

PATENT REQUEST: STANDARD PATENT / PATENT OF ADDITION

I / We, being the person(s) identified below as the Applicant, request the grant of a patent to the person identified below as the Nominated Person, for an invention described in the accompanying standard complete specification.

Full application details follow.

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Address as above
[54] Invention Title CYLINDER HEAD CLEANING MACHINE
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ASSOCIATED PROVISIONAL APPLICATION(S) DETAILS

[60] Application Number(s) and Date(s) PK 7665 lodged 9th August, 1991

BASIC CONVENTION APPLICATION(S) DETAILS

[31] Application Number	[33] Country	Country Code	[32] Date of Application

DIVISIONAL APPLICATION DETAILS

[62] Original application number

PARENT INVENTION DETAILS (Patent of Addition requests only)

[51] Application number Patent number

TICK IF APPLICABLE

☐ I am an eligible person described in Sections 33 - 36 of the Act.

Drawing number recommended to accompany the abstract FIG 6

COLIN JONES and LIANNE JONES By Our Patent Attorney JOHN L.DAVIES & CO.

(Signature)

29th December, 1993

(Date)

AUSTRALIA

Patents Act 1990

NOTICE OF ENTITLEMENT

(To be filed before acceptance)

We, COLIN JONES and LIANNE JONES
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being the applicant in respect of Application No. PK 7665 now 20537/92, state the following:-

Part 1 - Must be completed FOR ALL APPLICATIONS.

The person(s) nominated for the grant of the patent:

~~*is~~ ^{are} ~~*are~~ the actual inventor(s) COLIN JONES and LIANNE JONES

~~or~~

~~*has~~ entitlement from the actual inventor(s) by Assignment of a part-interest
dated 8th August, 1991

(eg by assignment, by mesne assignment, as legal representative of ..., etc)

* Part 2 - Must be completed IF THE APPLICATION IS ASSOCIATED with one or more PROVISIONAL APPLICATIONS.

The person (s) nominated for the grant of the patent:

☒ ~~*are~~ the applicant(s) of the provisional application(s) listed on the patent request form

or

~~has~~ entitlement to make a request under Section 113 in relation to the provisional application(s) listed on the patent request form

(eg by assignment, by agreement, etc)

COLIN JONES and LIANNE JONES By Our Patent Attorney JOHN L.DAVIES & CO.

(Signature)

29th December, 1993

(Date)

(If the applicant is a Company or other legal entity, also indicate the name and standing of the authorized signatory.)

~~*Omit/Delete if not appropriate~~

Note: Use form P/00/008b where details for PCT, convention priority, microorganism deposit, additional or divisional application, are required.



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- (56) Prior Art Documents
AU 475385 71464/74 25.5
AU 478513 61066/73 25.5
AU 22503/83 B08B 3/083/02
- (57) Claim

1. Apparatus for cleaning a dirty machine part such as an internal combustion engine cylinder head by using a high-pressure water jet or jets and which comprises a housing, a pair of horizontally-rotatable, vertically opposed clamping assemblies for removably supporting a cylinder head to be cleaned within the housing, the assemblies comprising a tailstock upper clamping assembly and a headstock lower clamping assembly, each assembly having identical, spring-loaded clamping members comprising a plurality of circumferentially-spaced, clamping members arranged in a circular path upon a horizontally-rotatable disc, at least one high-pressure water jet nozzle mounted within the housing and adapted to direct a high-pressure water

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spray jet over the cylinder head, and high-pressure water pump means for supplying high-pressure water to the at least one high-pressure water jet nozzle.

AUSTRALIA

Patents Act 1990

652266

**ORIGINAL
COMPLETE SPECIFICATION
STANDARD PATENT**

Invention Title:CYLINDER HEAD CLEANING MACHINE.....

The following statement is a full description of this invention, including the best method of performing it known to me:-

This invention relates generally to equipment for cleaning machine parts and automotive components such as cylinder heads and relates in particular to a machine for cleaning cylinder heads of internal combustion engines by a high pressure water jet.

In the past, warm or hot aqueous caustic soda (sodium hydroxide) solutions have been used for cleaning grease and other residues from machine parts and automotive components and especially cylinder heads of internal combustion engines but in present times many cylinder heads are made of aluminium alloys which are attacked by caustic soda. Furthermore, waste caustic soda and other waste products from such cleaning operations is flushed into drainage thus polluting the environment and damaging the ecology. Additionally, attention is not paid to waste recovery.

It is an object of this invention to provide a machine for cleaning parts of machinery such internal combustion engine cylinder heads by using a high-pressure water jet or jets.

According to the invention, there is provided apparatus for cleaning dirty machine parts such as internal combustion engine cylinder heads by using a high-pressure water jet or jets and which comprises a housing, a pair of horizontally-rotatable, vertically opposed clamping assemblies for removably supporting a cylinder head to be cleaned within the housing, the assemblies comprising a tailstock upper clamping assembly and a headstock lower clamping assembly, each



assembly having identical, spring-loaded clamping members comprising a plurality of circumferentially-spaced, clamping members arranged in a circular path upon a horizontally-rotatable disc, at least one

5 high-pressure water jet nozzle mounted within the housing and adapted to direct a high-pressure water spray jet over the cylinder head, and high-pressure water pump means for supplying high-pressure water to the at least one high-pressure water jet nozzle.

10 Preferably, each clamping member tapers away from one side of the disc to form a conical clamp segment.

Preferably, the tailstock clamping assembly is actuated by a pneumatic ram from an air cylinder
15 linear drive unit and the lower or headstock clamping assembly is rotated by a drive chain powered by a variable-speed motor via a chain drive.

Preferably, the apparatus of the invention includes means associated with the at least one high-
20 pressure water spray jet to move it to and fro with respect to the machine part, the said means being a vertically-travelling spinning spray head mounted on a carriage sliding and reciprocating vertically along bearing guide members and which is driven by a variable-
25 speed drive electric motor driving an air motor reduction gear box operating a chain drive and through a rotary coupling thereby spinning a spray nozzle which travels up and down a central threaded column together with the spinning spray head. Preferably, a plurality



of high-pressure water spray jets are mounted upon the spinning spray head and are adapted for rotation in a vertical or in an inclined plane and the spinning spray head is adapted to travel in a either a single pass or
5 in multiple passes along and parallel to at least one axis of the machine part to be cleaned.

Preferably, the clamping assemblies and the clamped engine part to be cleaned rotate in unison at variable speeds.

10 Preferably, the apparatus of the invention includes means for collection and separation of waste products from soiled cleaning water, the means comprises a wheeled collection tank within or underneath and removable from the housing, the tank having a plurality
15 of fixed, vertically-opposed and horizontally mutually spaced baffles which separate sludge and any floating scum from the cleaning water which is recovered and recycled through the apparatus. Preferably the collection tank is also provided with a removable basket
20 of mesh and which is disposed at or near the top of the the tank.

A non-limiting example of a practical arrangement or embodiment of the invention will now be described with reference to the accompanying drawings in
25 which:

Figure 1 is a front, external elevational view of a fully-assembled, internal combustion engine cylinder head water spray cleaning machine constructed, arranged and adapted to operate in accordance with the

invention.

Figure 2 is a rear, external elevational view of the machine of Figure 1.

Figure 3 is a front view with door open of the
5 cylinder head clamping assemblies for the cleaning machine of Figures 1 and 2.

Figure 4 is a front view of the high-pressure water spray assembly (also with door open) for the machine of Figures 1 and 2 and for use with the clamping
10 assemblies of Figure 3.

Figure 5 is a rear elevational view of the spray-cleaning assembly of Figure 4 (with housing wall removed).

Figure 6 is a right-hand side sectional view of
15 the dirty machine part clamping assembly, spray-cleaning assembly and waste water collection and recovery tank.

Referring to the drawings, there is shown apparatus in the form of a machine for cleaning dirty machine parts and in this example an alloy cylinder head
20 of an internal combustion engine by means of a high-pressure water jet, the general layout is shown in the external views of Figures 1 and 2 and comprises a cylinder head cleaning cabinet 10 with control box 11, and an overhead tailstock air cylinder 12 which operates
25 a pneumatic clamping ram to hold a dirty "workpiece" cylinder block 23 (referred to hereinafter) in place for cleaning. As shown in Figure 3, a variable-speed drive assembly is provided for rotating the dirty cylinder head at variable speeds while it is clamped between

clamping assemblies and during cleaning. This drive assembly includes a variable speed pneumatic motor 13 which drives a bearing shaft 13a via a chain drive assembly 13b. The apparatus includes a removable
5 sludge collection and water recovery and recycling tank 14 on four wheels two of which are shown and labelled 15 and 16. A reserve air tank 17 supplies compressed air to a clamping ram and the drive motor 13. A high-pressure water pump 16 is powered by a six-cylinder,
10 water-cooled, LP gas-fuelled, internal-combustion engine engine 19 with water-cooling radiator 20. The hot exhaust gases from the engine are passed through a hot water heat-exchange tank 21 so that hot water under pressure is delivered to a transfer pump 22. Alternat-
15 ively, to prevent exhaust gas pollution, the internal combustion engine for driving the high-pressure water pump 18 can be replaced by an electric motor. Referring to Figures 3 and 6 of the accompanying drawings, there is additionally shown installed a dirty
20 cylinder head 23 to be cleaned by the apparatus of the invention and which is removably clamped between a tailstock or upper clamping assembly 24 and a headstock or lower clamping assembly 25, both assemblies comprise a plurality of circumferentially-spaced, conical-headed,
25 spring-loaded clamping members arranged in a circular path around a circular horizontally rotatable disc. The clamping members are actuated by the tailstock pneumatic ram from air cylinder linear drive 12. The clamping assemblies are rotated in unison and at variable speeds

by the variable-speed motor 13 via chain drive 13a rotating bearing 13b. In Figure 4 there is shown within the same housing as the cylinder head clamping assemblies 24, 25 of Figure 6, a cleaning assembly which

5 comprises a rotating or spinning and vertically travelling high-pressure water spray cleaning head 26 which has a carriage 26a sliding and reciprocating vertically along smooth, hardened-steel linear bearing guides 27, 28 and which is driven by a variable-speed

10 drive electric motor driving the air motor reduction gear box 29a operating a chain drive 30 and through a rotary coupling 30a spinning a tungsten-tipped, high-pressure water spray nozzle 31 which, with the cleaning head 26 travels up and down a central threaded member

15 32. Referring again to Figure 6, there is shown in ghosted outline in the waste water collection tank 14 a series of fixed and vertically opposed and horizontally spaced baffles 33, 34, 35, 36 and 37 which separate sludge and any floating scum from spent cleaning water

20 which is then recovered and recycled. A removable basket 38 of mesh is also provided in and at the top of the water collection and recovery tank. A dump valve 39 is also provided.

The claims defining the invention are as follows:

1. Apparatus for cleaning a dirty machine part such as an internal combustion engine cylinder head by using a high-pressure water jet or jets and which comprises a housing, a pair of horizontally-rotatable, vertically opposed clamping assemblies for removably supporting a cylinder head to be cleaned within the housing, the assemblies comprising a tailstock upper clamping assembly and a headstock lower clamping assembly, each assembly having identical, spring-loaded clamping members comprising a plurality of circumferentially-spaced, clamping members arranged in a circular path upon a horizontally-rotatable disc, at least one high-pressure water jet nozzle mounted within the housing and adapted to direct a high-pressure water spray jet over the cylinder head, and high-pressure water pump means for supplying high-pressure water to the at least one high-pressure water jet nozzle.
2. Apparatus according to claim 1 wherein each clamping member tapers away from one side of the disc to form a conical clamp segment.
3. Apparatus according to claim 1 or 2 wherein the tailstock upper clamping assembly is actuated by a tailstock pneumatic ram from an air cylinder linear drive unit and the lower or headstock clamping assembly is rotated by a drive chain powered by a variable speed motor via a drive chain.
4. Apparatus according to any preceding claim wherein headstock lower clamping assembly and thus the



5. Apparatus according to claim 4 wherein the clamping assemblies are rotated via a pneumatic motor and chain drive assembly powered from the tailstock pneumatic ram air cylinder unit.
6. Apparatus according to claim 1 and which includes means associated with the at least one high-pressure water spray jet to reciprocate it vertically with respect to the dirty cylinder head.
7. Apparatus according to claim 6 wherein the means associated with the at least one high-pressure water spray jet is a vertically travelling spinning spray head mounted on a carriage sliding and reciprocating vertically along bearing guide members and which is driven by a variable-speed drive electric motor driving an air motor reduction gear box operating a chain drive and through a rotary coupling, thereby spinning a spray nozzle which travels up and down a central threaded column together with the spinning spray head.
8. Apparatus according to claim 7 wherein a plurality of high-pressure water spray jets are mounted upon the spinning spray head and are adapted for rotation in a vertical or inclined plane.
9. Apparatus according to claim 7 or 8 wherein the spinning spray head is adapted to travel in a single pass or in multiple passes along and parallel to at least one axis of the machine part to be cleaned.

10. Apparatus according to any preceding claim wherein the high-pressure water pump is powered by a six-cylinder, water-cooled, internal-combustion engine with a water-cooled radiator.

11. Apparatus according to claim 10 wherein the engine is LP gas fuelled.

12. Apparatus according to claim 10 or 11 wherein hot exhaust gases from the engine are passed through a hot water heat-exchange tank so that hot water under pressure is delivered to a transfer pump.

13. Apparatus according to any preceding claim and which includes means for collection and separation of waste products from soiled cleaning water.

14. Apparatus according to claim 13 wherein the means for collection and separation of waste products from cleaning water comprises a wheeled collection tank removable from the housing and which has a plurality of fixed, vertically-opposed, and horizontally-spaced baffles which separate sludge and any floating scum from the cleaning water which is recovered and recycled.

15. Apparatus according to claim 14 wherein the collection tank includes a removable basket of mesh and which is disposed at or near the top of the tank.

16. Apparatus for cleaning a machine part such as an internal combustion engine cylinder head by using a high-pressure water jet or jets substantially as hereinbefore described with reference to the accompanying drawings.

Dated this 16th day of June, 1994; COLIN & LIANNE JONES

By Our Patent Attorney; JOHN L.DAVIES & CO.



ABSTRACT

A machine for cleaning an internal combustion engine cylinder head (23) using a high-pressure water jet supplied by a pump (18) driven by an engine (19) or electric motor and via a spinning spray nozzle (31) mounted on a vertically reciprocating cleaning head (26) travelling the length of a cylinder head (23) clamped by headstock and tailstock clamping assemblies (24,25) each with six conical-headed, spring-loaded clamping members (24,24a) in circular arrangement and closed by a pneumatic ram (12) and rotatable horizontally at varying speeds by a variable-speed motor (13) in synchronization with an overhead variable speed motor (29) driving a spinning spray jet head assembly (26); all assemblies are mounted in a framed cabinet (10) and a removable wheeled waste water collection tank (14) underneath has a removable basket (38) of mesh for coarse waste and has fixed, vertically-opposed, horizontally spaced baffles for separation and settling sludge and floating scum from water which is then recycled.

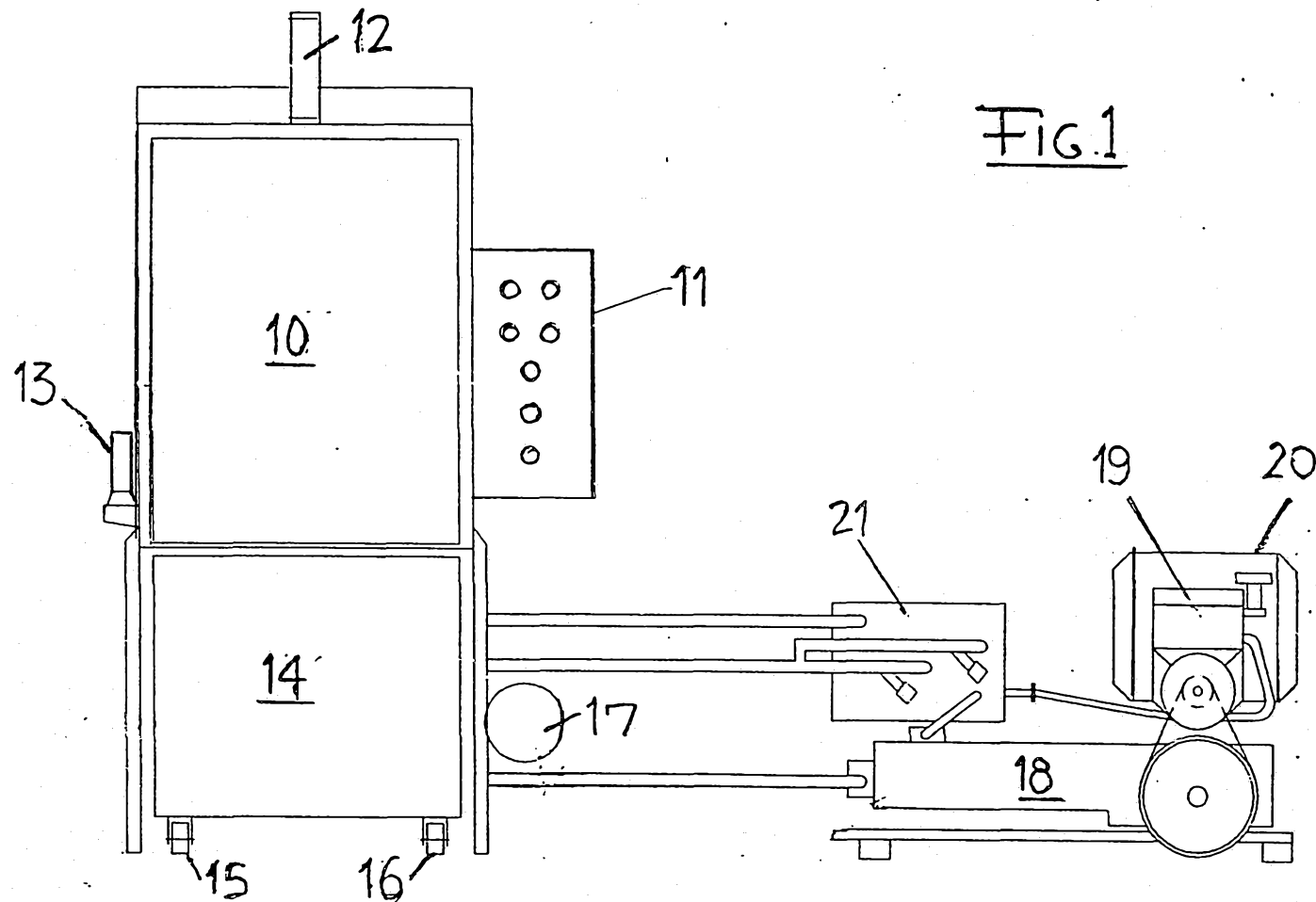


FIG. 1

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FIG. 2

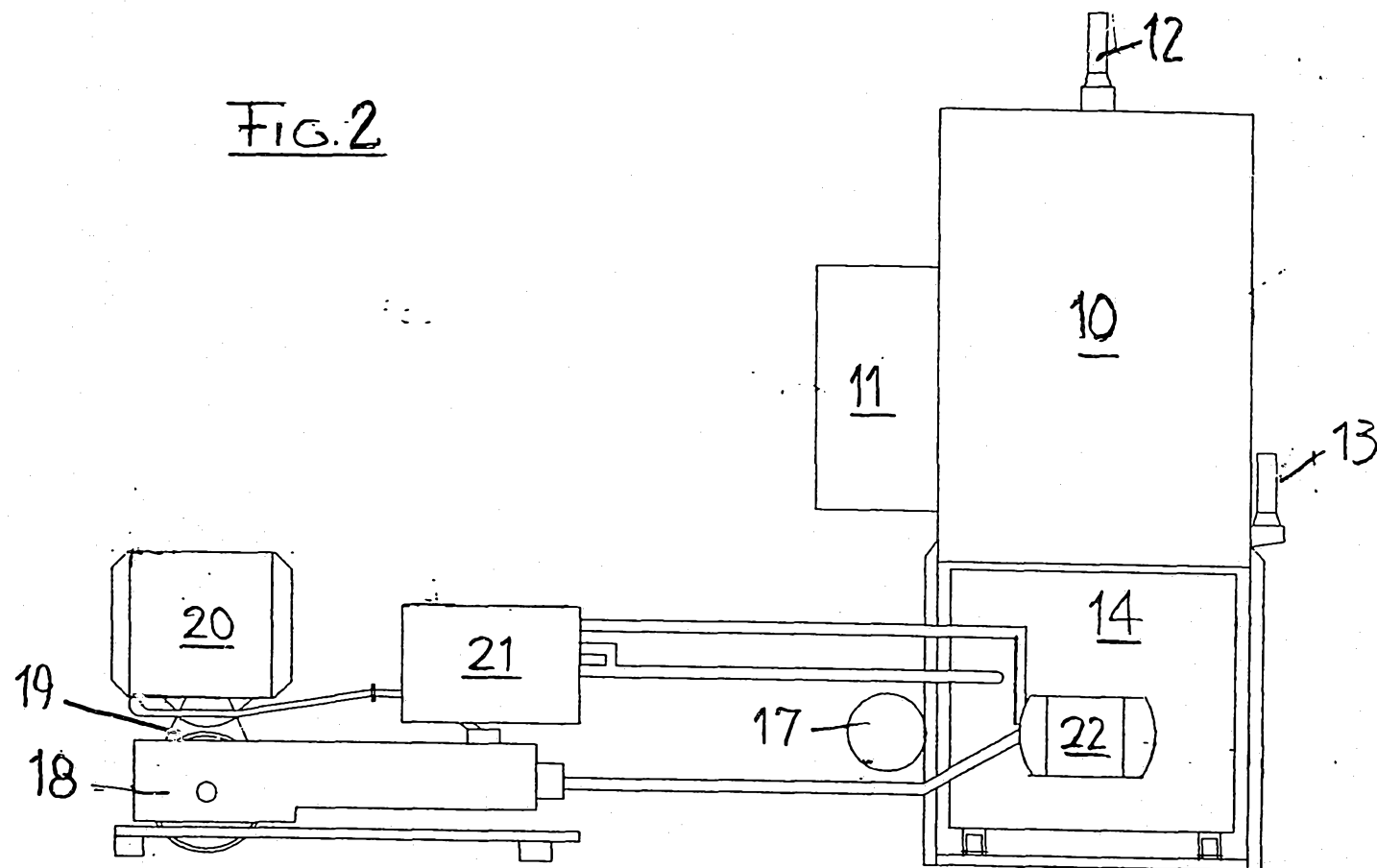


FIG 3

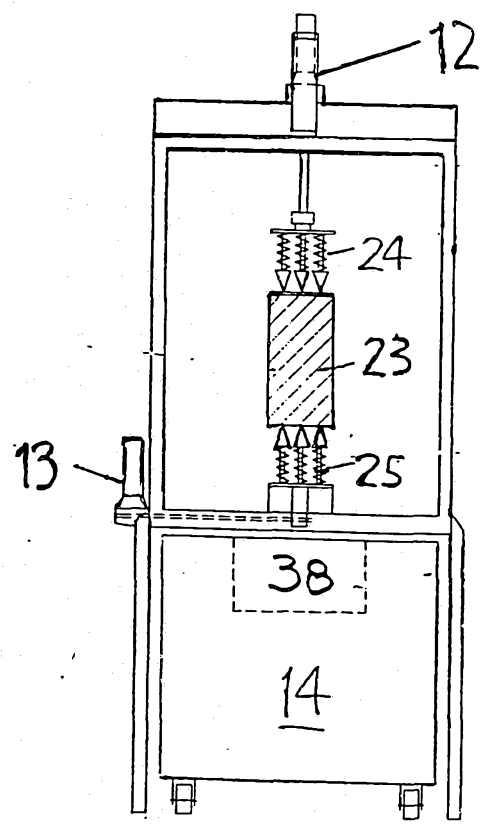
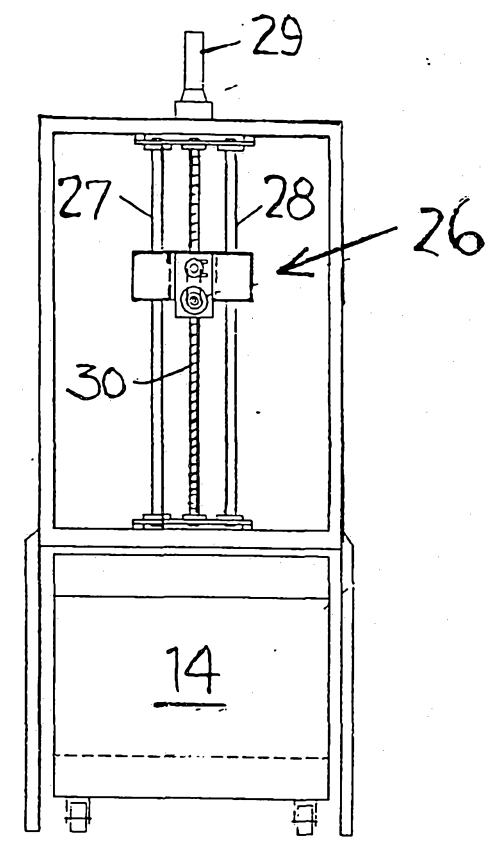


FIG 4



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FIG. 5

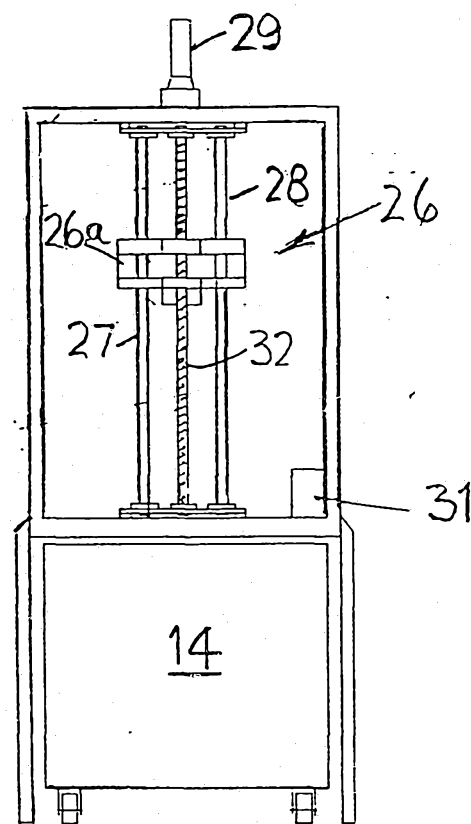
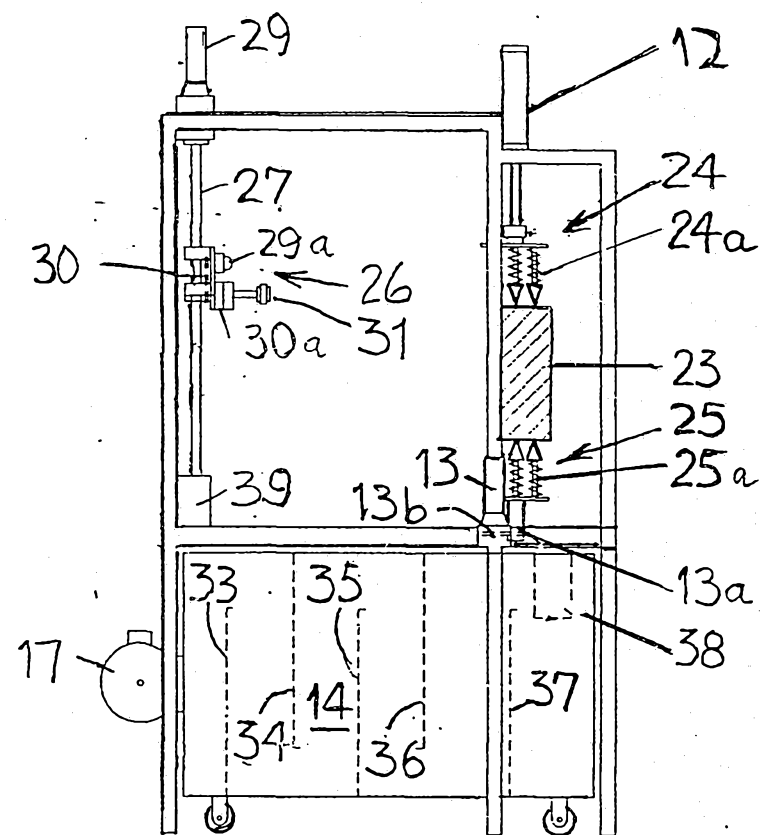


FIG. 6



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