CLAIMS:

1. A hydraulic intensifier comprising a reciprocating differential piston arrangement and control means for controlling the supply of low pressure hydraulic fluid to the intensifier, said control means comprising at least one solenoid operated pilot valve and electronic means for operating the pilot valve.

2. A hydraulic intensifier according to claim 1, comprising:

a piston which has a first face at a low pressure side and a second, opposite face at a high pressure side, the first face having a greater surface area than the second face;

an input for supplying low pressure hydraulic fluid to said low pressure side; and

an output for high pressure hydraulic fluid from said high pressure side, said control means being arranged for controlling the supply of low pressure hydraulic fluid to the input.

3. An intensifier according to claim 2, including:

first and second such pistons, each of which has such a first face at a respective low pressure side and each of which has such a second face, at a respective high pressure side, wherein:

there is a respective such input at each of the low pressure sides;

the output is coupled with each of said high pressure sides;

the pistons are joined by a cylindrical member which defines the second face of each of the pistons; and

the control means comprises a respective such solenoid operated pilot valve for each input operable alternately by said electronic means.

4. An intensifier according to claim 3, wherein each of said pistons is reciprocable in a respective cylinder.

5. A hydraulic intensifier comprising:

a first piston which is reciprocable in a first cylinder;

a second piston which is reciprocable in a second cylinder;

a cylindrical member joining the pistons so that each of them has a first face which has a greater surface area than its second, opposite face as a result of said cylindrical member, the first face of each of the pistons being at a respective low pressure side and the second face of each of the pistons being at a respective high pressure side;

first and second inputs for supplying low pressure hydraulic fluid to respective ones of the low pressure sides;

an output for high pressure hydraulic fluid from the high pressure sides;

first and second solenoid operated pilot valves for controlling the supply of low pressure hydraulic fluid to respective ones of the inputs; and

electronic means arranged for operating the pilot valves for supplying low pressure hydraulic fluid alternately to the inputs.

6. An intensifier according to any of claims 3 to 5, including coupling means whereby, if low pressure fluid is applied to one of said low pressure sides, such fluid is also applied to the high pressure side of the other of the pistons.

7. An intensifier according to claim 6, wherein said coupling means comprises a first passageway, between the low pressure side of the first piston and the high pressure side of the second piston, and a second passageway, between the low pressure side of the second piston and the high pressure side of the first piston, each of the passageways being provided with a respective non-return valve for permitting flow from the low pressure side to the high pressure side.

8. An intensifier according to any preceding claim, wherein said electronic means is provided by a subsea electronics module of a subsea well control system.

9. A method of producing high pressure hydraulic fluid comprising providing a hydraulic intensifier comprising a reciprocating differential piston arrangement and controlling the supply of low pressure hydraulic fluid to the intensifier, using at least one solenoid operated pilot valve and electronic means which operate the pilot valve.

10. A method according to claim 9, wherein the intensifier comprises:

a piston which has a first face at a low pressure side and a second, opposite face at a high pressure side, the first face having a greater surface area than the second face;

an input for supplying low pressure hydraulic fluid to said low pressure side; and

an output for high pressure hydraulic fluid from said high pressure side, said control means controlling the supply of low pressure hydraulic fluid to the input.

11. A method according to claim 10, wherein the intensifier includes first and second such pistons, each of which has such a first face at a respective low pressure side and each of which has such a second face, at a respective high pressure side, wherein:

there is a respective such input at each of the low pressure sides;

the output is coupled with each of said high pressure sides;

the pistons are joined by a cylindrical member which defines the second face of each of the pistons; and

the control means comprises a respective such solenoid operated pilot valve for each input operated alternately by said electronic means.

12. A method according to claim 11, wherein each of said pistons is reciprocable in a respective cylinder.

13. A method of producing high pressure hydraulic fluid comprising providing a hydraulic intensifier comprising:

a first piston which is reciprocable in a first cylinder;

a second piston which is reciprocable in a second cylinder;

a cylindrical member joining the pistons so that each of them has a first face which has a greater surface area than its second, opposite face as a result of said cylindrical member, the first face of each of the pistons being at a respective low pressure side and the second face of each of the pistons being at a respective high pressure side;

first and second inputs for supplying low pressure hydraulic fluid to respective ones of the low pressure sides; and

an output for high pressure hydraulic fluid from the high pressure sides;

there being first and second solenoid operated pilot valves which control the supply of said low pressure hydraulic fluid to respective ones of the inputs; and

electronic means which operate the pilot valves to supply low pressure hydraulic fluid alternately to the inputs.

14. A method according to any of claims 11 to 13, wherein, if low pressure fluid is applied to one of said low pressure sides, coupling means applies such fluid to the high pressure side of the other of the pistons.

15. A method according to claim 14, wherein said coupling means comprises a first passageway, between the low pressure side of the first piston and the high pressure side of the second piston, and a second passageway, between the low pressure side of the second piston and the high pressure side of the first piston, each of the passageways being provided with a respective non-return valve for permitting flow from the low pressure side to the high pressure side.

16. A method according to any of claims 11 to 15, wherein said electronic means is provided by a subsea electronics module of a subsea well control system.

CLAIMS

1. A hydraulic intensifier (1) comprising:

   a first piston (4) which is reciprocable in a first cylinder (2);

   a second piston (4') which is reciprocable in a second cylinder (2');

   a cylindrical member (5) joining the pistons so that each of them has a first face (6 or 6') which has a greater surface area than its second, opposite face (7 or 7') as a result of said cylindrical member, the first face of each of the pistons being at a respective low pressure side and the second face of each of the pistons being at a respective high pressure side;

   first and second inputs (19, 19') for supplying low pressure hydraulic fluid to respective ones of the low pressure sides;

   an output for high pressure hydraulic fluid from the high pressure sides;

   first and second solenoid operated pilot valves (8, 8') for controlling the supply of low pressure hydraulic fluid to respective ones of the inputs;

   electronic means (25) arranged for operating the pilot valves for supplying low pressure hydraulic fluid alternately to the inputs; and

   coupling means (20, 20', 21, 21') between the first and second pistons, **characterised in that**:

   the coupling means is such that, if low pressure fluid is applied to one of said low pressure sides, said low pressure fluid also flows from said low pressure side through the coupling means to the high pressure side of the other of the pistons, the coupling means comprising a first passageway (20), between the low pressure side of the first piston and the high pressure side of the second piston, and a second passageway (20'), between the low pressure side of the second piston and the high pressure side of the first piston, each of the passageways being provided with a respective non-return valve (21 or 21') for permitting flow from the low pressure side to the high pressure side.

2. An intensifier (1) according to claim 1, wherein said electronic means (25) is provided by a subsea electronics module of a subsea well control system.

3. A method of producing high pressure hydraulic fluid comprising providing a hydraulic intensifier (1) comprising:

   a first piston (4) which is reciprocable in a first cylinder (2);

a second piston (4') which is reciprocable in a second cylinder (2');

a cylindrical member (5) joining the pistons so that each of them has a first face (6 or 6') which has a greater surface area than its second, opposite face (7 or 7') as a result of said cylindrical member, the first face of each of the pistons being at a respective low pressure side and the second face of each of the pistons being at a respective high pressure side;

first and second inputs (19, 19') for supplying low pressure hydraulic fluid to respective ones of the low pressure sides; and

an output for high pressure hydraulic fluid from the high pressure sides;

there being first and second solenoid operated pilot valves (8, 8') which control the supply of said low pressure hydraulic fluid to respective ones of the inputs;

electronic means (25) which operate the pilot valves to supply low pressure hydraulic fluid alternately to the inputs; and

coupling means between the first and second pistons, **characterised in that**:

if low pressure fluid is applied to one of said low pressure sides, the coupling means (20, 20', 21, 21') is such that said low pressure fluid also flows from said low pressure side through the coupling means to the high pressure side of the other of the pistons, the coupling means comprising a first passageway (20), between the low pressure side of the first piston and the high pressure side of the second piston, and a second passageway (20'), between the low pressure side of the second piston and the high pressure side of the first piston, each of the passageways being provided with a respective non-return valve (21 or 21') for permitting flow from the low pressure side to the high pressure side.

4. A method according to claim 3, wherein said electronic means (25) is provided by a subsea electronics module of a subsea well control system.