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(71) Applicant: **Mazzei, Antonello**
01036 Nepi (VT) (IT)

(72) Inventor: **Mazzei, Antonello**
01036 Nepi (VT) (IT)

(74) Representative: **Marcio', Paola et al**
Ing. Mari & C. SRL
Via Garibotti, 3
26100 Cremona (IT)

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(54) **An improved press for the reversible disassembling of car shock absorbers**

(57) The present invention concerns an improved press (P), for the reversible disassembling of car shock absorbers, mainly comprising:

- a pneumatic cylinder (1) with a relative movable stem (2), associated with an activation valve (3) and with a control pedal (4),
- first clamping means (5'), with push arms (6) that may be fixed either to the upper coils of springs of car shock absorbers, or to the upper spring-carrying disks of said shock absorbers;
- second clamping means (5''), with push arms (6) that may be fixed either to the lower coils of springs of car shock absorbers, or to the lower spring-carrying disks of said shock absorbers.

Said first and second clamping means (5', 5'') also comprise adjusting means (15, 20) for adjusting the symmetrical horizontal opening and the independent vertical inclination of the push arms (6), so as to allow the application of said push arms (6) onto springs and/or spring-carrying disks of car shock absorbers with different helicality, structural shape and dimensions.

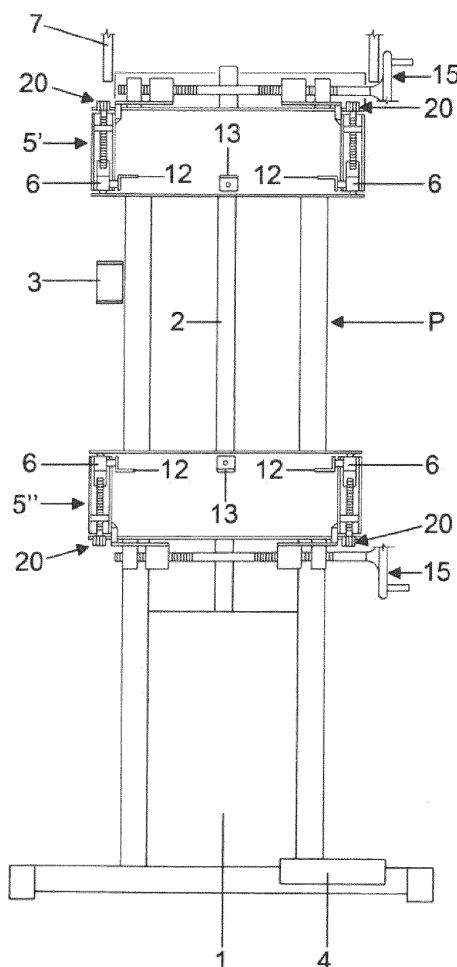


FIG. 1

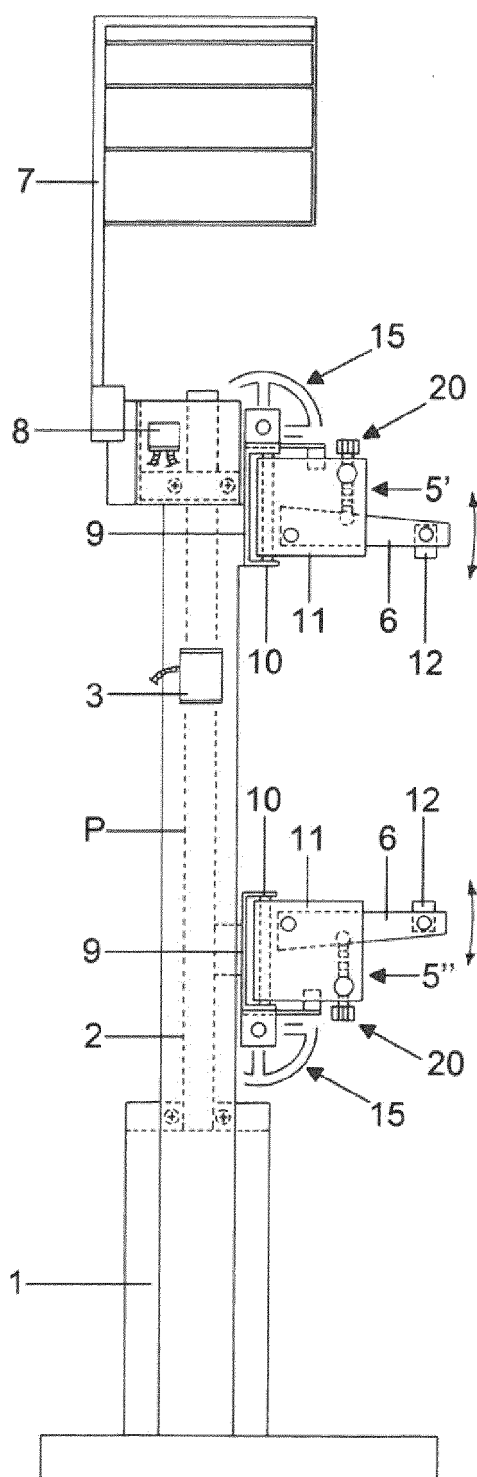


FIG. 2

Description

[0001] The present invention concerns the field of workshop machinery for repairing cars.

[0002] More in detail, it concerns an improved press for the reversible disassembling of car shock absorbers, used in MacPherson suspension systems.

[0003] As it is known, shock absorbers installed on common cars mainly consist of a helicoidal spring containing a (hydraulic or pneumatic) piston arranged oblique to the vertical axis of said spring as it is mounted, often for space reasons, concentric to the upper spring-carrying disk and eccentric to the lower spring-carrying disk.

[0004] It is further known that, in case of repair or replacement, said misalignment makes the disassembling of said shock absorbers extremely difficult since complex and dangerous procedures of compression of the spring normally associated with the piston are required for determining the separation of the piston from the upper spring-carrying disk.

[0005] Different kinds of machinery suitable for allowing the reversible disassembling of car shock absorbers, after an appropriate compression of the relative spring, are already known for overcoming said inconveniences.

[0006] In a previous patent filed under No. RM2005A000101 in the name of Mario Mazzei, a press is described for the reversible disassembling of car shock absorbers, comprising a clamp that may be fixed to the lower end of the shock absorber's piston during disassembling and a pair of push means that may be fixed to the upper coil of the spring associated to said piston.

[0007] In said press, the clamp allows to adjust the inclination of the shock absorber's piston and thus the orientation of the spring associated therewith, thus determining the perfect perpendicularity of the coils of said spring with respect to the push means and therefore the performance of the correct compression of said spring.

[0008] Above mentioned device however has the following limits:

- the clamping of the piston to the clamp may be impeded by the presence on the same of extroflexions for the support or the passing of various hoses and mechanisms;
- the compression of the spring may be impeded by the presence of ball bearings generating torques such as to annul the compression thereof by the push means.

[0009] In a further previous patent filed under No. RM2003A000312, also in the name of Mario Mazzei, a press for the reversible disassembling of car shock absorbers is described, comprising a pair of clamping means that may be secured respectively to the upper and lower coil of the spring associated with the absorber's piston during disassembling.

[0010] In said press, instead, the spring of the shock

absorber is directly secured to the clamping means in vertical position, so as to simplify the compression process.

[0011] Above described device however has the following limits:

- the compression of the spring may be impeded by the occurrence of lateral lying down of the coils, determined by said coils getting hooked to the clamping means at diametrically opposite points;
- the hooking of the spring to the clamping means may be impeded by the presence of a limited number of coils and also by an excessive helicoidality or by an extremely small pitch of said coils.

[0012] Furthermore, devices are known in the specific prior art with replaceable forks according to the characteristics of the spring supplied together with the shock absorber of interest.

[0013] It is the aim of the present invention to overcome the limits of above mentioned devices and of the devices for the reversible disassembling of car shock absorbers in general.

[0014] The aim set forth is reached by means of an improved press for the reversible disassembling of car shock absorbers, comprising:

- a pneumatic cylinder with a relative movable stem, associated with a valve for the inlet of compressed air and with a control pedal,

characterized in that it comprises:

- first clamping means, with push arms that may be fixed either to the upper coils of springs of car shock absorbers, or to the upper spring-carrying disks of said shock absorbers;
- second clamping means, with push arms that may be fixed either to the lower coils of springs of car shock absorbers, or to the lower spring-carrying disks of said shock absorbers, wherein said first and second clamping means comprise adjusting means for adjusting the symmetrical horizontal opening and the independent vertical inclination of the push arms, so as to allow the application of said push arms onto springs and/or spring-carrying disks of car shock absorbers with different helicoidality, structural shape and dimensions.

[0015] The dependent claims define further features of the present invention. The present invention has the following numerous advantages:

- it allows the application of the clamping means without distinction on the upper and/or the lower coils of car shock absorbers and/or on the upper and/or lower disks of the same;
- it allows to perform the compression of the springs

of car shock absorbers indifferently between upper and lower coil, or between upper and/or lower coil and upper and/or lower spring-carrying disk;

- by means of the adjusting means of the push arms opening, it allows the application of the clamping means on springs and/or spring-carrying disks having a diameter between minimum 80mm and maximum 310 mm;
- by means of means for adjusting the inclination of the push arms, it allows the application of the clamping means onto springs and/or spring-carrying disks of different helicoidality and structural shape;
- by means of three fixing hooks, it allows to impede the occurrence of possible lateral lying down of said springs, thus favouring the correct compression thereof.

[0016] Further features and advantages of the present invention will become more evident from the detailed description hereinbelow, relating to the enclosed drawings in which a preferred embodiment is shown for exemplifying and not limiting purposes, and wherein:

- figures 1 and 2 respectively show a plane front and lateral view of the structural shape of an improved press for the reversible disassembling of car shock absorbers according to the present invention;
- figures 3 and 4 respectively show in detail a plane front and top view of the structural shape of the first and second clamping means of said press.

[0017] Relating to the details of figures 1 and 2, an improved press P for the reversible disassembling of car shock absorbers according to the present invention mainly comprises:

- a pneumatic cylinder 1 with a relative movable stem 2 for operating means 5', 5" of essentially identical shape and components, arranged for the clamping and the compression of the spring of the shock absorber of interest, associated with a valve 3 for the inlet of for compressed air and with a control pedal 4;
- first clamping means 5', comprising a pair of push arms 6 that may be secured to the upper coils of the spring commonly present in car shock absorbers, or to the upper spring-carrying disk of the same;
- second clamping means 5" comprising a pair of push arms 6 that may be secured to the lower coils of the spring commonly present in car shock absorbers, or to the lower spring-carrying disk of the same;
- a protection shield 7 pivoting on the top of the press P, adapted to protect the operator from possible accidents due to the casual release of the shock absorber from the push arms 6 of clamping means 5', 5";
- a safety valve 8, adapted to limit the pressure of the compressed air introduced in the pneumatic cylinder 1 to the complete and correct lowering of the protec-

tion shield 7, so as to allow, without any risk, the performance of the normal initial adjustment operations of said press P.

[0018] Relating to figures 3 and 4, the clamping means 5', essentially identical in shape and components to clamping means 5", are associated with said press P and further comprise:

- a body 9, with everted edges 10, applicable to said stem 2 of the pneumatic cylinder 1 or directly onto the structure of said press P;
- a pair of grooved supports 11, carrying push arms 6, hinged on the opposite ends of the everted edges 10 of said body 9 and rotating on said ends;
- fixing hooks 12, 13 free to rotate on pins 14 for hooking springs and/or spring-carrying disks of car shock absorbers, respectively applied onto push arms 6 and on body 9 of clamping means 5', 5";
- means 15, of the kind with opposed double thread 17 screws 16, driven by means of a wheel 18, associated with lever systems 19 for distributing the movement, for adjusting the symmetrical horizontal opening of the push arms 6 of clamping means 5', 5";
- adjusting means 20 of the kind with knob screws 21, for adjusting the vertical independent inclination of the push arms 6 of clamping means 5', 5".

[0019] According to the present invention, said improved press P comprises means 5', 5" arranged for the clamping and the compression of the spring commonly present in car shock absorbers, so as to allow the reversible disassembling, and therefore the replacement and/or repair of the single elements forming the same (spring, spring-carrying disks, thrust bearing, hydraulic and/or pneumatic piston, etc.).

[0020] Said clamping means 5', 5" are integral respectively with the structure of the press P and with the stem 2 of a pneumatic cylinder 1, housed in the lower part of the same.

[0021] Said clamping means 5', 5" are essentially identical to one another and consist of a body 9 with everted edges 10, on the opposed ends whereof grooved supports 11 are hinged carrying push arms 6 provided with fixing hooks 12.

[0022] A further fixing hook 13 is also placed directly on the body 9 of said clamping means 5', 5".

[0023] The particular L-shape of the fixing hooks 12, 13 favours the hooking to the push arms 6 of the clamping means 5', 5" of upper and/or lower coils of springs of car shock absorbers and/or of upper and/or lower spring-carrying disks.

[0024] The plane cross section of the fixing hooks 12, 13 facilitates the insertion of the same between coils that might also be particularly close to one another.

[0025] Said fixing hooks 12, 13 furthermore are adapted to rotate on pins 14 in order to automatically adjust their grasp on springs and spring-carrying disks of differ-

ent helicoidality and structural shape.

[0026] To the push arms 6 of the clamping means 5', 5" special adjusting means 15, 20 are associated, adapted to allow the use of said clamping means in the presence of car shock absorbers having even very different dimensional and structural features.

[0027] The adjusting means 15 comprise screws 16, with opposed double threading 17 and driven by a wheel 18, adapted to symmetrically vary the horizontal opening of the push arms 6 of the clamping means 5', 5" between the everted edges 10 of the corresponding box-shaped bodies 9, so as to allow an optimal and advantageous grasp thereof on springs and spring-carrying disks having a diameter between minimum 80mm and maximum 310 mm.

[0028] To said screws 16 there are associated lever systems 19 adapted to distribute the opposed movement of the double threads 17 between the push arms 6 of the clamping means 5', 5", determining a rotation of the same of equivalent entity and in opposite direction between the everted edges 10 of the bodies 9 of said clamping means 5', 5", with the purpose of varying their horizontal opening without ever changing the centre, and consequently maintaining the fixing hooks 12, 13 constantly at about 120° between them.

[0029] The adjusting means 20, instead, comprise knob screws 21 adapted to adjust, in an independent manner to each other, the vertical inclination of the push arms 6 of the clamping means 5', 5" inside the corresponding grooved supports 11, so as to allow their optimal and advantageous grasp on springs and spring-carrying disks of different helicoidality and structural shape.

[0030] Relating to above specification, the functioning of the press P is as follows:

- the shock absorber of interest is placed on the lower clamping means 5", the lower coil being retained by fixing hooks 12, 13 respectively present on push arms 6 and on body 9 of the same;
- by means of adjusting means 15, 20 associated with lower clamping means 5", the perfect adaptation of the symmetrical horizontal opening of the push arms 6 to the diameter of the spring is determined, as well as of the independent vertical inclination of said push arms 6 to the helicoidality of the same, and thus also the perfect clamping of said elements between the fixing hooks 12, 13 by means of screws 16 operated by wheel 18 and of knob screws 21 of said adjusting means 15, 20 is obtained;
- by means of the control pedal 4 the inlet of compressed air at low pressure (about 1.6 bar) is determined into the pneumatic cylinder 1, adjusted by safety valve 8, and the following uplift of the lower clamping means 5", integral with the stem 2 of said pneumatic cylinder 1, until the hooking of the upper coil of the spring to fixing hooks 12, 13 respectively present on push arms 6 and on body 9 of upper clamping means 5';

- by means of adjusting means 15, 20 associated with upper clamping means 5', the perfect fitting of the symmetrical horizontal opening of push arms 6 to the diameter of the spring and of the independent vertical inclination of said push arms 6 to the helicoidality of the same is obtained, and therefore the perfect clamping of said elements between fixing hooks 12, 13 by means of screws 16 driven by wheel 18 and of knob screws 21 of said adjusting means 15, 20;
- following the lowering of the protection shield 7, the deactivation of the safety valve 8 is obtained and, by means of the control pedal 4, the inlet of compressed air at the maximum net pressure (about 1,600 kg at 10 bar) into the pneumatic cylinder 1 is

[0031] determined, adjusted by inlet valve 3, and therefore the required compression of the spring is obtained between the push arms 6 of clamping means 5', 5", functional to the disassembling of the single components of the shock absorber of interest.

[0032] Said press P allows the advantageous overcoming of following operative conditions:

- in case of springs with a low number of coils, which would make the contemporary hooking of the relative lower and upper coils difficult, the compression of the same may occur between the sole lower spring and the upper spring-carrying disk, or even vice versa;
- in case of replacement of the sole spring-carrying disk or of the sole thrust bearing, the compression of the spring may occur between the lower spring-carrying disk and the upper coil of the same;
- in case of double action shock absorbers, the complete compression of the spring, required for the correct disassembling of the same, also may occur between the lower spring-carrying disk and the upper coil of the same.

[0033] Regardless of the process used, la special arrangement of the fixing hooks 12, 13 constantly kept at reciprocal angles of about 120°, allows to evenly distribute the thrust exerted on the spring, avoiding the occurrence in the same of lateral lying down that might impede the correct compression thereof.

Claims

1. An improved press (P), for the reversible disassembling of car shock absorbers, comprising:

- a pneumatic cylinder (1) with a relative movable stem (2), associated with a valve (3) for the inlet of compressed air and with a control pedal (4),

characterized in that it comprises:

- first clamping means (5'), with push arms (6) that may be fixed either to the upper coils of springs of car shock absorbers, or to the upper spring-carrying disks of said shock absorbers;
- second clamping means (5''), with push arms (6) that may be fixed either to the lower coils of springs of car shock absorbers, or to the lower spring-carrying disks of said shock absorbers,

wherein said first and second clamping means (5', 5'') comprise adjusting means (15, 20) for adjusting the symmetrical horizontal opening and the independent vertical inclination of the push arms (6), so as to allow the application of said push arms (6) onto springs and/or spring-carrying disks of car shock absorbers with different helicoidality, structural shape and dimensions.

2. Press (P) according to claim 1, **characterized in that** the first and second clamping means (5', 5'') comprise a body (9), wherein said body (9) allows the application of the first and second clamping means (5', 5'') respectively onto the structure of the press (P) and onto the stem (2) of the pneumatic cylinder (1).
3. Press (P) according to claim 2, **characterized in that** the body (9) of the first and second clamping means (5', 5'') comprises everted edges (10).
4. Press (P) according to the preceding claims, **characterized in that** the first and second clamping means (5', 5'') comprise grooved supports (11) carrying the push arms (6), wherein said grooved supports (11) are hinged on the opposed ends of the everted edges (10) of the body (9) of said first and second clamping means (5', 5''), and rotate on said ends.
5. Press (P) according to claim 1, **characterized in that** the first and second clamping means (5', 5'') comprise fixing hooks (12), integral with the push arms (6).
6. Press (P) according to claim 1, **characterized in that** the first and second clamping means (5', 5'') comprise one single fixing hook (13) integral with the body (9) of said clamping means.
7. Press (P) according to claims 5 and 6, **characterized in that** the fixing hooks (12, 13) rotate on pins (14).
8. Press (P) according to claims 5 and 6, **characterized in that** the fixing hooks (12, 13) are L-shaped and have flat cross section.
9. Press (P) according to claim 1, **characterized in that** the adjusting means (15) for adjusting the horizontal

opening of the push arms (6) of the first and second clamping means (5', 5'') comprise screws (16) with opposite double threads (17), driven by means of a wheel (18).

10. Press (P) according to claim 9, **characterized in that** the screws (16) of the adjusting means (15) are associated with lever systems (19) adapted to distribute the movement of the double threads (17) on the grooved supports (11) carrying the push arms (6) of the first and second clamping means (5', 5'').
11. Press (P) according to claim 1, **characterized in that** the adjusting means (20) for adjusting the vertical inclination of push arms (6) of the first and second clamping means (5', 5'') comprise knob screws (21).
12. Press (P) according to claim 1, **characterized in that** it comprises a protection shield (7) associated with a safety valve (8), wherein said safety valve (8) is adapted to limit the pressure of the compressed air fed into the pneumatic cylinder (1) until activation of said protective shield (7).

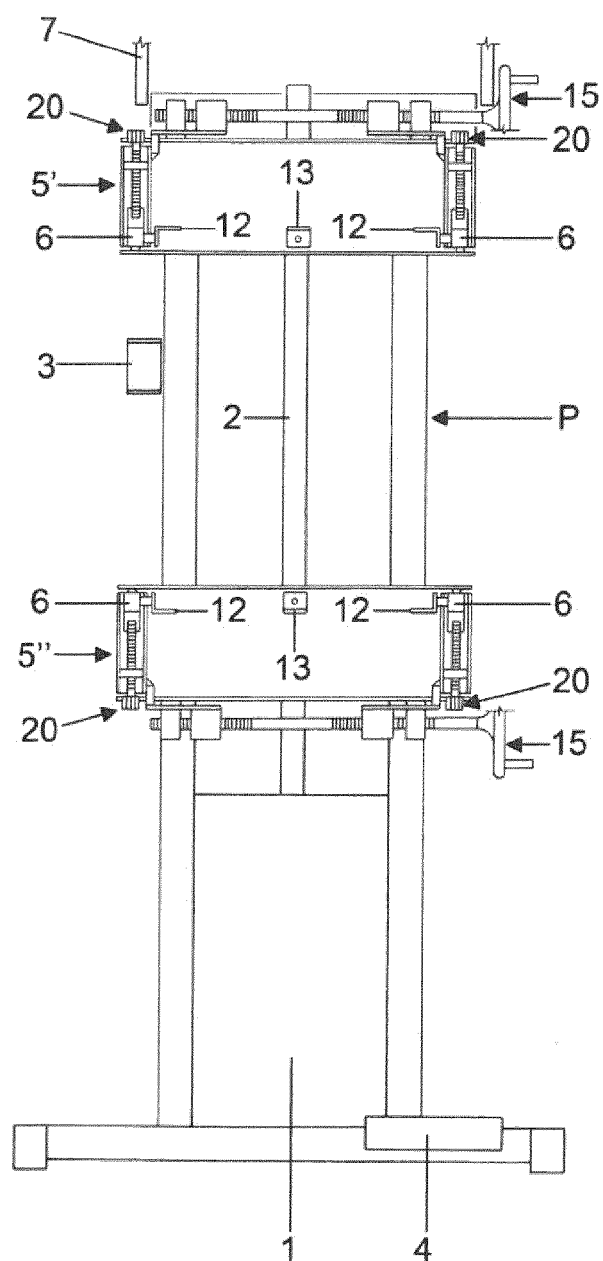


FIG. 1

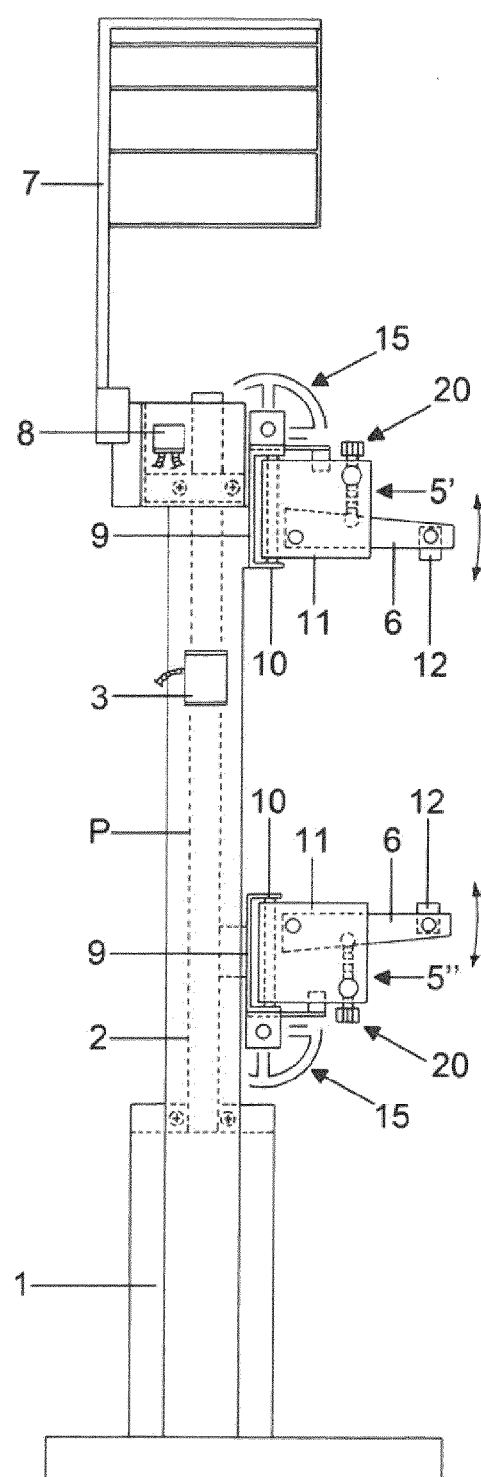


FIG. 2

FIG. 3

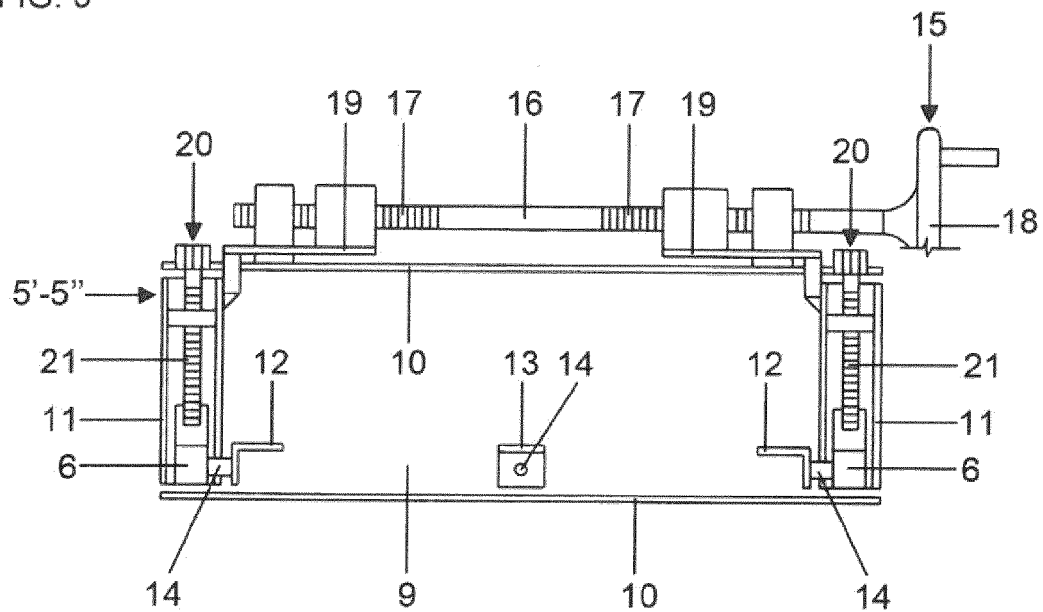
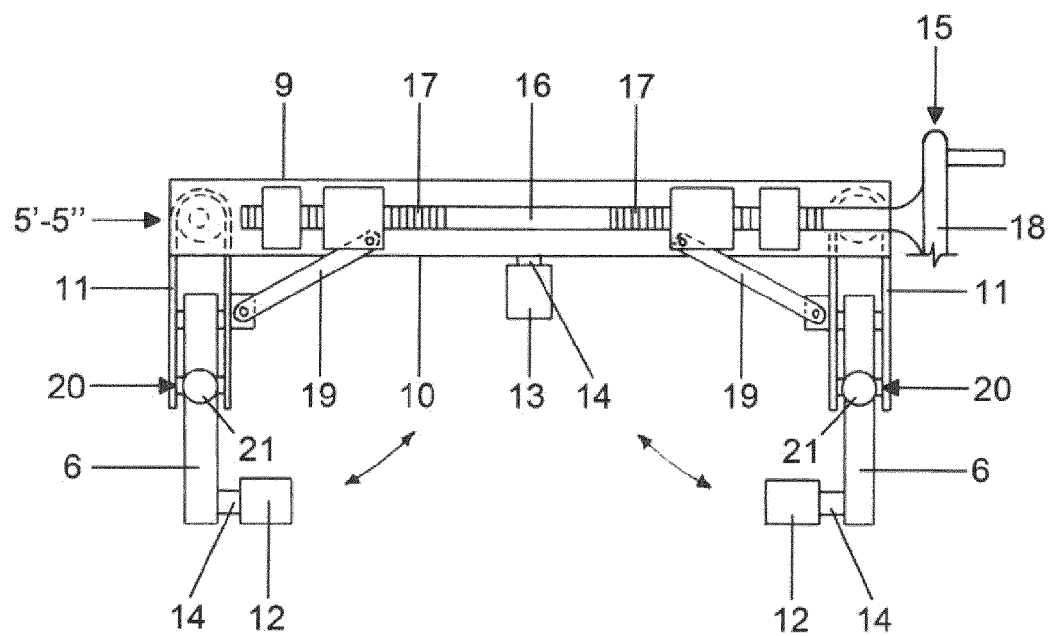


FIG. 4





EUROPEAN SEARCH REPORT

Application Number
EP 13 19 3763

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A	WO 01/17727 A1 (SEMA S R L UNIPERSONALE [IT]; GAZZANO CARLO [IT]) 15 March 2001 (2001-03-15) * page 6, line 3 - line 10; figures *	1-12	TECHNICAL FIELDS SEARCHED (IPC) B25B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 6 February 2014	Examiner Plastiras, Dimitrios
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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