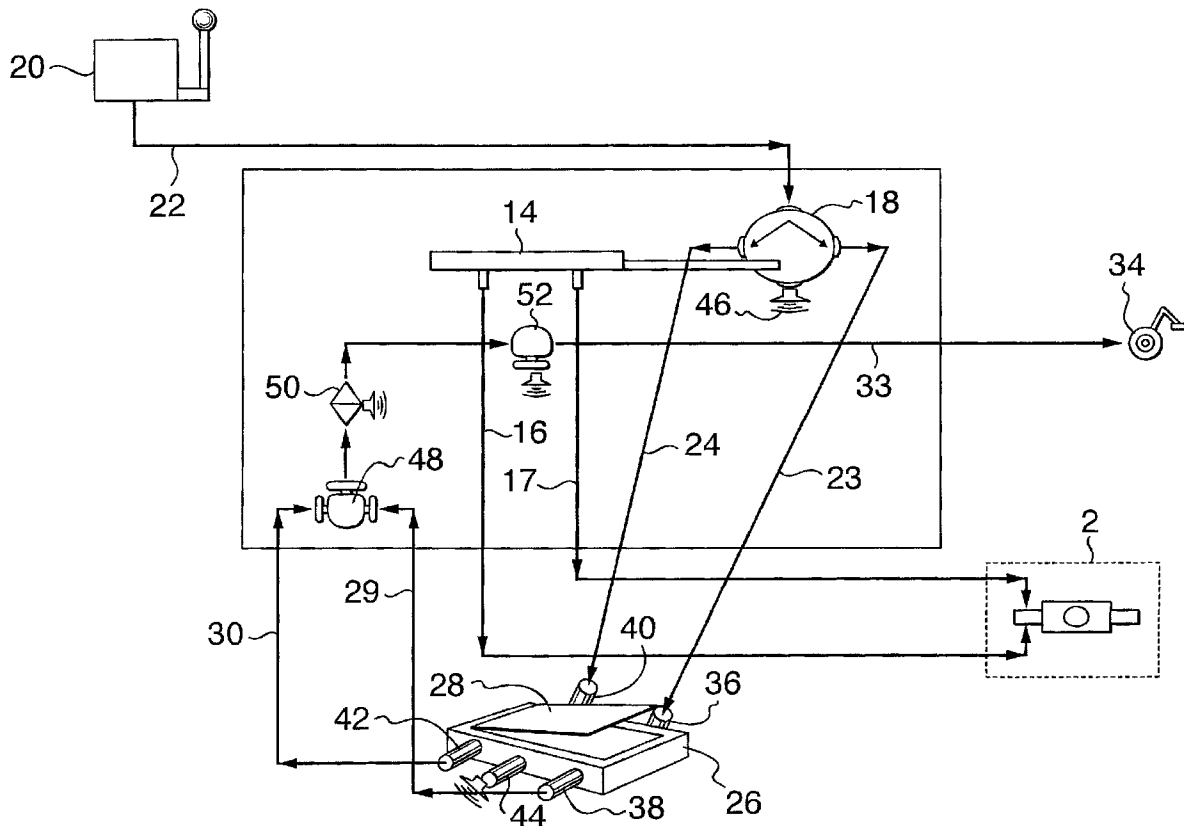




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(54) Titre : BOITIER DE COMMANDE ET DE LIMITATION DES GAZ POUR FOREUSES SOUS PRESSION EN
CONJONCTION AVEC INSTALLATION ET ENTRETIEN DES FORAGES
(54) Title: THROTTLE LIMITING CONTROL BOX FOR SNUBBING UNITS IN CONJUNCTION WITH SERVICE OR
DRILLING RIGS



(57) Abrégé/Abstract:

A system for a pneumatically-actuated engine throttle of a snubber ram unit of an oil service/drilling rig, to stop accidental engine engagement of a pipe section and its being pulled into or pushed through the snubber ram unit of the rig, the system comprising a

(57) **Abrégé(suite)/Abstract(continued):**

switch positioned in an air line between a pneumatic throttle control and an engine throttle of the rig, the switch manually actuatable between open and closed positions and normally biased towards open position, the switch associated with the throttle control and engine throttle, on the one hand, and a snubber ram unit control on the other, so as to override the throttle control and prevent actuation of the engine throttle when the snubber ram unit is in closed position, the switch associated with the snubber ram unit control so as to be inoperative when the snubber ram unit is in an open position, but to be operative when the snubber ram unit is in a closed position, the switch constructed so as to require, when operative, manual positioning by an operator, against its bias towards open position, to move it to and hold it in closed position, the switch, when in open position and when the snubber ram unit is in closed position, shutting off flow of air to the engine throttle to prevent engine engagement of the pipe section, and when in closed position, permitting regular flow of air to the engine throttle and engine engagement, and moving, of the pipe section.

ABSTRACT

A system for a pneumatically-actuated engine throttle of a snubber ram unit of an oil service/drilling rig, to stop accidental engine engagement of a pipe section and its being pulled into or pushed through the snubber ram unit of the rig, the system comprising a switch positioned in an air line between a pneumatic throttle control and an engine throttle of the rig, the switch manually actuatable between open and closed positions and normally biased towards open position, the switch associated with the throttle control and engine throttle, on the one hand, and a snubber ram unit control on the other, so as to override the throttle control and prevent actuation of the engine throttle when the snubber ram unit is in closed position, the switch associated with the snubber ram unit control so as to be inoperative when the snubber ram unit is in an open position, but to be operative when the snubber ram unit is in a closed position, the switch constructed so as to require, when operative, manual positioning by an operator, against its bias towards open position, to move it to and hold it in closed position, the switch, when in open position and when the snubber ram unit is in closed position, shutting off flow of air to the engine throttle to prevent engine engagement of the pipe section, and when in closed position, permitting regular flow of air to the engine throttle and engine engagement, and moving, of the pipe section.

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THROTTLE LIMITING CONTROL BOX FOR SNUBBING UNITS IN CONJUNCTION WITH SERVICE OR DRILLING RIGS

FIELD OF THE INVENTION

The present invention is related to a throttle limiting control system and method for its use in association with snubbing units for rigs for
5 servicing/drilling for oil or natural gas.

BACKGROUND OF THE INVENTION

"Snubbing" relates to the insertion of piping and tools into, or their extraction from, wells being serviced/drilled for oil and natural gas under pressure. It is conventional to employ one or more blow-out preventers (BOP's)
10 in conjunction with such snubbers. The BOP's are closed into pressurized engagement with the piping in order to prevent leakage of gas under pressure from the well bore.

Conventionally, a snubbing unit is situated on top of the primary service/drilling rig BOP's. One or more sets of stripping rams are used to strip
15 tubing out of and into the pressurized well.

Snubbing is done when piping or tubing is pulled out/pushed into a well under pressure. Normally this pressure is from natural gas. Stripping pipe rams and stripping annulars, components of a snubbing unit, are designed to have tubing slide through them. Tubing connectors (i.e. collars) cannot be slid
20 through the stripping rams because of their size. When a collar is stripped from a higher pressure well, it must be "staged" out. To stage a collar out from a well, a combination of stripping annulars and stripping pipe rams are used in accordance with the following sequential steps:

- 25 1. The tubing is hoisted by the service rig until the collar is below a stripping annular. The collar is at the stripping annular when the service rig weight indicator starts to increase in weight.
2. The adjacent stripping pipe rams are closed.

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3. The pressure that is trapped between the stripping pipe rams and the stripping annular is then bled off to atmospheric pressure.
4. The stripping annular is then opened.
- 5 5. The service rig then hoists the tubing collar above the stripping annular.
6. The stripping annular is then closed.
7. The pressure is then equalized from below the stripping pipe rams to between the stripping annular and the stripping pipe rams.
8. The stripping pipe rams are then opened.
- 10 9. Then the tubing is hoisted to the next tubing connection and the process starts again.

A difficulty currently exists in that, at the eighth step, the stripping pipe rams may accidentally not be opened by the operators. When this happens, a collar can be accidentally pulled into the stripping rams and the tubing can be parted. This creates a number of possible dangers, including exposing workers to injuries from flammable gas or an explosion. For example, an incident occurred in November 2004 on a gas well in Alberta where there was a service rig and a snubbing unit on the well. The tubing was being hoisted out of the well and the snubbers forgot to open their stripping pipe rams. The tubing was parted and there was an explosion. That explosion killed the service derrick hand, burned two snubbers and damaged the service rig, snubbing unit and BOP's.

Thus it is an object of the present invention to provide a system, adapted for snubbing units with BOP's in conjunction with a service or a drilling rig that prevents the pipe from moving when the stripping pipe rams are closed.

SUMMARY OF THE INVENTION

In accordance with the present invention there is provided a system adapted for a pneumatically-actuated engine throttle of a service or drilling rig

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in conjunction with a snubber ram unit, to stop accidental engine engagement of a pipe section and its being pulled into or pushed through the stripping rams of the snubber unit of the rig. The system comprises a switch positioned in an air line between a pneumatic throttle control and an engine throttle of the rig, the switch manually actuatable between open and closed positions and normally biased towards open position. The switch is associated with the throttle control and engine throttle, on the one hand, and a snubber ram unit control on the other, so as to override the throttle control and prevent actuation of the engine throttle when the snubber ram unit is in closed position. The switch is associated with the snubber ram unit control so as to be inoperative when the snubber ram unit is in an open position, but to be operative when the snubber ram unit is in a closed position. The switch is constructed so as to require, when operative, manual positioning by an operator, against its bias towards open position, to move it to and hold it in closed position. The switch, when in open position, and when the snubber ram unit is in closed position, shuts off flow of air to the engine throttle to prevent engine engagement of the pipe section, and when in closed position, permits regular flow of air to the engine throttle and engine engagement, and moving, of the pipe section.

The invention also relates to a method of preventing accidental engine engagement of a pipe section being pulled into or pushed through a snubber ram unit of an oil service/drilling rig. The method comprises the step of overriding a throttle control and thereby preventing actuation of an engine throttle when the snubber ram unit is in a closed position and requires manual positioning, and maintaining of that positioning, of a switch while the snubber ram unit is in closed position, to actuate the engine throttle.

As will be disclosed in more detail subsequently, the system and method according to the present invention provide a reliable way of preventing unwanted engagement of a pipe section by the rig engine, when snubbing is taking place. Accordingly, the safety of the service/drilling rig is significantly enhanced.

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BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects and advantages of the invention will become apparent upon reading the following detailed description and upon referring to the drawings in which:

5

Figure 1 is a schematic front elevation view of a snubber ram unit on top of a primary service/drilling rig BOP's illustrating the environment in which the present invention operates.

10

Figure 2 is a schematic drawing of a throttle-limiting control system in accordance with the present invention, associated with a snubber ram unit and rig engine throttle.

15

Figures 3a, 3b, 3c and 3d are, respectively, schematic diagrams of the main switch of the system of Figure 2, in a first open position with the snubber ram unit in open position and the service/drilling rig throttle working normally, in that same position with the snubber ram unit in closed position, the system operating to prevent the engine throttle from engaging pipe section, in a second, closed position with the snubber ram unit being still in closed position, the system operating to enable the engine to engage a pipe section to move it, and finally, in that same closed position with the snubber ram unit in open position.

20

While the invention will be described in conjunction with the illustrated embodiment, it will be understood that it is not intended to limit the invention to such embodiment. On the contrary, it is intended to cover all alternatives, modifications and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

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DETAILED DESCRIPTION OF THE DRAWINGS

In the following description, similar features in the drawings have been given similar reference numerals.

- 5 Turning to Figure 1, there is illustrated a snubber ram unit 2 on top of a rig BOP stack 3, incorporating a BOP 4, for a drilling rig. The snubber ram unit 2 includes stripping pipe rams 6, the purpose of which is to strip tubing 8 within casing 9 out of or force it into a pressurized well. The snubber ram unit 2 has associated with it a snubbing annular 10, and the rig BOP stack 3 has a safety
- 10 annular 11, these annulars being designed to have tubing 8 slide through them. The problem, as previously indicated, has been that the stripping pipe rams 6 will not receive collars 12 of tubing 8 when closed and hence, when the stripping pipe rams 6 are closed, tubing 8 should not be moved so that collars 12 are forced through stripping pipe rams 6.
- 15 Stripping pipe rams 6, as can be seen in Figure 2, are controlled pneumatically by snubber ram unit control 14 acting through hydraulic lines 16 and 17. A selector valve 18, for instance a BARKSDALE™ selector valve, controls whether snubber ram unit control 14, and hence snubber ram unit 2, are in open or closed position.
- 20 A manually operable engine throttle control illustrated as engine rig hand throttle 20, is pneumatically controlled, through line 22 passing through selector valve 18, and lines 23 and 24 communicating through switch 26, actuated by pedal 28, and pneumatic lines 29 and 30 and 33, by rig throttle actuator 34, which is used to activate the engine throttle of the rig (not shown). Pedal 28 of
- 25 switch 26 is normally biased (for example by a spring) towards an upright, open position. In this position, with snubber ram unit control 14 in an open position so that the stripping pipe rams 6 are open, normal air flow through switch 26 is from line 23, in through inlet port 36 and out through outlet port 38 (Figure 3a). In this case there is normal airflow between engine rig hand throttle 20 along
- 30 lines 23, 29 and 33, to rig throttle actuator 34.

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When snubber ram unit control 14 is closed, and snubber ram unit 2 is in a closed position, the snubber ram unit control 14 is constructed so as to cause selector valve 18 to close off air travel along lines 22, 23, 29 and 33, and instead cause airflow along lines 22, 24, 30 and 33, between engine rig hand throttle 20 and rig throttle actuator 34 (Figure 3b). Now, so long as pedal 28 of switch 26 is in its open position, with the pedal 28 elevated, switch 26 is configured so as to prevent passage of air from inlet port 40 to outlet port 42. Instead, air from line 24 is allowed to be dumped through exhaust port 44.

The configuration of switch 26 is such that when the pedal 28 is depressed, while snubber ram unit 2 is in closed position (Figure 3c), air flow is permitted through switch 26 from inlet port 40 to outlet port 42, so that there is now control of rig throttle actuator 34 by engine rig hand throttle 20 through lines 22, 24, 30 and 33. In this case, with switch 26 closed and snubber ram unit 2 and snubber ram unit control 14 closed, engine rig hand throttle 20 fully controls the action of rig throttle actuator 34, thereby allowing tubing 8 to be moved.

Once pedal 28 is allowed to return to its raised, open position, so long as snubber ram unit control 14 is closed, switch 26 is configured so that rig throttle air continues to be dumped through exhaust port 44 of switch 26 (Figure 3b). As well, that air is dumped through exhaust port 46 of selector valve 18. Thus, engine rig hand throttle 20 remains inoperative.

It should be noted that a shuttle valve 48 receives the air from pneumatic lines 29 and 30 and controls the flow of that air to rig throttle actuator 34. So that shuttle valve 48 does not get locked, a vent liner/perforated nipple 50 is provided in line 33 downstream from shuttle valve 48, as illustrated, to provide a constant bleed, and hence a pressure drop, downstream from shuttle valve 48 to ensure preparation of that shuttle valve and prevent it from becoming locked. A quick release valve 52 also is provided in line 33, downstream from vent liner 50, to provide an air dump to ensure that rig throttle actuator 34 is deactivated as required when snubber ram unit control 14 is closed and snubber ram unit 2

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is in closed position, with pedal 28 of switch 26 still being in its open position (Figure 3b).

If snubber ram unit control 14 is open, while pedal 28 is still depressed from when the stripping pipe rams 6 were closed, air is now fed through line 23
5 to inlet port 36 of switch 26, and switch 26 is configured to have air dumped through exhaust port 44. Only when the foot pedal 28 is released will normal air flow, and hence throttle control, resume, air flowing through switch 26 between inlet port 36 to outlet port 38 again allowing tubing 8 to be moved.

Thus, it can be seen that the only way to have engine rig hand throttle 20
10 actuate rig throttle actuator 34, so that tubing 8 can be moved, is if the snubber ram unit control 14 is open and pedal 28 is in raised or open position, or when snubber ram unit control 14 is closed, by depressing pedal 28. Thus, no tubing 8 can be moved at all when the stripping pipe rams 6 are in the closed position, unless the operator physically actuates pedal 28 of switch 26 and, after that,
15 when the stripping pipe rams 6 are in open position, unless the operator physically permits pedal 28 to return to its open position.

Thus, there has been provided in accordance with the invention throttle limiting control box for snubbing units in conjunction with service or drilling rigs that fully satisfies the objects, aims and advantages set forth above. While the
20 invention has been described in conjunction with specific embodiments thereof, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art in light of the foregoing description. Accordingly, it is intended to embrace all such alternatives, modifications and variations as fall within the spirit and broad scope of the invention.

CLAIMS:

1. A system for a pneumatically-actuated engine throttle of a snubber ram unit of an oil service/drilling rig, to stop accidental engine engagement of a pipe section and its being pulled into or pushed through the snubber ram unit of the rig, the system comprising a switch positioned in an air line between a pneumatic throttle control and an engine throttle of the rig, the switch manually actuatable between open and closed positions and normally biased towards open position, the switch associated with the throttle control and engine throttle, and a snubber ram unit control so as to override the throttle control and prevent actuation of the engine throttle when the snubber ram unit is in closed position, the switch associated with the snubber ram unit control so as to be inoperative when the snubber ram unit is in an open position, but to be operative when the snubber ram unit is in a closed position, the switch constructed so as to require, when operative, manual positioning by an operator, against its bias towards open position, to move it to and hold it in closed position, the switch, when in open position, and when the snubber ram unit is in closed position, shutting off flow of air to the engine throttle to prevent engine engagement of the pipe section, and when in closed position, permitting regular flow of air to the engine throttle and engine engagement, and moving, of the pipe section.
2. A system according to claim 1, wherein the switch is constructed so as to be controlled by the service/drilling rig operator's foot so as to move it to and hold it in closed position against the switch bias.
3. A system according to claim 1, wherein the snubber ram unit is constructed so as to be hydraulically controlled.

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4. A method of stopping accidental engine engagement of a pipe section being pulled into or pushed through a snubber ram unit of a service/drilling rig, the method comprising the step of overriding a throttle control and thereby preventing actuation of an engine throttle when the snubber ram unit is in a closed position, and requiring manual positioning of a switch, while the snubber ram unit is in closed position, to actuate the engine throttle.

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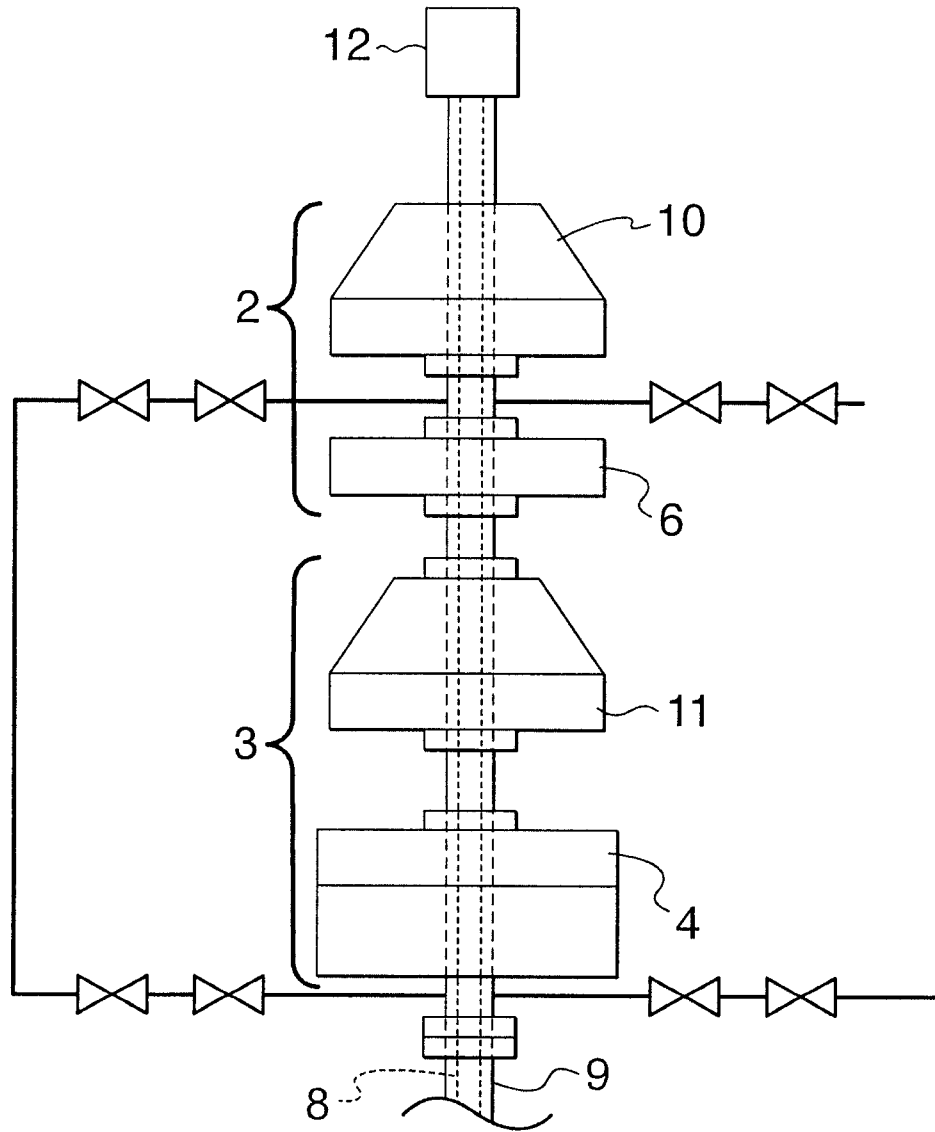


FIG. 1

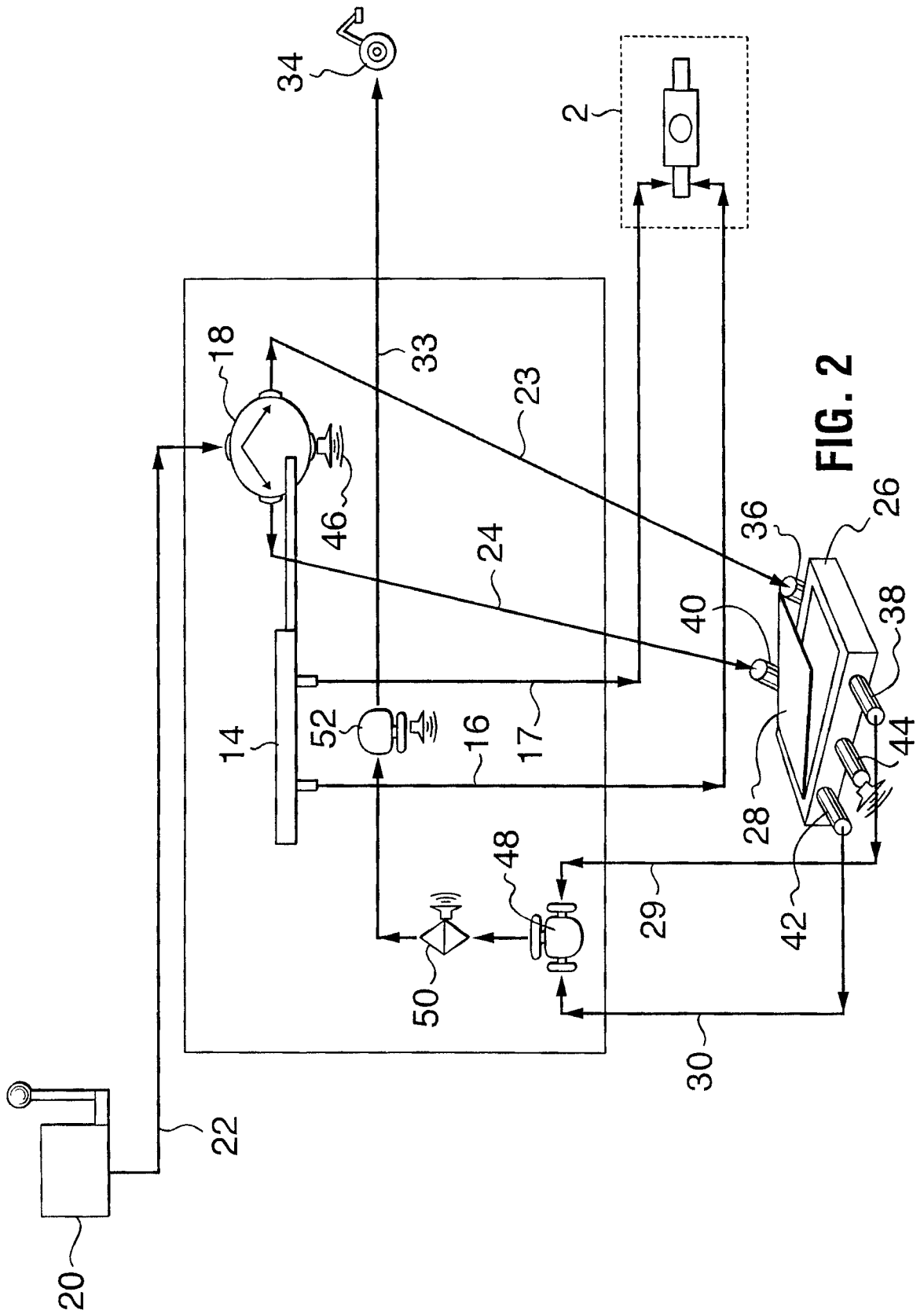


FIG. 2

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