve 121 or 131, the hydraulic jack 41 may be raised to come into contact with carrier beam 32, and in the preferred embodiment, extended incrementally until it takes up a predetermined load of the house 50 supported by that carrier beam at that loading point. Valves 121 and 131 are then closed.

Similarly, when valve 111 of manifold 110 is opened and valve 122 of the second manifold 120 is also opened, this permits pressurized hydraulic fluid from the hydraulic pump 80 to flow to valve 132 of the third manifold 130 and positive displacement pump 12. By controlling valve 122 or 132, the hydraulic jack 42 may be raised to come into contact with carrier beam 32, and in the preferred embodiment, extended incrementally until it takes up a predetermined load of the house 50 supported by that carrier beam at that loading point. Valves 122 and 132 are then closed.

Similarly when valve 111 of manifold 110 is opened and valve 123 of the second manifold 120 is also opened, this permits pressurized hydraulic fluid from the hydraulic pump 80 to flow to valve 133 of the third manifold 130 and positive displacement pump 13. By controlling valve 123 or 133, the hydraulic jack 43 may be raised to come into contact with carrier beam 34 (illustrated in Figure 4), and in the preferred embodiment, extended incrementally until it takes up a predetermined load of the house 50 supported by that carrier beam at that loading point. Valves 123 and 133 are then closed.

It is understood that valve 133 represents both the third, and the fourth, fifth, sixth, seventh and eighth valves in manifold 130, each of the additional valves being of like nature and function as valves 131 and 132. Likewise it is understood that positive displacement pump 13 represents both the third, and the fourth, fifth, sixth, seventh and eighth positive

displacement pumps, each of the additional positive displacement pumps being of like nature and function as positive displacement pumps 11 and 12. It is also understood that hydraulic jack 43 represents both the third, and the fourth, fifth, sixth, seventh and eighth hydraulic jacks, each of the additional hydraulic jacks being of like nature and function as hydraulic jacks 41 and 42, hydraulic jacks 43 and 44 supporting carrier beam 34, hydraulic jacks 45 and 46 supporting carrier beam 36 and hydraulic jacks 47 and 48 supporting carrier beam 38.

In the manner described above, the hydraulic line between each of the hydraulic jacks and its corresponding positive displacement pump has been filled with pressurized hydraulic fluid (each of corresponding the positive displacement pump chambers also being filled with pressurized hydraulic fluid), which pressure, in the case of the preferred embodiment, may be unique to each of these connecting hydraulic lines and positive displacement pumps, the pressure in each line (and its corresponding positive displacement pump) being determined in part by the hydraulic pressure required to raise the corresponding hydraulic jack to the point where it supports the predetermined load of the house 50 at its loading point.

### ***Lifting the House***

Once each of the hydraulic jacks has been placed in contact with the carrier beams, or in the case of the preferred embodiment, taken a predetermined portion of the load of the house at the loading point for that hydraulic jack, control over the raising and lowering of all of the hydraulic jacks, and the house, passes to the set of positive displacement pumps 10 linked by an actuator cross-member 27 to a positive displacement pump actuator 20. In the preferred embodiment, all of the positive displacement pumps 10 are identical to one another in output volume, controls, and method of operation, each of the hydraulic jacks being individually hydraulically connected to its own positive displacement pump so that each of the hydraulic jacks extends or retracts at the same rate as the others.

It is understood that if each of the hydraulic jacks used to lift the house have identical piston diameters to one another, then if piston type positive displacement pumps are used,

the piston diameters of each of the positive displacement pumps are also identical. Similarly, if one or more of the hydraulic jacks used to lift the house has a relatively larger or smaller piston diameter than the others, then a correspondingly larger or smaller piston diameter is to be utilized in the corresponding positive displacement pump so that each of the pistons of the positive displacement pumps transfers that amount of hydraulic fluid to each of the hydraulic jacks as is required to precisely raise or lower all of the hydraulic jacks by an identical amount, and at an identical rate.

The positive displacement pump actuator controls 20 the output of all of the positive displacement pumps 10 in the set of positive displacement pumps so that when actuating the positive displacement pumps, each of the positive displacement pumps will pump precisely that quantity of hydraulic fluid to its corresponding hydraulic jack as is required to precisely extend or retract that hydraulic jack the same distance and at the same rate as each of the other hydraulic jacks.

To raise the house 50, the actuator 20 drives each of the positive displacement pumps 10 at the same rate forcing that volume of hydraulic fluid from each positive displacement pump into its corresponding hydraulic jack to raise each of the hydraulic jacks the same distance and at the same rate, it being understood that in doing so, the pressures in each of the hydraulic jacks, and their corresponding connecting hydraulic lines may be unique as described above. When the house 50 has been raised the desired amount, the actuator 20 is maintained in a stationary position until such time as further vertical movement of the house 50 is required. Figure 5 illustrates the house in a raised position, the carrier beams 32, 34, 36 and 38 are raised above the skate beams 72, 73 and 74, allowing for the removal of the skate beams 72, 73 and 74 prior to the lowering of the house 50 onto the foundation 100.

These steps are achieved in the preferred embodiment through the following series of steps, having reference to Figure 7. With each of the valves in manifolds 110, 120 and 130 and the valve 140 closed, the valves in manifold 130 are fully opened. Thereafter, in a controlled manner, valve 112 is opened which begins to fill the actuator cylinder 24 with pressurized hydraulic fluid from the reservoir 90 by way of the main hydraulic pump 80,

driving the actuator piston 23 towards the lower position, generally shown as 25 in Figure 7, extending the actuator rod 26 and by means of the actuator cross-member 27, driving hydraulic fluid from each of the positive displacement pumps 10 into their corresponding hydraulic jacks to lift the house. When the house 50 has been raised the desired amount, valve 112 is closed, maintaining the actuator 20, each of the positive displacement pumps 10, and each of the hydraulic jacks, in a fixed position.

With the house 50 raised, the skate beams 72, 73 and 74 are then removed, permitting the house 50 to be lowered directly onto the foundation 100, as illustrated in Figure 6.

### *Lowering the House*

To lower the house 50 onto the foundation 100, with the valves in manifold 130 opened and the valves in manifold 120 closed, the actuator piston 23 is permitted to return toward the upper position 22 by opening valve 140 in a controlled manner, thereby permitting the pressurized hydraulic fluid in the actuator cylinder 24 to be expelled from the actuator cylinder 24 into the reservoir 90 in a controlled manner, thereby allowing each of the positive displacement pumps 10 to receive pressurized hydraulic fluid from the hydraulic jacks 41, 42, 43, 44, 45, 46, 47, and 48 as the actuator piston 23 is moved toward the upper position 22 of the actuator 20. The controlled movement of the pressurized hydraulic liquid from each of the hydraulic jacks allows for the controlled and simultaneous lowering of each of the hydraulic jacks at the same rate, permitting the house 50 to be lowered onto the foundation 100 in a controlled manner. In one embodiment, the carrier beams are lowered into the corresponding notches 105 in the foundation 100, and when the weight of the house has fully transferred to the foundation 100 and off of the carrier beams, the carrier beams are removed and the notches filled in a suitable manner.

It is to be noted that positive displacement pumps could take many forms including piston pumps, vane pumps, gear pumps, progressive cavity pumps, and any other pump which produces a precisely controllable output and input volume of hydraulic fluid. In the preferred embodiment, all of the positive displacement pumps are identical to one another in both output and input volume, controls, and method of operation.

It is also to be noted that the actuator 20 could take many different forms. In the embodiment shown in Figure 7, the actuator 20 includes an actuator hydraulic cylinder 24, an actuator piston 23 connected to an actuator rod 26 and an actuator cross-member 27 to form an inverted "T", the actuator cross-member 27 being securely attached to the actuator rod 26 in such a manner as to actuate each of the positive displacement pumps 10 at the same rate, by maintaining a constant angle between the actuator rod 26 and the actuator cross-member 27. It is to be understood that many forms of actuators are capable of performing these functions, including motors, screw jacks, chains, or rack and pinions, coupled to other linkages which could readily be provided, to actuate the positive displacement pumps in the manner described herein. In one embodiment shown in Figure 8, the positive displacement pumps 10 are arranged in a generally circular arrangement, centered around the axis of the actuator cylinder 24 and actuator rod 26, to reduce the tendency to twist or bend the actuator cross-member 27, actuator rod 26, and/or actuator piston 23.

It is also to be understood that this invention may be used to lift and lower buildings and houses onto other surfaces, such as, for example, a trailer or transporter, or factory floor with appropriate modifications to the process to accommodate those circumstances.

Numerous modifications, variations and adaptations may be made to the particular embodiments of the invention described herein without departing from the scope of the invention which is defined in the claims.

### **INDUSTRIAL APPLICABILITY**

The invention provides a device and system for raising or lowering a house onto a house foundation, utilizing at least three hydraulic jacks, means for releasably engaging each of the at least three hydraulic jacks to the house, at least three positive displacement hydraulic pumps, the positive displacement hydraulic pumps being individually hydraulically linked to the hydraulic jacks, actuating means for actuating each of the positive displacement hydraulic pumps so that each of the hydraulic jacks, and the house, may be raised or lowered at the same rate, by the same amount. The present invention provides a means for

lowering a house or other house onto a foundation without requiring a mobile crane or similar device. Additionally it is compact, and permits in appropriate circumstances, the use of the basement floor of the house or building as the support for the house or building while it is being lowered onto the foundation.

**THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:**

1. A device for lifting and lowering a house, comprising:
  - a. at least three hydraulic jacks;
  - b. means for releasably engaging each of the at least three hydraulic jacks to the house;
  - c. at least three positive displacement hydraulic pumps, each of which at least three positive displacement hydraulic pumps being individually hydraulically linked to a corresponding one of the at least three hydraulic jacks; and
  - d. a means for actuating each of the at least three positive displacement hydraulic pumps so that each of the at least three hydraulic jacks, and the house may be raised or lowered at the same rate, by the same amount.
  
2. A device for lifting and lowering a house, comprising:

at least three hydraulic jacks, each of the at least three hydraulic jacks being isolated from each other;

means for releasably engaging each of the at least three hydraulic jacks to the house;

a positive displacement hydraulic pump, the positive displacement hydraulic pump being able to isolate and raise or lower each of the at least three hydraulic jacks separately from any other one of the at least three hydraulic jacks; and

a means for actuating the positive displacement hydraulic pump so that each of the at least three hydraulic jacks, and the house, may be raised or lowered at the same rate, by the same amount.

3. The device of claim 1 or claim 2, wherein the at least three hydraulic jacks are connected together to minimize horizontal and pivoting movement of the at least three hydraulic jacks when the at least three hydraulic jacks are in engagement with and supporting the house.
4. The device of any one of claims 1 to 3, wherein a base of the at least three hydraulic jacks is positioned on a foundation floor of the house.
5. The device of any one of claims 1 to 4, wherein a base of the at least three hydraulic jacks is positioned on a load bearing plate positioned on a foundation floor of the house.
6. The device of any one of claims 1 to 5, wherein the at least three hydraulic jacks are pre-positioned on a foundation floor of the house prior to raising and lowering the house.
7. The device of any one of claims 1 to 5, wherein the at least three hydraulic jacks are positioned on a foundation floor of the house foundation once the house is in a raised position above the foundation floor of the house.
8. A device for lifting and lowering a house supported on carrier beams onto a house foundation comprising:
  - a plurality of hydraulic jacks;
  - valve means for releasably engaging each of the plurality of hydraulic jacks to the house;

at least three positive displacement hydraulic pumps, each of which at least three positive displacement hydraulic pumps being individually hydraulically linked to a corresponding one of the plurality of hydraulic jacks; and

a means for actuating each of the at least three positive displacement hydraulic pumps so that each of the plurality of hydraulic jacks, and the house, may be raised or lowered at the same rate, by the same amount.

9. The device of claim 8, wherein the plurality of hydraulic jacks comprises eight hydraulic jacks positioned on a foundation floor of the house foundation.
10. The device of claim 8 or 9, wherein at least two hydraulic jacks are positioned to engage and support each carrier beam positioned underneath the house.
11. The device of any one of claims 8 to 10, wherein each of the plurality of hydraulic jacks are connected to a positive displacement hydraulic pump, the positive displacement hydraulic pump being able to isolate and raise or lower any of the plurality of hydraulic jacks separately from any other one of the plurality of hydraulic jacks; whereby each of the plurality of hydraulic jacks can be extended or retracted without a corresponding raising or lowering of any other one of the plurality of hydraulic jacks.
12. A device for lifting and lowering a house supported on carrier beams onto a house foundation comprising:
  - a hydraulic reservoir filled with hydraulic fluid;
  - a hydraulic pump;
  - at least three hydraulic jacks;
  - valve means for releasably engaging each of the at least three hydraulic jacks to the

house;

at least three positive displacement hydraulic pumps, each of which at least three positive displacement hydraulic pumps being individually hydraulically linked to a corresponding one of the at least three hydraulic jacks; and

an actuating assembly for actuating each of the at least three positive displacement hydraulic pumps so that each of the at least three hydraulic jacks, and the house, may be raised or lowered at the same rate, by the same amount.

13. The device of claim 12, wherein the device further comprises hydraulic lines within which the hydraulic fluid may flow, the hydraulic lines operably interconnecting the hydraulic reservoir, the hydraulic pump, the at least three hydraulic jacks, the at least three positive displacement hydraulic pumps and the actuating assembly together as a hydraulic flow circuit, whereby the hydraulic fluid can be transferred therein.
14. The device of claim 12 or 13, wherein the actuating assembly further comprises a positive displacement pump actuator and an actuator cross-member.
15. The device of claim 14, wherein the positive displacement pump actuator is linked to the at least three positive displacement hydraulic pumps by the actuator cross-member, the actuator cross-member being connected to an upper portion of the at least three positive displacement hydraulic pumps.
16. The device of claim 15, wherein the positive displacement pump actuator further comprises an actuator hydraulic cylinder, an actuator piston positioned within the actuator hydraulic cylinder, and an actuator rod, the actuator rod being positioned on an underside of the positive displacement pump actuator so as to connect the positive displacement pump actuator to an upper portion of the actuator cross-member.

17. The device of claim 16, wherein the at least three positive displacement hydraulic pumps are centered and arranged in a generally circular arrangement around an axis of the actuator hydraulic cylinder and the actuator rod.
18. The device of any one of claims 8 to 17, wherein a piston diameter of each of the at least three positive displacement hydraulic pumps is uniform, and each of the at least three positive displacement hydraulic pumps are identical to one another with respect to output volume, controls and method of operation.
19. The device of claim 18, wherein a piston diameter of each of the at least three hydraulic jacks uniformly corresponds to the piston diameter of each of the at least three positive displacement hydraulic pumps.
20. The device of claim 16 or 17, wherein a piston diameter of each of the at least three hydraulic jacks and each of the at least three positive displacement hydraulic pumps can be varied.
21. The device of claim 20, wherein if the piston diameter of one or more of the at least three hydraulic jacks is smaller or larger than the piston diameter of any other of the at least three hydraulic jacks, a correspondingly smaller or larger piston diameter is utilized in a corresponding one or more of the at least three positive displacement hydraulic pumps, whereby each of the at least three positive displacement hydraulic pumps transfers an amount of the hydraulic fluid to each of the at least three hydraulic jacks as required to raise or lower all of the at least three hydraulic jacks at the same rate, by the same amount.
22. The device of any one of claims 14 to 21, wherein the positive displacement pump actuator controls an output of all of the at least three positive displacement hydraulic pumps, whereby, when each of the at least three positive displacement hydraulic pumps have been actuated, each of the at least three positive displacement hydraulic pumps pumps a sufficient quantity of the hydraulic fluid to each of the at least three hydraulic jacks to extend or retract each of the at least

three hydraulic jacks at a same distance and rate.

23. The device of any one of claims 12 to 22, wherein the valve means further comprises a first valve, a second valve, a third valve and a fourth valve, wherein each of the valves are operably able to control a flow of the hydraulic fluid to each of the at least three hydraulic jacks to raise or lower the house.
24. The device of any one of claims 12 to 22, wherein the valve means further comprises a first manifold, a second manifold, a third manifold and a flow valve, each of the manifolds having valves which can control the flow of the hydraulic fluid to each of the at least three hydraulic jacks to raise or lower the house.
25. The device of claim 24, wherein the first manifold further comprises a first valve and a second valve.
26. The device of claim 24, wherein the second manifold further comprises a third valve, a fourth valve and a fifth valve.
27. The device of claim 24, wherein the third manifold further comprises a sixth valve, a seventh valve and an eighth valve.
28. The device of claim 24, wherein the second manifold and the third manifold each possess a number of valves which are linked with and correspond to a number of hydraulic jacks used to raise or lower to or from the house foundation.
29. The device of claim 28, wherein eight valves are positioned in each of the second and the third manifolds, and eight corresponding hydraulic jacks are positioned on a foundation floor of the house foundation.
30. A device for lifting and lowering a house supported on carrier beams onto a house foundation comprising:

a hydraulic reservoir filled with hydraulic fluid;

a hydraulic pump;

at least three hydraulic jacks;

valve means for releasably engaging each of the at least three hydraulic jacks to the house;

at least one positive displacement hydraulic pump, the positive displacement hydraulic pump being able to isolate and raise or lower each of the at least three hydraulic jacks separately from any other one of the at least three hydraulic jacks; and

an actuating assembly for actuating the positive displacement hydraulic pump so that each of the at least three hydraulic jacks, and the house, may be raised or lowered at the same rate, by the same amount.

31. The device of claim 30, wherein the device further comprises hydraulic lines within which the hydraulic fluid may flow, the hydraulic lines operably interconnecting the hydraulic reservoir, the hydraulic pump, the at least three hydraulic jacks, the positive displacement hydraulic pump and the actuating assembly together as a hydraulic flow circuit, whereby the hydraulic fluid can be transferred therein.
32. The device of claim 30 or 31, wherein the actuating assembly further comprises a positive displacement pump actuator and an actuator cross-member, the positive displacement pump actuator being linked to the at least one positive displacement hydraulic pump by an actuator cross-member, whereby the actuator cross-member is connected to an upper portion of the at least one positive displacement hydraulic pump.

33. The device of claim 32, wherein the positive displacement pump actuator further comprises an actuator hydraulic cylinder, an actuator piston movably positioned within the actuator hydraulic cylinder, and an actuator rod, the actuator rod being positioned on an underside of the positive displacement pump actuator so as to connect the positive displacement pump actuator to the upper portion of the actuator cross-member.
34. The device of any one of claims 30 to 33, wherein a piston diameter of each of the at least three hydraulic jacks uniformly corresponds to a piston diameter of the at least one positive displacement hydraulic pump.
35. The device of any one of claims 32 to 34, wherein the positive displacement pump actuator controls an output of the at least one positive displacement hydraulic pump, whereby, when the at least one positive displacement hydraulic pump has been actuated, at least one positive displacement hydraulic pump pumps a sufficient quantity of the hydraulic fluid to each of the at least three hydraulic jacks to extend or retract each of the at least three hydraulic jacks at a same distance and rate.
36. The device of any one of claims 30 to 35, wherein the valve means further comprises a first valve, a second valve, a third valve and a fourth valve, wherein each of the valves are operably able to control a flow of the hydraulic fluid to each of the at least three hydraulic jacks to raise or lower the house.
37. The device of any one of claims 30 to 36, wherein the positive displacement hydraulic pump is a piston pump, a vane pump, a gear pump or a progressive cavity pump.
38. The device of any one of claims 30 to 35, wherein the valve means further comprises a first manifold, a second manifold, a third manifold and a flow control valve, each of the manifolds having valves which can control the flow of the hydraulic fluid to each of the at least three hydraulic jacks to raise or lower the

house.

39. The device of claim 38, wherein the first manifold further comprises a first valve and a second valve.
40. The device of claim 38, wherein the second manifold further comprises a third valve, a fourth valve and a fifth valve.
41. The device of claim 38, wherein the third manifold further comprises a sixth valve, a seventh valve and an eighth valve.
42. The device of claim 38, wherein the second manifold and the third manifold each possess a number of valves which are linked with and correspond to a number of hydraulic jacks used to raise or lower to or from the house foundation.
43. The device of claim 42, wherein eight valves are positioned in each of the second and the third manifolds, and eight corresponding hydraulic jacks are positioned on a foundation floor of the house foundation.
44. The device of any one of claims 30 to 41, wherein the at least three hydraulic jacks are connected together to minimize horizontal and pivoting movement of the at least three hydraulic jacks when the at least three hydraulic jacks are in engagement with and supporting the house.
45. The device of any one of claims 30 to 41, wherein a base of the at least three hydraulic jacks is positioned on a foundation floor of the house.
46. The device of any one of claims 1 to 30 to 41, wherein a base of the at least three hydraulic jacks is positioned on a load bearing plate positioned on a foundation floor of the house.
47. The device of any one of claims 30 to 41, wherein the at least three hydraulic jacks

are pre-positioned on a foundation floor of the house foundation prior to arrival of the house at the house foundation.

48. The device of any one of claims 30 to 41, wherein the at least three hydraulic jacks are positioned on a foundation floor of the house foundation once the house is positioned above and in alignment with the house foundation.

49. A system for raising or lowering a house onto a house foundation comprising:

providing at least three hydraulic jacks at the house foundation;

valve means for releasably engaging each of the at least three hydraulic jacks to the house;

providing at least three positive displacement hydraulic pumps, each of which at least three positive displacement hydraulic pumps being individually hydraulically linked to

a corresponding one of the at least three hydraulic jacks;

actuating means for actuating each of the at least three positive displacement hydraulic pumps so that each of the at least three hydraulic jacks can engage the house;

extending the at least three hydraulic jacks to raise the house upwardly; and

contracting the at least three hydraulic jacks to lower the house onto the house foundation.

50. A system for raising or lowering a house supported on carrier beams onto a house foundation comprising:

a beam assembly for supporting the carrier beams upon which the house rests; the

beam assembly spanning a foundation of the house;

transferring the carrier beams supporting the house along the beam assembly to a position above and in alignment with the house foundation;

providing at least three hydraulic jacks at the house foundation;

valve means for releasably engaging each of the at least three hydraulic jacks to the house;

providing at least three positive displacement hydraulic pumps, each of which at least three positive displacement hydraulic pumps being individually hydraulically linked to

a corresponding one of the at least three hydraulic jacks;

actuating means for actuating each of the at least three positive displacement hydraulic pumps so that each of the at least three hydraulic jacks, and the house, may be raised at the same rate, by the same amount, to engage the house;

extending the at least three hydraulic jacks to engage and raise the carrier beams supporting the house upwardly away from the beam assembly;

removing the beam assembly; and

contracting the at least three hydraulic jacks to lower the carrier beams supporting the house onto the house foundation.

51. A system for raising or lowering a house supported on carrier beams onto a house foundation comprising:

a hydraulic reservoir filled with hydraulic fluid;

a hydraulic pump;

providing at least three hydraulic jacks at the house foundation;

valve means for releasably engaging each of the at least three hydraulic jacks to the house;

providing at least three positive displacement hydraulic pumps, each of which at least three positive displacement hydraulic pumps being individually hydraulically linked to

a corresponding one of the at least three hydraulic jacks;

an actuating assembly for actuating each of the at least three positive displacement hydraulic pumps so that each of the at least three hydraulic jacks can engage the carrier beams supporting the house;

extending the at least three hydraulic jacks to raise the carrier beams supporting the house upwardly; and

contracting the at least three hydraulic jacks to lower the carrier beams and the house onto the house foundation.

52. The system of claim 51, wherein hydraulic lines operably interconnect the hydraulic reservoir, the hydraulic pump, the at least three hydraulic jacks, the at least three positive displacement hydraulic pumps and the actuating assembly together as a hydraulic flow circuit, within which the hydraulic fluid may flow to enable the at least three hydraulic jacks to be raised or lowered.
53. The system of claim 51 or claim 52, wherein the valve means for releasably engaging each of the at least three hydraulic jacks to the house further comprises a first manifold having a first and second valve, a second manifold having at least three valves, a third manifold having at least three valves, and a flow control valve.

54. The system of claim 53, wherein the actuating assembly further comprises a positive displacement pump actuator and an actuator cross-member, the positive displacement pump actuator being linked to the at least three positive displacement hydraulic pumps by an actuator cross-member, whereby the actuator cross-member is connected to an upper portion of the at least three positive displacement hydraulic pumps.
55. The system of claim 54, wherein the positive displacement pump actuator further comprises an actuator hydraulic cylinder, an actuator piston movably positioned within the actuator hydraulic cylinder, and an actuator rod, the actuator rod being positioned on an underside of the positive displacement pump actuator so as to connect the positive displacement pump actuator to the upper portion of the actuator cross-member.
56. The system of claim 55, wherein, prior to extending the at least three hydraulic jacks to raise the carrier beams supporting the house upwardly, and with the at least three valves of the second manifold, the at least three valves of the third manifold, the first and second valve of the first manifold and the flow control valve in a closed position, the actuator piston within the actuator cylinder is moved to an upper position within the actuator hydraulic cylinder by:
- a. opening the flow control valve;
  - b. opening the first valve of the first manifold;
  - c. opening the at least three valves of the second manifold briefly to initially fill each of the at least three positive displacement hydraulic pumps at a minimum of pressure with hydraulic fluid pumped by the hydraulic pump from the hydraulic reservoir and set the actuator piston in the upper position, the hydraulic fluid returning to the hydraulic reservoir through the opened flow control valve; and
  - d. closing the flow control valve and the at least three valves of the second manifold, whereby the actuator piston is maintained in the upper position.

57. The system of claim 56, further comprising the steps of:
- a. opening a first valve of the second manifold;
  - b. using the hydraulic pump to pump hydraulic fluid from the hydraulic reservoir, the hydraulic fluid flowing through the opened first valve of the second manifold to each of a first one of the at least three positive displacement hydraulic pumps and a first valve of the third manifold;
  - c. opening the first valve of the third manifold briefly, wherein the hydraulic fluid flows into a first one of the at least three hydraulic jacks, whereby the first one of the at least three hydraulic jacks is brought to an initially extended position to contact a carrier beam supporting the house; and
  - d. closing either the first valve of the second manifold or the first valve of the third manifold, whereby the first one of the at least three hydraulic jacks is maintained in the initially extended position.
58. The system of claim 57, further comprising the steps of:
- a. opening a second valve of the second manifold;
  - b. using the hydraulic pump to pump hydraulic fluid from the hydraulic reservoir, the hydraulic fluid flowing through the opened second valve of the second manifold to each of a second one of the at least three positive displacement hydraulic pumps and a second valve of the third manifold;
  - c. opening the second valve of the third manifold briefly, wherein the hydraulic fluid flows into a second one of the at least three hydraulic jacks, whereby the second one of the at least three hydraulic jacks is brought to an initially extended position to contact a carrier beam supporting the house; and
  - d. closing either the second valve of the second manifold or the second valve of the third manifold, whereby the second one of the at least three hydraulic jacks is maintained in the initially extended position.

59. The system of claim 57, further comprising the steps of:
- a. opening a third valve of the second manifold;
  - b. using the hydraulic pump to pump hydraulic fluid from the hydraulic reservoir, the hydraulic fluid flowing through the opened third valve of the second manifold to each of a third one of the at least three positive displacement hydraulic pumps and a third valve of the third manifold;
  - c. opening the third valve of the third manifold briefly, wherein the hydraulic fluid flows into a third one of the at least three hydraulic jacks, whereby the third one of the at least three hydraulic jacks is brought to an initially extended position to contact a carrier beam supporting the house; and
  - d. closing either the third valve of the second manifold or the third valve of the third manifold, whereby the third one of the at least three hydraulic jacks is maintained in the initially extended position.
60. The system of claim 59, further comprising the steps of:
- a. closing the at least three valves of the second manifold, the first and second valve of the first manifold and the flow control valve;
  - b. opening the at least three valves of the third manifold;
  - c. opening the second valve of the first manifold;
  - d. using the hydraulic pump to pump hydraulic fluid from the hydraulic reservoir, the hydraulic fluid flowing through the opened second valve of the first manifold to fill the actuator hydraulic cylinder with the hydraulic fluid, whereby the actuator piston is moved from the upper position to a lower position in the actuator hydraulic cylinder, and extending the actuator rod, whereby the actuator cross-member forces the hydraulic fluid from each of the at least three positive displacement hydraulic pumps into each corresponding one of the at least three hydraulic jacks to extend the

- at least three hydraulic jacks to an substantially extended position and raise the carrier beams supporting the house upwardly; and
- e. closing the second valve of the first manifold whereby the actuator piston in the actuator hydraulic cylinder and each of the at least three positive displacement hydraulic pumps are maintained in a fixed position, and the at least three hydraulic jacks are maintained in the substantially extended position.
61. The system of claim 60, further comprising the steps of:
- a. closing the at least three valves of the second manifold;
  - b. opening the flow control valve, whereby the hydraulic fluid in the actuator hydraulic cylinder is expelled through the opened flow control valve into the hydraulic reservoir, whereby the actuator piston is moved from the lower position in the actuator hydraulic cylinder to the upper position, and whereby the hydraulic fluid from each of the at least three hydraulic jacks is transferred to each corresponding one of the at least three positive displacement hydraulic pumps, permitting the at least three hydraulic jacks to lower the carrier beams supporting the house downwardly onto the house foundation.
62. The system of claim 53, wherein the system further comprises eight hydraulic jacks which can engage the carrier beams supporting the house and eight positive displacement hydraulic pumps, each of the eight hydraulic jacks having a corresponding one of eight positive displacement hydraulic pumps, and the second manifold and the third manifold each have eight valves, each of the valves being controllable to raise or lower the carrier beams supporting the house.
63. A system for raising or lowering a house supported on carrier beams onto a house foundation comprising:

a hydraulic reservoir filled with hydraulic fluid;

a hydraulic pump;

providing at least three hydraulic jacks at the house foundation;

valve means for releasably engaging each of the at least three hydraulic jacks to the house;

providing at least one positive displacement hydraulic pump, the positive displacement hydraulic pump being able to isolate and raise or lower each of the at least three hydraulic jacks separately from any other one of the at least three hydraulic jacks;

an actuating assembly for actuating the positive displacement hydraulic pump so that each of the at least three hydraulic jacks can engage the carrier beams supporting the house;

extending the at least three hydraulic jacks to raise the carrier beams supporting the house upwardly; and

contracting the at least three hydraulic jacks to lower the carrier beams and the house onto the house foundation.

64. The system of claim 63, wherein hydraulic lines operably interconnect the hydraulic reservoir, the hydraulic pump, the at least three hydraulic jacks, the positive displacement hydraulic pump and the actuating assembly together as a hydraulic flow circuit, within which the hydraulic fluid may flow to enable the at least three hydraulic jacks to be raised or lowered.
65. The system of claim 63 or claim 64, wherein the valve means for releasably engaging each of the at least three hydraulic jacks to the house further comprises a

first manifold having a first and second valve, a second manifold having at least three valves, a third manifold having at least three valves, and a flow control valve.

66. The system of claim 65, wherein the actuating assembly further comprises a positive displacement pump actuator and an actuator cross-member, the positive displacement pump actuator being linked to the positive displacement hydraulic pump by an actuator cross-member, whereby the actuator cross-member is connected to an upper portion of the positive displacement hydraulic pump.
67. The system of claim 66, wherein the positive displacement pump actuator further comprises an actuator hydraulic cylinder, an actuator piston movably positioned within the actuator hydraulic cylinder, and an actuator rod, the actuator rod being positioned on an underside of the positive displacement pump actuator so as to connect the positive displacement pump actuator to the upper portion of the actuator cross-member.
68. The system of claim 67, wherein, prior to extending the at least three hydraulic jacks to raise the carrier beams supporting the house upwardly, and with the at least three valves of the second manifold, the at least three valves of the third manifold, the first and second valve of the first manifold and the flow control valve in a closed position, the actuator piston within the actuator cylinder is moved to an upper position within the actuator hydraulic cylinder by:
- a. opening the flow control valve;
  - b. opening the first valve of the first manifold;
  - c. opening the at least three valves of the second manifold briefly to initially fill the positive displacement hydraulic pump at a minimum of pressure with hydraulic fluid pumped by the hydraulic pump from the hydraulic reservoir and set the actuator piston in the upper position, the hydraulic fluid returning to the hydraulic reservoir through the opened flow control valve; and
  - d. closing the flow control valve and the at least three valves of the second manifold, whereby the actuator piston is maintained in the

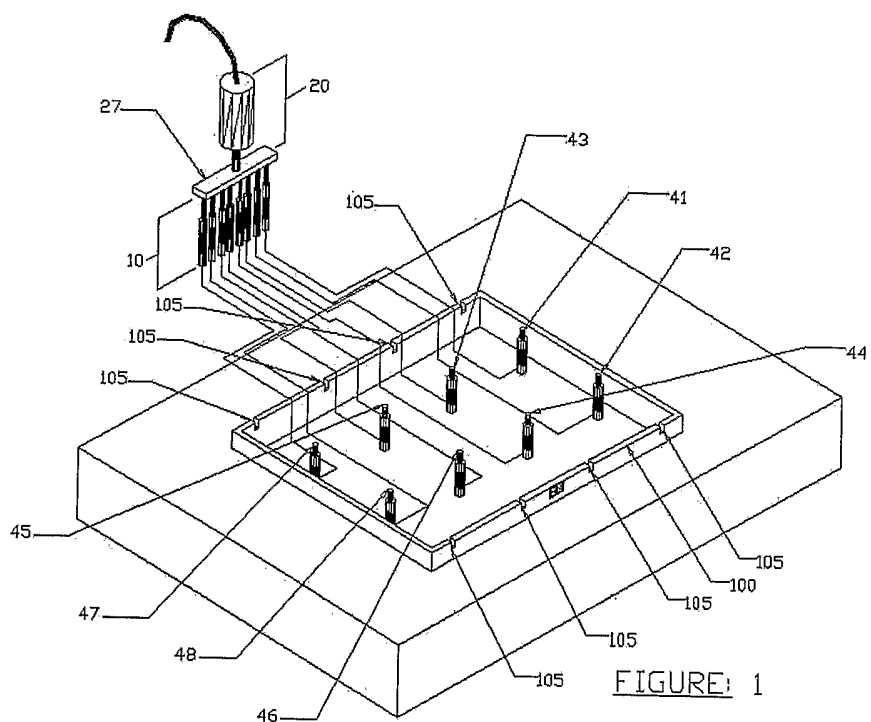
upper position.

69. The system of claim 68, further comprising the steps of:
- a. opening a first valve of the second manifold;
  - b. using the hydraulic pump to pump hydraulic fluid from the hydraulic reservoir, the hydraulic fluid flowing through the opened first valve of the second manifold to the positive displacement hydraulic pump and a first valve of the third manifold;
  - c. opening the first valve of the third manifold briefly, wherein the hydraulic fluid flows into a first one of the at least three hydraulic jacks, whereby the first one of the at least three hydraulic jacks is brought to an initially extended position to contact a carrier beam supporting the house; and
  - d. closing either the first valve of the second manifold or the first valve of the third manifold, whereby the first one of the at least three hydraulic jacks is maintained in the initially extended position.
70. The system of claim 69, further comprising the steps of:
- a. opening a second valve of the second manifold;
  - b. using the hydraulic pump to pump hydraulic fluid from the hydraulic reservoir, the hydraulic fluid flowing through the opened second valve of the second manifold to a second valve of the third manifold;
  - c. opening the second valve of the third manifold briefly, wherein the hydraulic fluid flows into a second one of the at least three hydraulic jacks, whereby the second one of the at least three hydraulic jacks is brought to an initially extended position to contact a carrier beam supporting the house; and
  - d. closing either the second valve of the second manifold or the second valve of the third manifold, whereby the second one of the at least three hydraulic jacks is maintained in the initially extended position.

71. The system of claim 70, further comprising the steps of:
- a. opening a third valve of the second manifold;
  - b. using the hydraulic pump to pump hydraulic fluid from the hydraulic reservoir, the hydraulic fluid flowing through the opened third valve of the second manifold to a third valve of the third manifold;
  - c. opening the third valve of the third manifold briefly, wherein the hydraulic fluid flows into a third one of the at least three hydraulic jacks, whereby the third one of the at least three hydraulic jacks is brought to an initially extended position to contact a carrier beam supporting the house; and
  - d. closing either the third valve of the second manifold or the third valve of the third manifold, whereby the third one of the at least three hydraulic jacks is maintained in the initially extended position.
72. The system of claim 71, further comprising the steps of:
- a. closing the at least three valves of the second manifold, the first and second valve of the first manifold and the flow control valve;
  - b. opening the at least three valves of the third manifold;
  - c. opening the second valve of the first manifold;
  - d. using the hydraulic pump to pump hydraulic fluid from the hydraulic reservoir, the hydraulic fluid flowing through the opened second valve of the first manifold to fill the actuator hydraulic cylinder with the hydraulic fluid, whereby the actuator piston is moved from the upper position to a lower position in the actuator hydraulic cylinder, and extending the actuator rod, whereby the actuator cross-member forces the hydraulic fluid from the positive displacement hydraulic pump into each one of the at least three hydraulic jacks to extend the at least three hydraulic jacks to a substantially extended position and raise the carrier beams supporting the house upwardly; and
  - e. closing the second valve of the first manifold whereby the actuator

piston in the actuator hydraulic cylinder and the positive displacement hydraulic pump are maintained in a fixed position, and the at least three hydraulic jacks are maintained in the substantially extended position.

73. The system of claim 72, further comprising the steps of:
- a. closing the at least three valves of the second manifold;
  - b. opening the flow control valve, whereby the hydraulic fluid in the actuator hydraulic cylinder is expelled through the opened flow control valve into the hydraulic reservoir, whereby the actuator piston is moved from the lower position in the actuator hydraulic cylinder to the upper position, and whereby the hydraulic fluid from each of the at least three hydraulic jacks is transferred to the positive displacement hydraulic pump, permitting the at least three hydraulic jacks to lower the carrier beams supporting the house downwardly onto the house foundation.



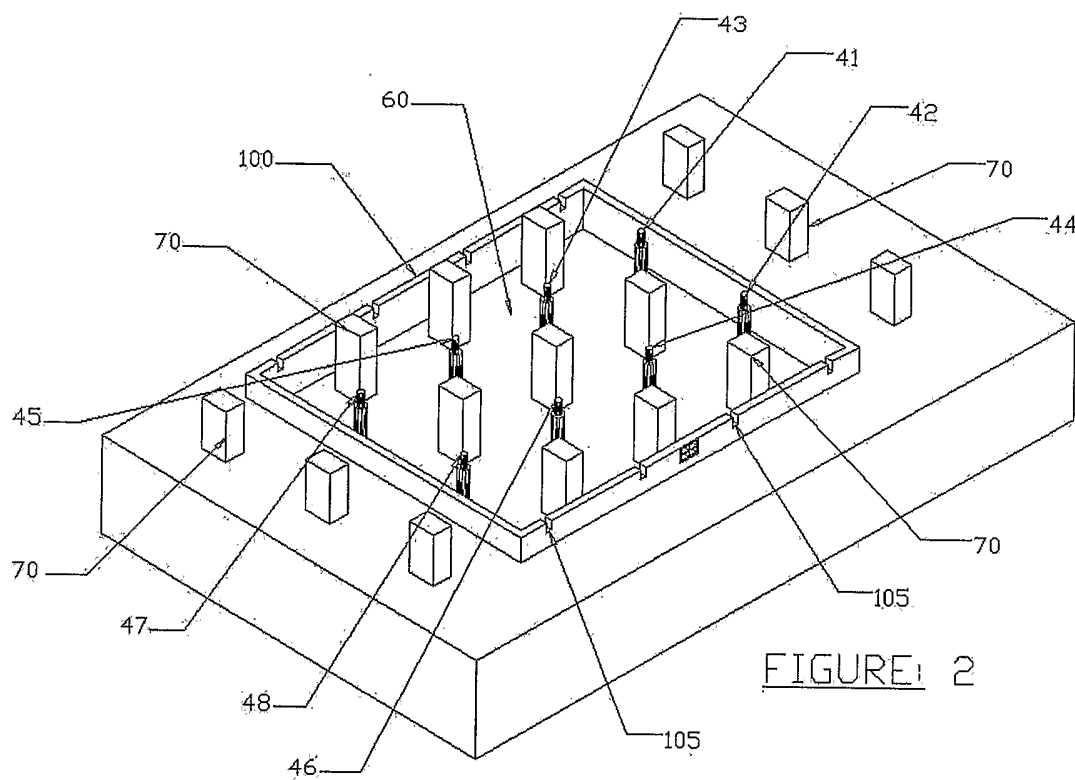


FIGURE 2

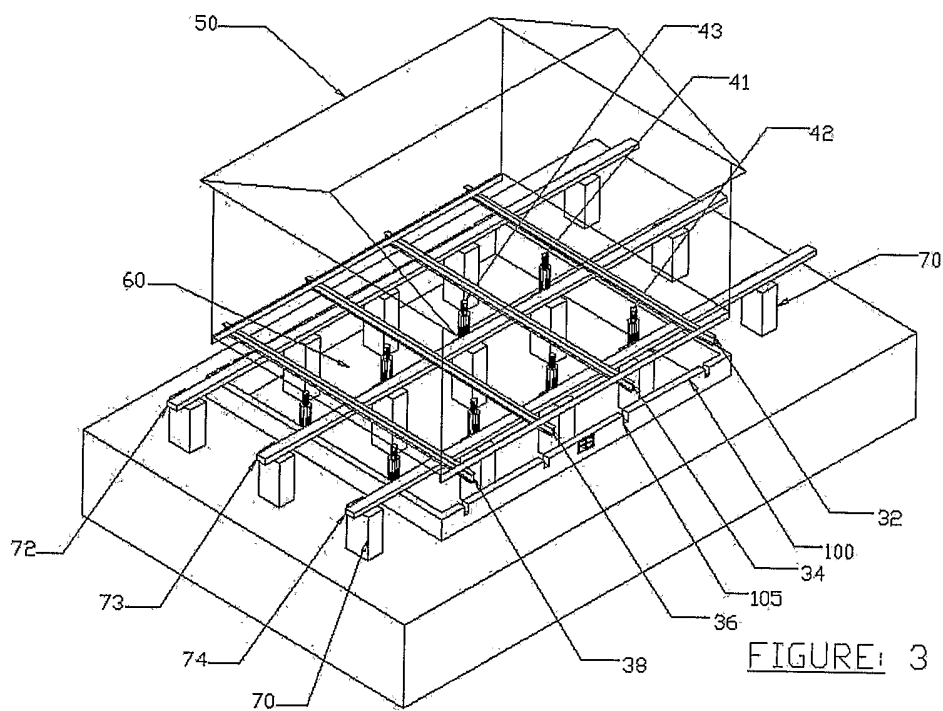
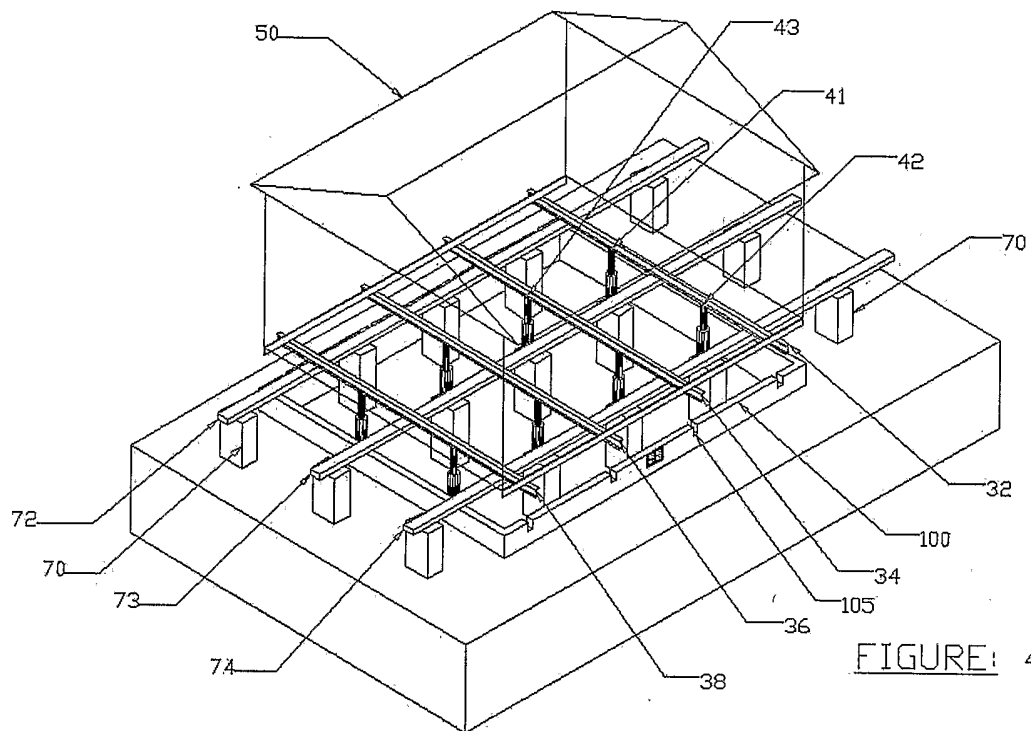
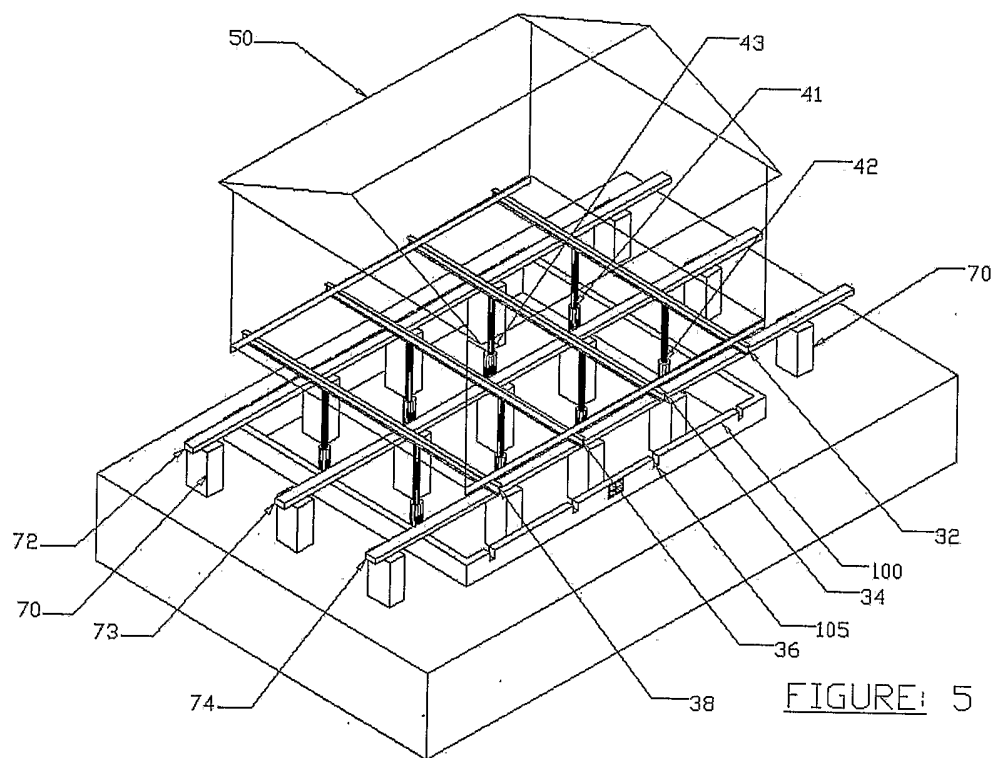


FIGURE: 3





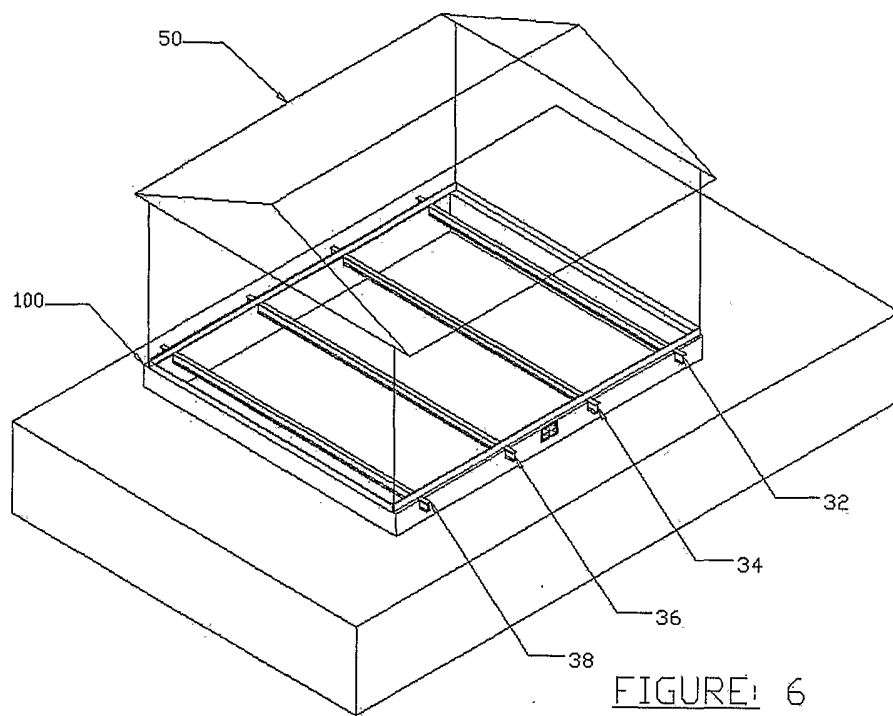
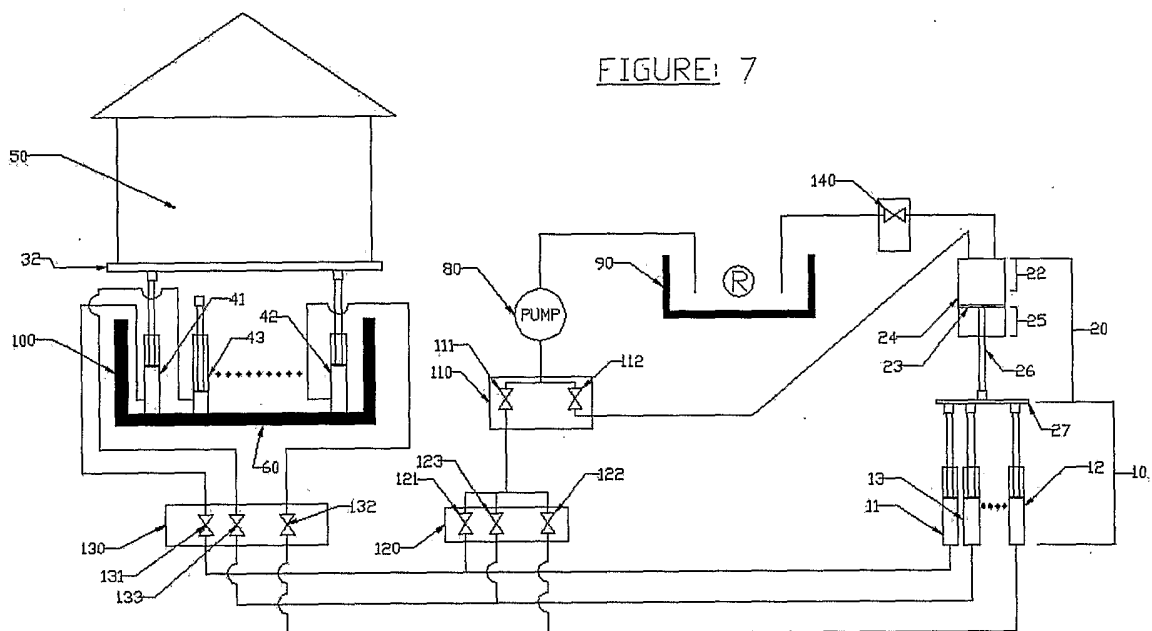


FIGURE 6

FIGURE 7



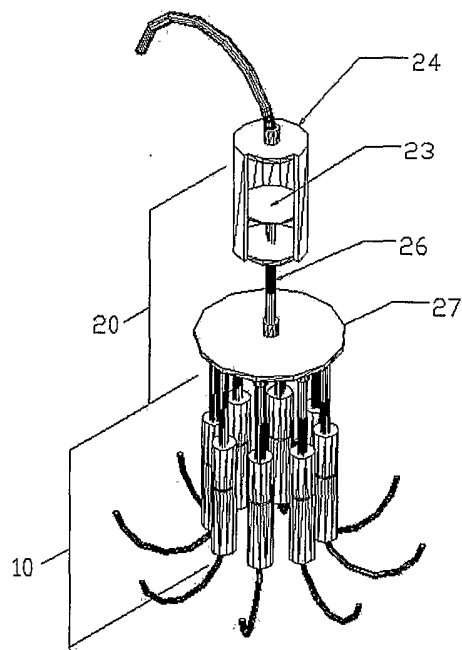


FIGURE: 8

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/CA2004/000052

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 E04G21/16 B66F3/46

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 E04G B66F E04B B60P B65G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 22 38 199 A (KRAUTZIG WALTER) 14 February 1974 (1974-02-14)	1, 2, 8, 12-32, 49, 63-67
Y	the whole document	3-7, 9-11, 44-48, 50-62
Y	US 3 958 705 A (BAXTER BOBBY G) 25 May 1976 (1976-05-25)  column 2, line 49 -column 7, line 23; figures 1-3	3-7, 9-11, 44-48, 50-62
A	FR 1 340 171 A (FRIEDRICH REICHERT MASCHF) 18 October 1963 (1963-10-18) the whole document	1-73
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Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

° Special categories of cited documents :

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- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
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Date of the actual completion of the international search

9 June 2004

Date of mailing of the international search report

23/06/2004

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INTERNATIONAL SEARCH REPORT

International Application No  
PCT/CA2004/000052

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A	US 4 044 854 A (SCHMITT MARVIN G) 30 August 1977 (1977-08-30) column 3, line 12 - line 55; figures 1,2,4 ----	1,2,8,12
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Information on patent family members

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