

Señora Jefe
División de Nuevas Creaciones
Superintendencia de Industria y Comercio
E. S. D.

SUPLENTE DE INDUSTRIA Y COMERCIO



No. 07-077010- -00003-0000

Fecha: 2008-09-17 15:20:45 Dep. 2020 NUECREACION
Tra 2 PATENTES Eve: 1 REGDEPOSITO
Act 538 PETICION Folios: 2

Referencia: Solicitud de privilegio para patente de invención
Título: Camión tractor equipado con equipo de presurización hidráulica.
Expediente No. 07-077.010
Solicitante: Neogás do Brasil Gás Natural comprimido S.A.
Asunto: Pago del examen de patentabilidad.

MONICA WOLF WASSERMAN, identificada con cédula de ciudadanía No. 51'711.267 de Bogotá y con Tarjeta Profesional de Abogado No. 46.034 del Consejo Superior de la Judicatura, como apoderada de la sociedad, NEOGÁS DO BRASIL GÁS NATURAL COMPRIMIDO S.A., por medio de la presente me permito allegar el recibo de consignación que respalda el pago del examen de patentabilidad, para la patente de invención identificada en la referencia, a efectos de que ese Despacho proceda a la práctica del mismo.

ANEXOS

Recibo de consignación N°. 0874310, por la suma de cuatrocientos veinte mil pesos m/cte (\$420.000).

NOTIFICACIONES

Recibiré notificaciones en la Secretaría de ése Despacho y en mi oficina, ubicada en la calle 83A No. 23-90 de esta ciudad.

De la Señora Jefe,

MÓNICA WOLF WASSERMAN
C.C. No. 51.711.267 de Bogotá
T.P.A. 46.034 del C. S. de la J.

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

NIT :

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

RECIBO OFICIAL DE CAJA : 08 - 74,310
FECHA : SEPTIEMBRE 17 DE 2008



No. 07-077010-00003-0000

Fecha: 2008-09-17 15:20:45 Dep. 2020 NUECREACION
Tra. 2 PATENTES Eve: 1 REGDEPOSITO
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***** CONSIGNACION *****

DEPOSITANTE	TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PGO	Vr. PAGO
WOLF ABOGADOS ASOCIADOS	CONSIGNACION	BANCO DE BOGOTA	062754387	81178333	17/09/2008	840,000.00

***** CONCEPTO *****

CANT.	RENTISTICO	CONCEPTO	TOTAL CONCEPTO
1	50005-01-01 SOLICITUDES	85 EXAMEN DE PATENTABILIDAD DE INVEN	420,000.00
		TOTAL :	\$ 420,000.00

SON: CUATROCIENTOS VEINTE MIL PESOS

RESPONSABLE : _____

RECIBO DE CAJA APLICADO AL EXPEDIENTE No. _____

DIVISIÓN DE NUEVAS CREACIONES

RADICACIÓN EXPEDIENTE No. 07-77010

EL EXTRACTO DE LA PRESENTE SOLICITUD DE **PATENTE DE INVENCION**

FUE PUBLICADO EN LA GACETA DE PROPIEDAD INDUSTRIAL No **590** DE

FECHA **31 DE MARZO DE 2008** EL TÉRMINO HÁBIL SEÑALADO POR LA LEY

EXPIRA EL **27 DE JUNIO DE 2008**

NOTA: Dentro del plazo de los seis (6) meses siguientes a partir de la fecha de publicación en la gaceta de Propiedad Industrial, deberá solicitar y cancelar el examen de patentabilidad so pena de que la solicitud caiga en abandono, de acuerdo con lo establecido en el Artículo 44 de la Decisión 486/2000.

SE PRESENTARON OPOSICIONES POR PARTE DE TERCEROS.

SI _____ NO X

108
110
111

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIRECCIÓN DE NUEVAS CREACIONES

2020
Bogotá, D.C.,

Abogada
Mónica Wolf W.
(Apoderada)

ASUNTO	Radicación	07 - 77 010
	Trámite	002
	Evento	001
	Actuación	430
	Oficio	08542
	Folios	028

Patente de Invención	☒	Patente de Modelo de Utilidad	☐
Vía Nacional	☒		
Vía PCT (fase nacional)	☐	Cap. I	☐
		Cap. II	☐
Solicitud Internacional n.º	_____		
Fecha de Presentación Intrnl.	_____		

Como resultado del examen de fondo, realizado con fundamento en el artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le comunica:

1. Documentos estudiados

<u>Descripción:</u>	Folios 3 a 18 como se radicó inicialmente
<u>Reivindicaciones:</u>	Folios 20 y 21 como se radicó inicialmente
<u>Dibujos:</u>	Folios 22 a 31 como se radicó inicialmente
<u>Prioridad:</u>	Folios 47 a 102; 2006-07-27, BR, PI 0603748

2. Objeto de la invención

Título de la solicitud: *Camión tractor equipado con equipo de presurización hidráulica*, folio 1.

El objeto de la presente solicitud de patente de invención consiste en suministrar un equipo de compresión hidráulica móvil para gas natural comprimido, GNC.

El problema planteado en esta solicitud es satisfacer la necesidad de tener unos medios adecuados para el transporte y el suministro de GNC.

Para solucionar este problema técnico la solicitud en estudio proporciona un equipo de compresión hidráulica que se monta sobre un camión tractor (conocido en nuestro medio como 'cabezote de tractomula') al cual se añade un remolque con los cilindros de almacenamiento de gas. El equipo está alimentado por una toma de fuerza adaptada -mediante un cardán- a la caja de cambios del camión, esa fuerza mueve a una bomba de compresión que está controlada mediante un panel de control alimentado por la batería del camión. El equipo comprende un tanque de reserva de fluido hidráulico, acoplado a la bomba de compresión; un bloque múltiple de envío, un bloque múltiple de retorno, unos detectores, unas válvulas, un cilindro decantador y un filtro de partículas.

Clasificación Internacional de Patentes (IPC): B60P 9/00, F17C 7/02, 5/06

3. De la solicitud de Patente

Antes de entrar en detalles específicos, se le dan al solicitante ciertas indicaciones generales, algunas de las cuales son aplicables a este caso y todas deberán ser tenidas en cuenta en las eventuales modificaciones:

El título o nombre de la invención debe concordar con lo que se reclama en el capítulo reivindicatorio. Esto es, si en las reivindicaciones se reclama un producto, tal producto debe ser mencionado en el título, y si en las reivindicaciones se reclama un procedimiento o un sistema o un método, también debe ser mencionado allí. Normalmente, el título debe contener máximo diez palabras aunque eventualmente pueden ser más. El título no debe contener palabras cuyo significado no esté reconocido dentro del sector de la técnica de que se trate. Preferiblemente, deben ser palabras cuyo significado se encuentre en el Diccionario de la Real Academia Española (DRAE).

En Colombia, la máxima autoridad en cuestiones del lenguaje es la Academia Colombiana de la Lengua. En caso de duda sobre el significado de las palabras, se debe acoger la definición que trae el Diccionario de la Real Academia Española (DRAE).

En Colombia, es de uso obligatorio el Sistema Internacional de unidades. Esto implica, también, que la coma decimal es de uso obligatorio. Cuando aparezca algún valor con unidades diferentes a las exigidas, deberá incluirse su correspondiente conversión al Sistema Internacional.

La parte técnica de la solicitud se divide en tres secciones, debidamente separadas, preferiblemente en este orden: El capítulo descriptivo, el capítulo reivindicatorio y el juego de dibujos o figuras. Se prefiere que el texto se presente escrito de manera mecánica, en una sola columna. Ninguna de estas secciones podrá llevar membretes (encabezamientos o pies de página) ajenos al contenido técnico de la solicitud.

Por lo menos el capítulo descriptivo debe estar debidamente paginado y estar escrito a doble espacio, con el fin de facilitar la referencia a los apartados del texto. Se debe evitar, en lo posible, el uso de mayúsculas corridas, hay que recordar que ese empleo equivale a gritar en el lenguaje oral. Se pueden emplear las mayúsculas para resaltar ciertos apartados del

texto, pero si todo el texto está escrito en mayúsculas, nada queda resaltado.

La terminología empleada en la descripción y en las reivindicaciones debe ser igual para designar las diferentes partes, piezas, elementos, detalles o aspectos de lo que se mencione en ellas; los cuales, a su vez, deben estar designados con números o signos de referencia.

Dentro del texto de la descripción y las reivindicaciones se aconseja encerrar entre paréntesis el número o signo de referencia cada vez que se mencione el detalle correspondiente, con el fin de distinguirlo de otros tipos de números o signos que eventualmente aparezcan allí. Estos números o signos de referencia deben aparecer dentro del juego de dibujos (preferiblemente, sin paréntesis, aunque pueden estar encerrados dentro de un círculo) siempre acompañados de líneas o flechas que señalen o indiquen a qué parte, pieza, elemento o aspecto se encuentran asociados.

Las reivindicaciones deben estar numeradas individual y consecutivamente (1, 2, ... 5, 6, etc.) El capítulo reivindicatorio no debe tener subtítulos.

Normalmente se pueden encontrar dos categorías de reivindicaciones: una, la de producto; y, la otra, de procedimiento.

En las reivindicaciones se deben definir los alcances de la protección que desea el solicitante. En consecuencia, las reivindicaciones forman un cuerpo aparte de la descripción y como tal debe ser redactado: la primera vez que se mencione un nombre dentro de las reivindicaciones debería estar acompañado de un artículo indeterminado; y, la inclusión -entre paréntesis- de un número de referencia no sustituye la definición del elemento o aspecto al que se refiere, simplemente sirve de información complementaria. Se debe entender que la descripción sirve para interpretar las reivindicaciones y, en consecuencia, si en una reivindicación se reclama un aparato, por ejemplo, no se deberían mencionar aspectos del funcionamiento del aparato dentro de la reivindicación, limitándose a definir únicamente los elementos que constituyen el aparato.

Para detectar si una definición de producto está bien hecha, se debe poder responder a la cuestión: ¿cómo es el producto reclamado? Si no se puede dar una respuesta razonable, es porque el producto está mal definido o no ha sido definido en absoluto. Otra prueba común es la de invertir el razonamiento: ¿son las características definidas -en determinada reivindicación- propias de un producto? Si la definición de una característica de un producto empieza por un verbo, muy seguramente no es una característica propia del producto.

Normalmente no se puede definir un producto por el procedimiento de su obtención, porque el producto, en la mayoría de los casos, es producido en cantidades industriales por una variedad de procedimientos, muchos de los cuales no dejan trazas o huellas que se puedan detectar satisfactoriamente en el producto terminado y puesto a disposición del público.

Por lo demás, los productos industriales son bienes tangibles, son algo concreto, tienen existencia física, y por tanto son susceptibles de definición mediante sus características físicas -en la mayoría de los casos- o físico-químicas en los restantes, aunque existen unas pocas excepciones -que pertenecen a ciertas tecnologías emergentes- en donde resulta más fácil su identificación por el procedimiento de obtención, pero éste no es el caso en la presente oportunidad.

Cada una de las figuras debe estar debidamente identificada, preferiblemente con un número consecutivo: Figura 1, figura 2, ...

Las figuras deben ser realizadas siguiendo las reglas del dibujo técnico.

Se prefiere que dentro de las figuras no se incluya ningún texto. Cada uno de los detalles ilustrados en las figuras deberá estar señalado con un número o signo de referencia, el cual será el mismo en todas las figuras en donde se encuentre el detalle en cuestión. Si en alguna figura no se encuentran números de referencia, se entiende que no se va a decir nada sobre ella dentro del texto de la descripción y, entonces, es preferible que se omita tal figura. Análogamente, si en una figura no se encuentra señalado algún detalle con el respectivo número de referencia, es preferible que se omita tal detalle.

La patente de **modelo de utilidad** no puede incluir los procedimientos, por definición. Si alguna de las reivindicaciones de una solicitud de patente de modelo de utilidad reclama un procedimiento, debe ser suprimida.

Descripción (artículo 28 D. 486)

Durante el análisis del texto de la descripción y de las ilustraciones anexadas, se observaron los siguientes defectos:

- 1) El título o nombre de la invención *Camión tractor equipado con equipo de presurización hidráulica* tiene los siguientes defectos: una expresión cacofónica: *equipado con equipo* [en las reivindicaciones aparece *provisto de equipo*]; y, un término - *presurización*- cuyo significado no concuerda con el contexto. *presurizar*, según el Diccionario de la Real Academia Española, DRAE, significa:
(Del ingl. *to pressurize*). 1. tr. *Mantener la presión atmosférica normal en un recinto, independientemente de la presión exterior, como en la cabina de pasajeros de un avión.* Significado que no concuerda con el contexto, porque aquí se manejan presiones superiores a la *presión atmosférica normal*.

El solicitante deberá sustituir este término -y sus derivados, a lo largo de toda la solicitud- por una expresión que se ajuste a lo que desea divulgar. Se sugiere el término *compresión* (derivado de *comprimir*), o la expresión *someter a presión*.

- 2) En la página 1, folio 3, aparece la definición de la sigla HPU: *equipo de presurización hidráulica* que debe ser revisada, a la luz de la objeción anterior sobre el empleo del verbo *presurizar* -y sus derivados- dentro de la solicitud. Además, en la página 12, folio 14, el solicitante define HPU como *Unidad de Presurización Hidráulica*, expresión que es más cercana al significado original en inglés, pero, en igual medida, es defectuosa, por tener el término *presurización*. Se observa que, en la página 8, folio 10, aparece la expresión *estación HPU* que no concuerda con ninguna de las dos definiciones. En todo caso, el solicitante debe adoptar una definición única para cada una de las siglas que utilice dentro de la solicitud. En la página 9, folio 11, aparece la sigla como *HPA*.

- 3) En la misma página 1 aparece por primera vez el término *semiremolque* -con una sola r- cuyo significado no es claro, ya que -según el Diccionario de la Real Academia Española (DRAE)- *remolque* es un vehículo, entonces, *semirremolque* será... ¿?

- 4) En la misma página 1 aparece por primera vez la expresión *y/o*. Al respecto, el *Diccionario panhispánico de dudas* de la Real Academia Española y de la Asociación de Academias de la Lengua Española, primera edición, octubre de 2005, página 681, dice:

y/o: Hoy es frecuente el empleo conjunto de las conjunciones copulativa y disyuntiva separadas por una barra oblicua, calco del inglés «and/or», con la intención de hacer explícita la posibilidad de elegir entre la suma o la alternativa de dos opciones: «Se necesitan traductores de inglés y/o

francés». Se olvida que la conjunción 'o' puede expresar en español ambos valores conjuntamente.

El examinador ha subrayado la última frase porque es particularmente aplicable a este caso.

- 5) En la misma página 1 aparece por primera vez el término *carreta* cuyo significado, según el DRAE, no corresponde al contexto.
- 6) En la misma página 1 aparece por primera vez el término *ampollas* cuyo significado -según el DRAE- no corresponde al contexto.
- 7) En la misma página 1 aparece la expresión *presión próxima a la condición factor mínimo de compresibilidad* que carece de sentido.
- 8) En la misma página 1 aparece por primera vez un valor [220 bar] cuyas unidades no están expresadas en el Sistema Internacional. En la página 4, folio 6, se encuentran otros valores, de presión, expresados en *psi* -que tampoco son admisibles-
- 9) En la página 2, folio 4, aparece la expresión fraccionaria $1/600$ que debe ser sustituida por su equivalente decimal [0,001666...], según las reglas de uso del Sistema Internacional de unidades.
- 10) En la misma página 2 aparece por primera vez el término *estoqueado* cuyo significado, aparentemente, derivado del verbo *estoquear* (herir con estoque) no concuerda con el contexto.
- 11) En la página 3, folio 5, aparece la expresión *regasificado en su destilación* que carece de significado reconocible.
- 12) En la misma página 3 aparece por primera vez la expresión *patente americana US* -no *Patente Americana US*, como se encuentra en el texto- en donde se debe omitir el calificativo *americana* porque no existe ninguna oficina *americana* que conceda tales patentes y porque, además, con el empleo de la sigla *US* se identifica plenamente el origen de la patente.
- 13) En la misma página 3 aparece por primera vez una expresión numérica [3,235,725] en la cual se hace mal uso de la coma; en Colombia es de uso obligatorio la coma decimal en relación con las expresiones numéricas.
- 14) En la página 4, folio 6, aparece la expresión *la solicitud de patente PI 0208143-1* que no corresponde a la numeración utilizada en Colombia, por lo que debe hacerse la aclaración respectiva.
- 15) En la página 5, folio 7, aparece por primera vez el término *manifold* que debe ser correctamente traducido al español.
- 16) En la misma página 5 aparece la expresión *dicho disco de rastreo* que carece de sentido porque, antes de ella, no se ha mencionado ningún disco de rastreo.
- 17) En la misma página 5 aparece la expresión *en el documento PI0006389-1* que no tiene un sentido reconocible.
- 18) En la página 8, folio 10, aparece por primera vez el término *NEOgás*. Como se refiere al nombre del solicitante, debe omitirse, porque el contenido de la descripción debe ser puramente técnico, dentro de ella no se debe hacer referencia -en lo posible- a nombres comerciales o a marcas registradas. El solicitante debe estar atento al eventual cambio de propietario de la solicitud [o de la patente] o al eventual cambio de la denominación de su marca o nombre comercial. Se sugiere sustituir el término objetado por *solicitante*, *inventor* según sea el caso.
- 19) En la página 10, folio 12, aparece por primera vez una sigla [*PLC*] que no se encuentra acompañada por su significado. En la página 14, folio 16, aparece la sigla *PC* con este mismo defecto.
- 20) En la misma página 10 aparece el término *direccione* que, aparentemente, se deriva de un supuesto verbo *direccionar* que no se encuentra en el DRAE.

- 21) En la página 11, folio 13, se mencionan por primera vez varias figuras con su correspondiente número, sin embargo dentro del juego de dibujos, en los folios 22 a 31, ninguna figura está identificada con números.
- 22) Las figuras -sin número- que aparecen en los folios 22 a 24 carecen de nitidez y su interpretación es difícil.
- 23) Con relación, también, a las figuras, en algunas de ellas se ilustran ciertos detalles que no están señalados con números de referencia.
- 24) En la página 12, folio 14, aparece por primera vez la expresión *tipo tubulão* que carece de sentido reconocible.
- 25) En la misma página 12 aparece la expresión *software PLC* que carece de sentido.
- 26) En la misma página 12 aparece por primera vez la expresión *válvula de esfera manual* que carece de sentido. En la página 13, folio 15, aparece, también por primera vez, la expresión *válvula de esfera actuada* que, igualmente, carece de sentido.
- 27) En la página 14, folio 16, aparece la expresión *presión ecualizada* cuyo significado se desconoce, porque, según el DRAE, *ecualizar* se refiere a la alta fidelidad en el sonido, cuestión que no concuerda con el contexto.
- 28) En la misma página 14 aparece por primera vez el término *restrictores* cuyo significado se desconoce, ya que no se encuentra en el DRAE.
- 29) En la página 14, folio 17, aparecen los números de referencia (61), (62) que no se encuentran señalados en ninguna de las figuras.
- 30) En la página 16, folio 18, aparece la expresión *conexión resinada* cuyo significado se desconoce.
- 31) En la misma página 16 aparece la expresión *la figura 5b también consiste en un tubo...* que es confusa.

La descripción no cumple con los requisitos de claridad y divulgación completa, lo que dificulta o impide su comprensión y ejecución de acuerdo al Art. 28 de la Decisión 486

Reivindicaciones (artículo 30 D 486)

Durante el análisis del texto de las reivindicaciones se observaron los siguientes defectos:

- 1) Dentro de las reivindicaciones, folios 20 y 21, se encuentran las siguientes expresiones -que fueron objetadas arriba, con relación a la descripción-: *presurización, manifold, restrictores, semiremolque, y/o, carreta, tubulão*.
- 2) En la reivindicación 1, folio 20, se objetan -la primera vez que aparecen- las expresiones *la toma de fuerza, la caja de cambios, la bomba de succión, la batería, las válvulas* porque, en cada caso, el artículo que debe acompañar al nombre debe ser indeterminado, así: *una toma de fuerza, una caja de cambios, una bomba de succión, una batería, unas válvulas*. Además, se objetan las siguientes expresiones que aparecen sin el correspondiente artículo [indeterminado]: *restrictores, reductores de flujo, sensor de control capacitivo, sensor de control fotoeléctrico*.
- 3) En la misma reivindicación 1 aparece la expresión *un cilindro decantador* (30) pero, según se observa en las figuras de los folios 22 y 23, el número (30) está señalando a una válvula.
- 4) En la misma reivindicación 1 aparecen las expresiones *unas -no las- válvulas* (4, 5, 14, 17, 20), *unas -no las- válvulas* (5, 17, 18, 23) en las que se sustituye la definición -obligada- por los números de referencia -que son accesorios-. Además, en cada una de estas expresiones, los números de referencia deberían estar separados, porque cada uno de ellos está señalando a un elemento distinto dentro de las figuras. De acuerdo con lo expuesto en la página 15, folio 17, por

ejemplo, la primera expresión objetada debería ser sustituida por la expresión válvulas de control (3), (4), (5), (14), (17) y (20) en la cual, incidentalmente, se incluye el número de referencia (3) omitido en la reivindicación.

5) En las reivindicaciones 2 y 3, folio 21, se reclama un *camión tractor, provisto de un equipo de presurización hidráulica conforme a la reivindicación...* que, en aras de la concisión, debería ser: *camión tractor, conforme a la reivindicación...* porque en la reivindicación a la que se remite, en cada caso, solo se define un camión tractor, la expresión suprimida resulta redundante.

6) En la reivindicación 2, folio 21, se reclama un *camión tractor... conforme a la reivindicación 1, que se caracteriza por el hecho de que el camión está conectado a un semiremolque... que consta...* pero, dado que el *semiremolque* -cualquier cosa que eso sea- no forma parte del camión, no puede caracterizarlo, no se puede definir al camión tractor por algo con lo que éste se conecta. Se le sugiere al solicitante que reclame en cambio, *un sistema de transporte compuesto por un camión tractor y... -lo que sea que va conectado a él- u otra expresión que se ajuste mejor a lo que el solicitante quiere decir.* Lo propio es aplicable -cambiando lo que haya que cambiar- a la reivindicación 3, folio 21, donde se encuentra un defecto similar al aquí anotado.

Debe entenderse que las reivindicaciones dependientes de las reivindicaciones objetadas son, asimismo, objetadas, por razones análogas.

Las reivindicaciones no cumplen con los requisitos de definición, claridad, concisión o sustento por la descripción de acuerdo al Art. 30 de la Decisión 486.

Se deben presentar, entonces, nuevos capítulos descriptivo y reivindicatorio, ambos completos, junto con un nuevo juego de dibujos, donde se hayan corregido todas las objeciones que se han hecho arriba. Esto con el fin de evitar -cuando solo se presentan algunas páginas sueltas corregidas- que el lector tenga que desplazarse desde un sitio a otro de la solicitud y luego regresar a donde estaba antes sin perder la ilación de la lectura, porque esto produce confusión y afecta negativamente la claridad de dichos capítulos.

4. Determinación del Estado de la Técnica

La fecha que se ha tenido en cuenta para determinar el Estado de la Técnica es la

Fecha de presentación de la solicitud prioritaria 2006-07-27

Se realizó la búsqueda en el estado de la técnica de documentos relacionados con la solicitud teniendo en cuenta la fecha indicada; y durante la búsqueda de anterioridades se encontraron los siguientes documentos, que forman parte -**tentativamente**, porque lo reclamado en las reivindicaciones fue objetado- del estado de la técnica más cercano al objeto de la solicitud:

n.º	Documento	Título	Fecha de publicación
D1	Patente US 2 037 020, cuyo inventor es Frank A. Holby	«Tank Truck»(Un carro tanque)	1936-04-14
D2	Patente US 3 796 518, cuyo inventor es Clarence W. Weaver, quien le cedió sus derechos a la Allied Chemical Corporation	«LPG high pressure mobile pumping unit»(Una unidad móvil para bombeo a alta presión de gas líquido comprimido)	1974-03-12

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n.º	Documento	Título	Fecha de publicación
D3	Patente US 4 177 017, cuyo inventor es Jeffrey A. Schultz, quien le cedió sus derechos a la Process Engineering, Inc.	«Pump system for cryogenic liquid delivery vehicles»(Un sistema de bombas para vehículos repartidores de líquido criogénico)	1979-12-04
D4	Patente US 5 127 230, cuyos inventores son Timothy A. Neeser y Kelly W. Hedegard, quienes le cedieron sus derechos a la Minnesota Valley Engineering, Inc.	«LNG delivery system for gas powered vehicles»(Un sistema de suministro de gas natural líquido para vehículos impulsados por gas)	1992-07-07
D5	Publicación EP 0 525 329 A2, cuyo inventor es Dennis John Clark, quien le cedió sus derechos a la Union Carbide Industrial Gases Technology Corporation	«Variable speed hydraulic pump system for liquid trailer»(Un sistema de bomba hidráulica de velocidad variable para un remolque de transporte de líquidos)	1993-02-03
D6	Modelo de Utilidad DE 296 10 113 U1, cuyo titular es Christian Hasenkopf	«Füllanlage zum Füllen von Druckgasflaschen o.dgl. Druckgasbehälter»(Sistema de llenado para llenar los cilindros de gas comprimido o cilindros similares)	1996-10-24
D7	Patente US 5 603 360, cuyo inventor es James R. Teel	«Method and system for transporting natural gas from a pipeline to a compressed natural gas automotive re-fueling station»(Un método y un sistema para transportar gas natural desde un gasoducto hasta una estación de suministro de gas natural para vehículos)	1997-02-18
D8	Patente US 5 6076 180, cuyo inventor es James R. Teel	«Method and system for storing and hydraulically-pressurizing compressed natural gas (CNG) at an automotive re-fuel station»(Un método y un sistema para almacenar y comprimir hidráulicamente gas natural comprimido en una estación de suministro de gas para automóviles)	1997-10-14
D9	Publicación US 2001/0050167 A1, cuyos inventores son John Buysse y Rick Story	«Hydraulic oil cooler and supplying vessel pressure stabilizer»(Un enfriador de aceite hidráulico y un estabilizador de presión para un recipiente de suministro)	2001-12-13
D10	Publicación DE 10 2004 052 010 A1, cuyos inventores son Gerd Mühlenbeck, Benjamin Hebenstreit y Hans-Jürgen Schmidt quienes le cedieron sus derechos a la Fachhochschule Nordhausen	«Prüfstand für druckbeaufschlagte Sicherheitseinrichtungen»(Banco de pruebas para el equipo de seguridad de las instalaciones de enriquecimiento de presión)	2006-04-27
D11	Patente US 7 069 730 B2, cuyos inventores son Claus D. Emmer, Jesse Gamble, Craig Zelasko y Thomas K. Drube, quienes le cedieron sus derechos a la Chart Inc.	«Liquid and compressed natural gas dispensing system»(Un sistema de suministro de gas natural comprimido y líquido)	2006-07-04

Se anexa la copia de ciertas páginas pertinentes de estos documentos

119 113 118

NOTAS: No se realizaron las evaluaciones de los demás requisitos de patentabilidad, porque se hicieron algunas objeciones respecto a la definición, la claridad, la concisión y el sustento por la descripción de las reivindicaciones; esto es, no se pudo practicar un análisis comparativo, por ausencia de materia.

5. Conclusión:

Los requisitos de patentabilidad de la presente solicitud se encuentran afectados negativamente por la falta de claridad de la descripción y las reivindicaciones y por la falta de definición, de sustento y de concisión de estas últimas.

En cumplimiento del artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le indica que debe dar respuesta dentro del término de sesenta días contados a partir de la fecha de notificación de la presente comunicación. En caso de no dar respuesta al presente requerimiento, o si a pesar de la respuesta subsistieran los impedimentos para la concesión, se denegará la patente.

Notifíquese el presente oficio conforme a lo dispuesto en el número 5.2, letra e), del capítulo quinto del título primero de la Circular Única n.º 10 de 2001.



ALIX CARMENZA CÉSPEDES DE VERGEL
Directora de Nuevas Creaciones (C)

El anterior requerimiento fue notificado por fijación en lista, de fecha

01 JUL. 2010

CONCEPTO TÉCNICO n.º 2237	EXAMINADOR TÉCNICO Código n.º 202009
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D1

April 14, 1936.

F. A. HOLBY.

2,037,020

TANK TRUCK

Filed April 3, 1933

9 Sheets-Sheet 1

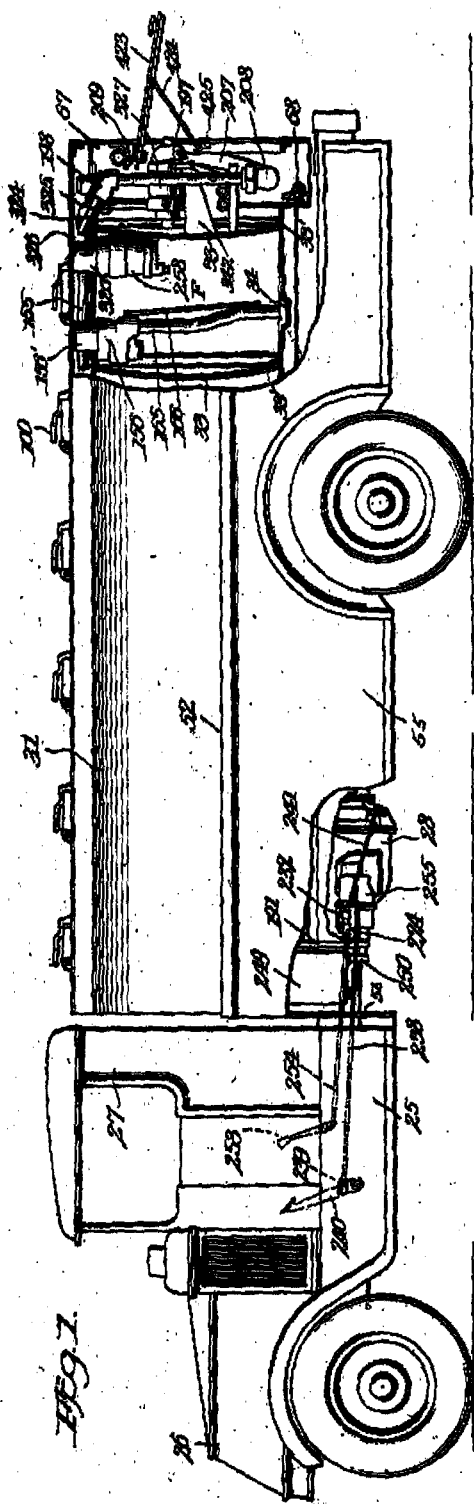


Fig. 1.

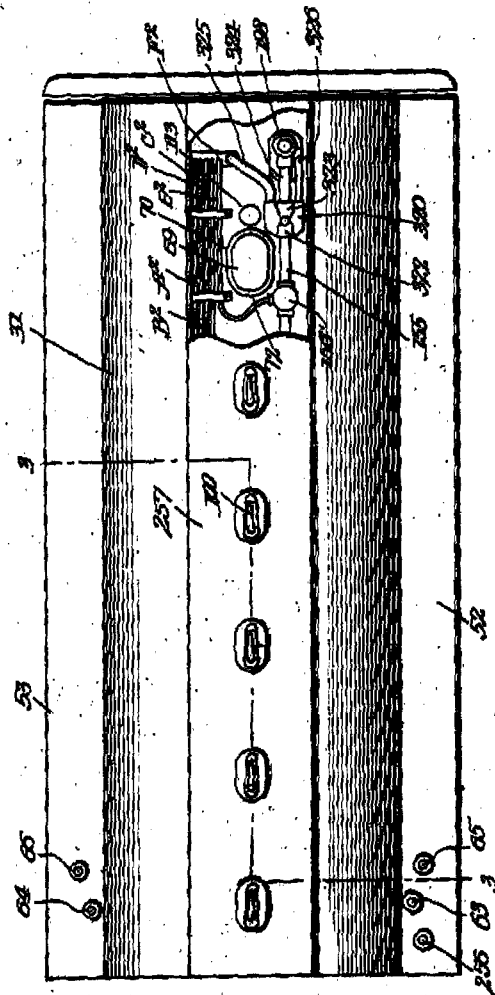


Fig. 2.

Inventor
Frank F. Holby.

Cushman, Darby Cushman,
Attorneys

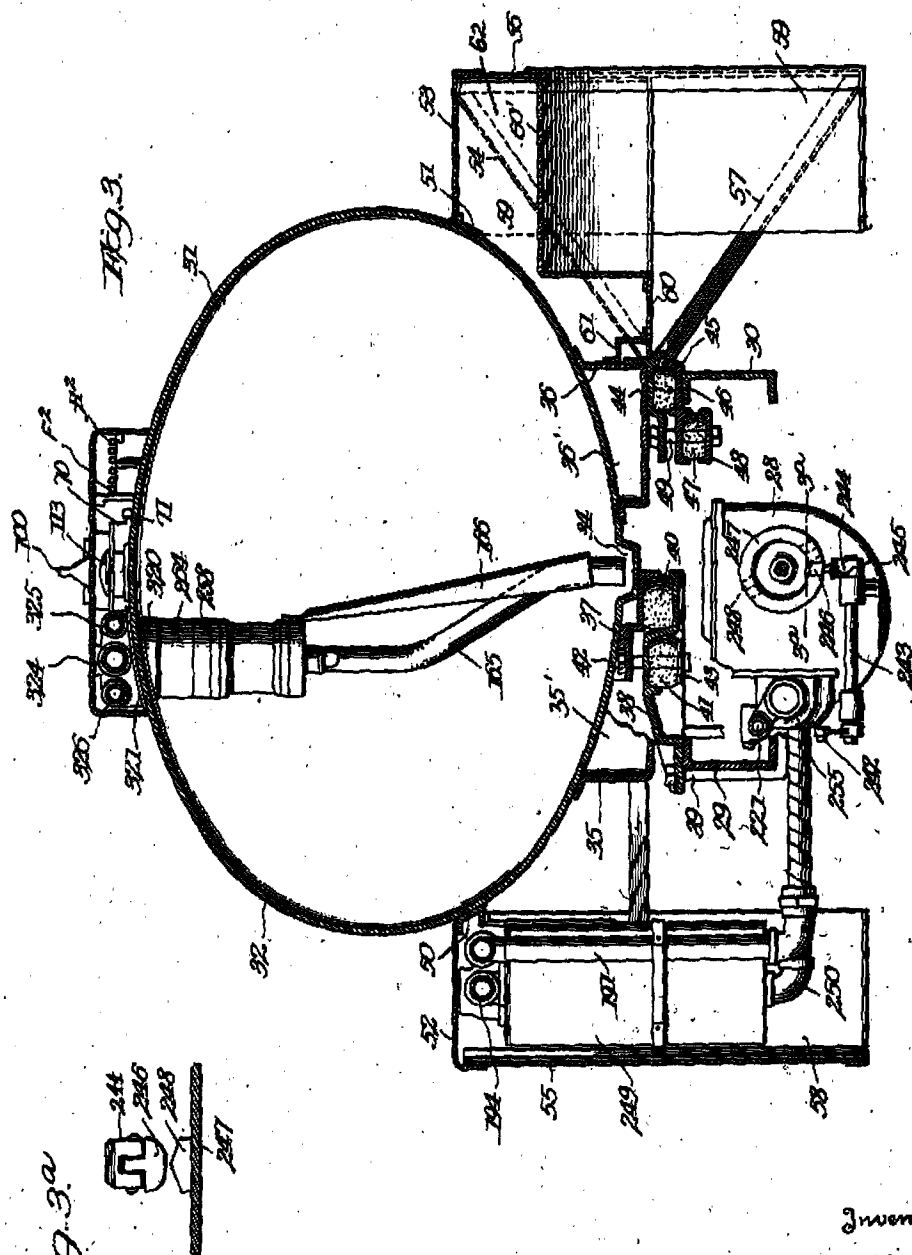
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Filed April 3, 1933

9 Sheets-Sheet 2



Inventor

Frank F. Holby.

584 *Crustacean, Dumbo & small ones.*
Atotonilco

April 14, 1936.

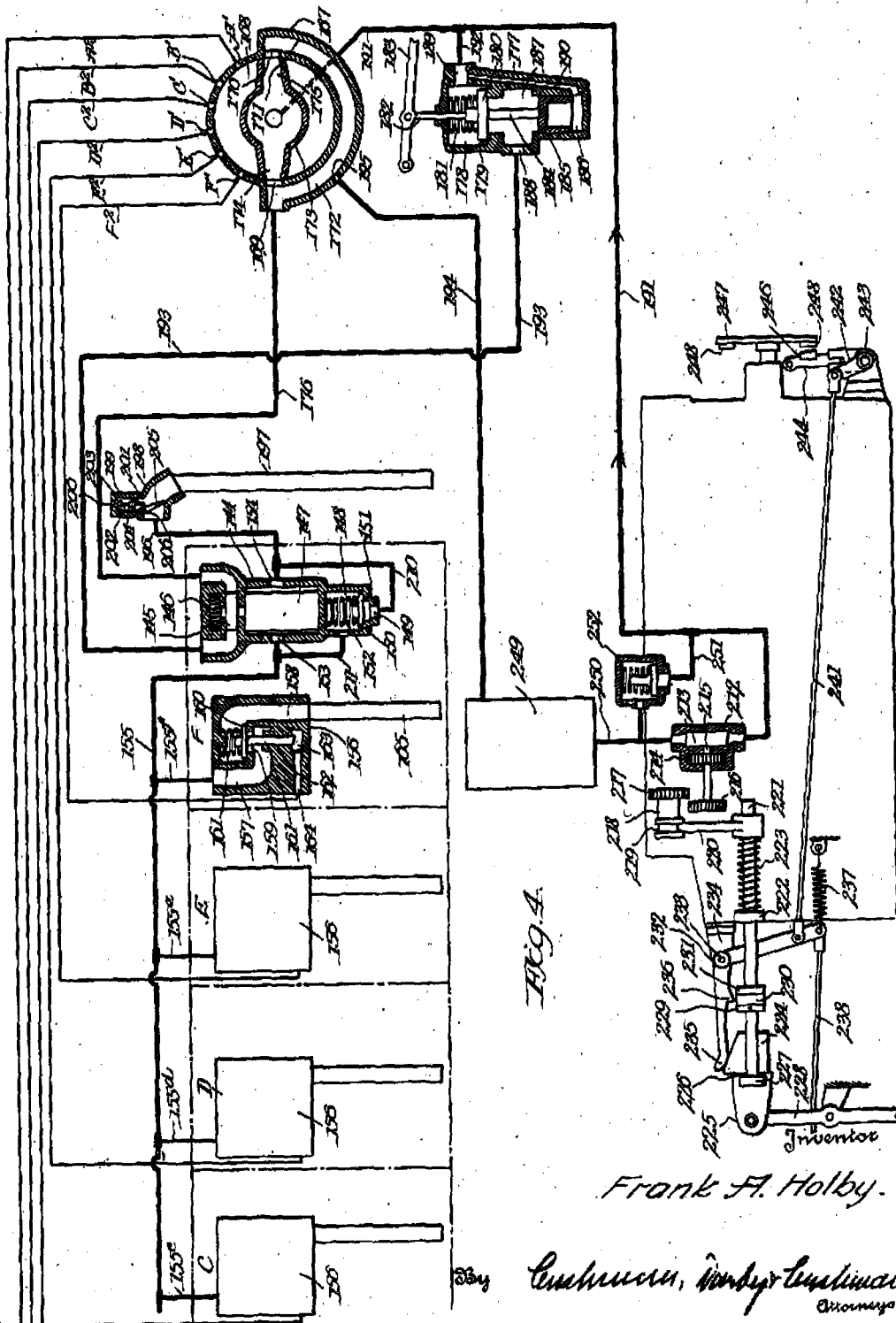
F. A. HOLBY

2,037,020

TANK TRUCK

Filed April 3, 1933

9 Sheets-Sheet 3



United States Patent [19]
Weaver

[11] **3,796,518**
[45] **Mar. 12, 1974**

- [54] **LPG HIGH PRESSURE MOBILE PUMPING UNIT**
[75] Inventor: **Clarence W. Weaver**, Houston, Tex.
[73] Assignee: **Allied Chemical Corporation**, New York, N.Y.

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[22] Filed: **Sept. 7, 1971**

[21] Appl. No.: **178,511**

Related U.S. Application Data

- [63] Continuation of Ser. No. 845,017, July 25, 1969, abandoned.

- [52] U.S. Cl. **417/244, 417/364, 417/426**
[51] Int. Cl. **F04b 17/00**
[58] Field of Search **417/2, 429, 62, 244; 166/304**

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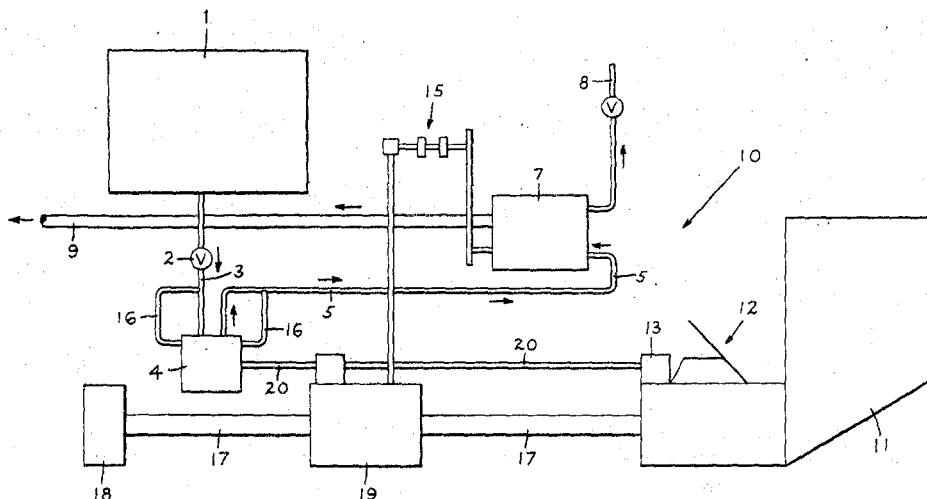
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Primary Examiner—William I. Freeh
Attorney, Agent, or Firm—Ernest D. Buff; Jonathan Plaut; P. L. Henry

[57] **ABSTRACT**

A system for pumping liquid solvent with a plurality of pumps separately powered by a variable vehicle engine power supply.

3 Claims, 2 Drawing Figures



LPG HIGH PRESSURE MOBILE PUMPING UNIT

This is a continuation, of U. S. Pat. application Ser. No. 845,017, filed July 25, 69, now abandoned.

This invention relates to the pumping of a solvent mixture for introduction into a well, flowline, pipeline, storage vessel, etc. for the removal of paraffin therefrom, or for other use as desired. The solvent mixture may be a specific mixture of liquefied propane and/or butane (LPG) and it must be kept under adequate pressure to ensure that it remains in liquefied form. One specific solvent mixture, a mixture of liquefied propane and butane of a ratio propane:butane = 70:30 to 50:50, by volume, as set forth in U.S. Pat. application Ser. No. 727,592, filed May 8, 1968, cleans wells, flowlines, etc. in the manner disclosed in that application.

In order to inject the liquefied solvent mixture into well tubing, flowlines, etc., it is first necessary to get the mixture to the line into which it is to be injected. This presents a number of difficulties, not the least of which is that oil and gas wells, pipelines, flowlines, etc. are often located in extremely rough, inaccessible terrain. Transportation over this terrain demands a compact pumping unit combined with the vehicle which moves it. In order to limit the vehicle carrying the pumping apparatus to a single rear axle, which is often required for transportation in the mountainous, swamp or largely undeveloped terrains which must be traversed, the pumping apparatus should be advantageously compact.

Perhaps more important, as individual pumping conditions vary from well to well, or line to line, etc., it is highly advantageous to develop a pumping system which provides for selectively varying RPM and horsepower powering the pumps. The combination of this variable aspect of the system with an efficient pumping system made of more than one pump allows for adaptability of the pumping system to the well or lines conditions, as will be understood with reference to the later detailed disclosure.

In addition, because of safety and pollution control, it is advantageous to design a compact, mobile, variable pumping system which has a minimum of power supplying (combustion) elements and a maximum of exhaust product control.

GENERAL DESCRIPTION OF THE INVENTION

With the above desirable design features in mind, I have invented a new pumping system for supplying the liquefied solvent to the well, flowline, etc., in a highly efficient and practical manner. Basically, it is desirable to move the liquefied solvent from a container in which it is held under pressure as a liquid through a first intermediary pump, which raises the pressure of that liquid solvent to a first intermediary pressure, from which it is transported to a second main, high pressure, pump for elevation to high pressure and injection through into well or lines, etc. thereafter. In order to achieve that which has just been described as basically desired, I designed the following pumping system which I will now generally describe:

Generally, I mount the intermediary pump and the main high pressure pump with the source of liquid solvent on the rear chassis of a single axle vehicle. Horsepower normally supplied to the rear axle of the vehicle for movement thereof is diverted to power the main high speed pump. In like manner, horsepower normally used in the vehicle operation is also used to power the

intermediary pump. Since the horsepower of the vehicle is controlled by manipulation of gears of the vehicle, the power supplied to each of the pumps may be varied by choice by manipulation of the gears. Since the pumps run at different speeds, it has been found especially advantageous not to link each of the pumps to the power of the vehicle through the same power train.

DETAILED DESCRIPTION OF THE INVENTION

The pumping system just generally described will be discussed in greater detail in the following detailed specification thereof, in which objectives and advantages of the invention will become more apparent.

FIG. 1 of the drawing is a schematic showing of the basic pumping requirements which the invention satisfies.

FIG. 2 of the drawing shows schematically a particular embodiment of the pumping system of the invention.

Tank 1 contains liquid solvent; for example, liquid petroleum gas, and in one embodiment, more particularly, a liquid combination of propane and butane in a ratio within the range disclosed in U.S. Pat. application Ser. No. 727,592, filed May 8, 1968. According to the invention, said liquid solvent is moved through a valve 2 and a line 3 to an intermediary 4. The liquid solvent is moved from the pump 4 through a line 5 which may advantageously include a flow meter 6 to a high pressure pump 7. From the high pressure pump 7, which has a safety vent to the atmosphere 8, the liquid solvent moves through the line 9 to the point of use. The intermediary pump 4 in the case of the butane-propane mixture disclosed previously, for example, may raise the pressure of the liquid solvent up to 150 pounds per square inch, while the high pressure pump 7, in the same embodiment may produce pressures up to or even over 3,000 pounds per square inch. In one embodiment the intermediary pump is a Blackmer 2 inch TLGL LPG pump, and the high pressure pump is a Union Quintuplex Plunger pump.

The basic system disclosed with relation to FIG. 1 is mounted upon a truck or vehicle body generally shown at 10 in FIG. 2. That vehicle has a cab 11 with a driver occupancy area generally shown at 12. The container 1 is mounted on the vehicle, as are pumps 4 and 7. The pump 4 is powered by the vehicle 10 as a result of the power take off from the horsepower of the vehicle engine, power take off generally being shown at 13, transmitted to the pump 4 through the shaft 20, and activated by a clutch and lever assembly, not shown. In one embodiment in what is called the power take off 13, a gear is interposed upon activation of clutch and lever assembly into the transmission gearing to mesh therewith in order to divert some of the power transmitted from the vehicle engine through the transmission to the shaft 20 to rotate the pump 4.

The high pressure pump 7 is powered through a gear train 15 and a power divider 19 interconnecting the pump 7 to the horsepower of the vehicle engine. The power divider 19 diverts the power of the vehicle normally transmitted through the drive shaft 17 to the rear wheels 18 to the pump 7 when so engaged. As described with relation to the power take off 13, in one embodiment the power divider assembly 19 is comprised of a gear train which is selectively interposed to connect with the drive shaft 17 and divert the power

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transmitted thereby to the high pressure pump 7. In the case of the power divider 19, as compared to the power take off 13, no power can be transmitted to the rear axle of the vehicle simultaneously with the diversion of power to pump 7.

The intermediary pump 4, as previously described with relation to FIG. 1, moves liquid solvent through a valve 2 and a line 3 from the container 1 through a line 5 to the high pressure pump 7, as previously discussed. A bypass line 16 may be used to recirculate that liquid solvent which the intermediary pump is supplying to the large pump and the large pump is not powered to supply through line 9 to the point of use at that time.

The intermediary pump maintains the liquid solvent under such pressure, in the case of the liquid butane-propane mixtures disclosed above about 5psi to maintain required pressure for such ratio of liquefied mixtures, so as to supply the positive suction head required by the large (high pressure) pump at the variable pumping volumes possible according to this pumping system design.

Generally, when the pumping system is to be used, the power system of the vehicle is engaged to the intermediary pump 4' by the use of the power take off 13 and suitable clutch and lever mechanism, for example, as previously discussed. Separately, the power divider 19 is made operative so as to divert power to the high speed pump 7. The gear ratio of the vehicle is selected so as to provide the desired horsepower to the pumps in combination with the selected RPM of the vehicle engine to adequately power them to provide the required volumes of solvent in a given amount of time to the end use. Liquid solvent is drawn from the container 1 by the pump 4, raised to the intermediary pressure and supplied at the desired volume per unit of time (by the choice of gear ratio and RPM) to the high pressure pump 7, which then supplies the liquid solvent at high pressure to the user, as described.

Since the intermediary pump 4 and the high pressure pump 7 described previously run at different speeds, that is, the intermediary pump runs, for example, from 600 to 900 RPM while the high pressure pump runs from 10 to 450 RPM, it has been found highly desirable to operate the two pumps separately off the same vehicle power supply. The use of gearing or some other apparatus to power each of the pumps from the same point of power supply would be cumbersome and produce a less efficient and less practical unit. On the other hand, the use of entirely separate power supplies for the two pumps would not only result in a less efficient, less practical unit for use in the types of terrain already disclosed, but would also probably introduce a second engine compounding the safety (for example, fire) and air pollution considerations.

The speed of both intermediary and high pressure pumps is of course in part in each case dictated by the gear ratio of the transmission of the vehicle, since that gear ratio will dictate horsepower supplied to the pumps. Furthermore, the vehicle engine RPM will also in part determine the flow rate, that is the volume produced by the pumps per unit of time since the speed of the pumps is determined by both the gear ratio and the RPM of the vehicle engine. The volume of flow from the high pressure pump into a well is dictated at a minimum by the pressure conditions of that well. In addition, the cleaning characteristics of well or flowline, etc., will vary so that different volumes per unit of time

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will be required from the high pressure pump. Utilizing the gear selection found in the vehicle transmission, which may be as many as five or more different gears, and the variable speed (RPM) of the vehicle engine, such a variable characteristic is provided for.

It is pointed out that this condition of being able to vary the horsepower input to the pumps by varying the gear ratio of the vehicle transmission will not only give the operator the versatility of providing for different volume per unit of time, as needed, but will allow for correction of the situation wherein the well or line demands are such so that the pumping system is underpowered and therefore "lugging." In these situations, the gear ratio may be changed and the underpower situation alleviated. In addition, it has been found that when first introducing butane-propane mixtures of the type described into a well, it is advantageous to start the main pump so as to supply the liquid solvent at a low volume in order to first discover the pressure conditions of the well until a safe operation has commenced. Later, when these pressure conditions are understood, the volume of the supply from the main (high pressure) pump is increased, by changing the gear ratio and therefore the power driving the pump and/or the speed of the engine.

I will now describe the operation of the embodiment shown in FIG. 2 in its start up and then pumping operations, after the vehicle is driven to the location of a well or flow-line, etc., in order that the butane-propane mixture already described may clean the tubing of the well or flowline, etc. of the paraffin contained thereon.

The vehicle carrying the pumping system and the liquid petroleum gas is brought right to the point of the well. The single rear axle allows for the maneuverability of the vehicle required to bring it to that point. The operator of the vehicle turns the vehicle off and then connects with suitable tubing the high pressure pump to the well or flowline, etc.

As a matter of convenience the controls, pressure gauges, etc. may be mounted on a control panel, as previously mentioned, and it may be mounted outside of the cab 11 of the truck. This control panel may include alternate control levers to change the RPM and gear ratio of the vehicle engine, for example. This convenience will allow the operator of the truck to remain outside of the cab of the vehicle during pumping operation.

The operator disengages the power divider 19 from the rear wheels of the truck to the neutral position of the power divider. The operator opens the valve 2 supplying the LPG from the tank 1 to the intermediary pump 4. With the valve 2 open the vapor or liquid is sent into the piping system by virtue of the vapor pressure from the storage tank. At this time the operator bleeds down all truck vents, hose vents, etc. to assure that no air traps remain in the system. At this time he engages the truck transmission to a pre-selected gear ratio — normally a low first or second position for initial pumping. The pump 4 is powered through the power take off (PTO) assembly 13 from the trucks multi-speed transmission through a standard drive shaft 20. The operator engages the clutch and therefore power take off assembly 13 which starts the small pump 4 rotating. The small pump is allowed to rotate until a positive suction head is delivered to the large (high pressure) pump. When this is noted, the operator then engages the power divider 19 to the position of rotating

United States Patent [19]

Schultz

[11] 4,177,017

[45] Dec. 4, 1979

[54] PUMP SYSTEM FOR CRYOGENIC LIQUID DELIVERY VEHICLES

[75] Inventor: Jeffrey A. Schultz, East Rochester, N.H.

[73] Assignee: Process Engineering, Inc., Plaistow, N.H.

[21] Appl. No.: 912,540

[22] Filed: Jun. 5, 1978

Related U.S. Application Data

[63] Continuation of Ser. No. 741,193, Nov. 12, 1976, abandoned.

[51] Int. Cl.² F04B 9/00; F04B 17/00; F17C 7/02; B60P 3/22

[52] U.S. Cl. 417/231; 417/390; 62/55; 62/239; 280/5 E

[58] Field of Search 417/364, 390, 231, 234; 180/53 R; 62/55, 239; 280/5 E; 222/626, 627

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Primary Examiner—Carlton R. Croyle

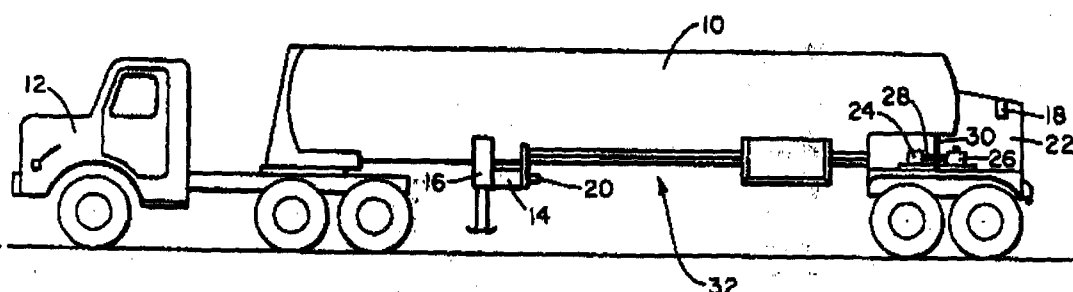
Assistant Examiner—Thomas L. Ross

Attorney, Agent, or Firm—Wolf, Greenfield & Sacks

[57] ABSTRACT

The system is used for pumping cryogenic liquids from delivery vehicles including trucks, semi-trailers and trailers. An internal combustion engine is mounted at the forward end of the vehicle or, in the case of a trailer truck at the forward end of the trailer, and drives a variable displacement hydrostatic transmission which comprises a hydraulic pump driven directly from the output shaft of the internal combustion engine. The transmission also comprises a high speed hydraulic motor coupled by hydraulic lines with the hydraulic pump and arranged in a closed loop system. The hydraulic motor is disposed at a rear end of the vehicle (trailer) and has its output shaft coupled directly to the cryogenic delivery pump of the vehicle. A control panel is mounted in a rear compartment of the vehicle and allows the operator to control, inter alia, engine speed, hydrostatic drive speed and cryogenic pump output pressure.

4 Claims, 2 Drawing Figures



dangerous when in proximity to hydrocarbons, commonly found around internal combustion engines.

In discussing the details of a preferred embodiment of the system reference is now made to FIGS. 1 and 2, which show, respectively, a schematic diagram of a trailer truck vehicle and associated pumping system of the invention. FIG. 1 shows a conventional trailer truck comprising the trailer portion 10 and the tractor 12. One of the advantages of the system of this invention is that there are no special connections required between the trailer and the tractor. The system of this invention is totally self-contained on the trailer. The primary drive for the system of this invention is provided by a gasoline drive engine 14 which is preferably a Volkswagen engine model 126A industrial engine. The engine is provided with a variable speed (load sensitive) governor, starter, generator, key ignition switch, tachometer, high temperature warning light, low oil pressure warning light, and manual choke. The engine is preferably protected by an automatic shut-off in the event of low oil pressure or excess temperature. The engine is located in a rugged, light weight aluminum cabinet and is disposed under the belly of the trailer just behind the landing gear 16. Some of the controls for the engine or at least the gages are lights to be monitored may be disposed at the rear of the trailer at the control panel 18.

A variable displacement hydraulic pump 20 is mounted directly to the output shaft of the drive engine 14. This hydraulic pump in a preferred embodiment is a Sundstrand hydro-transmission pump series 18 made by Sundstrand Corporation of Ames, Iowa, part No. 18-2014. This pump is capable of handling powers of up to 60 horsepower, and speeds of up to 4000 r.p.m. The engine 14 has an output power of approximately 46 horsepower at 3600 r.p.m. and thus the pump is easily within the operating parameters of the engine 14. The displacement of the pump 20 is controlled by a single arm controller in the rear cabinet 22 where the control panel is disposed. Appropriate linkages (not shown) may be provided between the pump 20 and the cabinet 22 for facilitating control at the cabinet end of the pump. This arm controller provides pump displacements from zero to a maximum displacement. At zero displacement the pump is in "neutral" and no hydraulic flow occurs. At maximum displacement the pump flow is sufficient to cause a speed increase of 2:1 to the hydraulic motor 24. With the hydraulic pumping system of this invention and the provision of a "neutral" position for the pump there is no need for the use of valves which are many times troublesome in operation.

The hydraulic motor 24 is a high speed motor mounted in a common frame with the cryogenic pump 26, coupled by a direct drive shaft 28. An appropriate safety barrier 30 is interposed between the motor 24 and the cryogenic pump 26. As previously mentioned, the motor 24 is a high speed motor capable of transmitting up to 60 horsepower and speeds of up to 7500 r.p.m. In a preferred embodiment the motor may be a Volve motor model No. FIID-19-100-666. The displacement ratio for the pump (at maximum displacement) motor combination is approximately 2:1, allowing the hydraulic motor to utilize all of its speed potential if the need arises. However, due to the horsepower requirements of the cryogenic pump 26, speeds of over 5500 r.p.m. at the hydraulic motor—cryogenic pump shaft are not likely. The 5500 r.p.m. speed is within the operating

parameters of the hydraulic motor 24. The hydrostatic transmission of this invention in addition to including the hydraulic pump 20 and hydraulic motor 24 includes fluid connecting lines 32 which, as shown in FIG. 2, include a main flow line and a return flow line intercoupled between the pump and motor. As shown in FIG. 2 the hydraulic system is a closed loop system. With this system the hydraulic fluid is not returned to the reservoir 34 after passing through the system but is cycled continuously from the pump to the motor. A preferred hydraulic fluid for this system is a fire-resistant phosphate-ester composition fluid, with low viscosity for cold weather operation, presently Monsanto 29c-LT. This type of system requires a reservoir only to replace lost fluid which is quite minimal. Therefore, a three gallon reservoir can be used instead of the 20-30 gallon reservoir required for open loop systems.

Another advantage to the system of the present invention is that essentially all of the control can be provided from a single location at the rear of the trailer in the cabinet 22. For example, the engine control including the ignition switch, tachometer, warning lights, throttle and choke are all housed in the rear cabinet 22. This allows the operator to control the engine 14 and also the hydraulic drive and the piping controls all from a single location. Preferably, a magnetic pick up is used in association with the shaft 28 for sensing shaft speed. This indication is also displayed on the control panel 18 along with such other parameters as the cryogenic pump output pressure. The control panel 18 is supported in a well known manner in the lading piping control compartment or cabinet 22.

There are many advantages associated with the system of the present invention. For example, in comparison to mechanical systems a system of this invention has far fewer maintenance requirements. Secondly, because the system of this invention has a variable drive ration, maximum horsepower is available over a broad range of delivery pump speeds. This results in maximum power and economy for the various delivery conditions that may be encountered. As previously mentioned the closed loop system is also of noted advantage especially since it requires a much smaller reservoir and does not require the use of auxiliary valves which are usually necessary in an open loop system.

Having described one embodiment of the present invention it should now become apparent to those skilled in the art that numerous modifications can be made in the disclosed embodiment, all of which are contemplated as falling within the scope of the present invention. For example, the principles of the present invention may also be used with a vehicle other than a trailer truck such as a straight truck. In this case the drive engine of the truck itself is utilized to drive the hydraulic pump 20 by means of a transmission power-take-off unit coupled from the presently existing transmission for the vehicle.

What is claimed is:

1. A pumping system for cryogenic liquid delivery vehicles that include a tractor and trailer that is substantially longer than the tractor having forward and rear ends comprising;
 - self-contained internal combustion engine means having control means associated therewith,
 - means for mounting the internal combustion engine means at a forward end of the trailer remote from the rear end of the trailer,

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D3

[54] LNG DELIVERY SYSTEM FOR GAS
POWERED VEHICLES

[75] Inventors: Timothy A. Neeser, Savage; Kelly W.
Hedegard, Eden Prairie, both of
Minn.

[73] Assignee: Minnesota Valley Engineering, Inc.,
New Prague, Minn.

[21] Appl. No.: 702,076

[22] Filed: May 17, 1991

[51] Int. Cl.⁵ F25B 19/00

[52] U.S. Cl. 62/7; 62/50.1;
62/50.2; 123/525; 123/527

[58] Field of Search 62/50.1, 50.2, 46.2,
62/7; 123/525, 527

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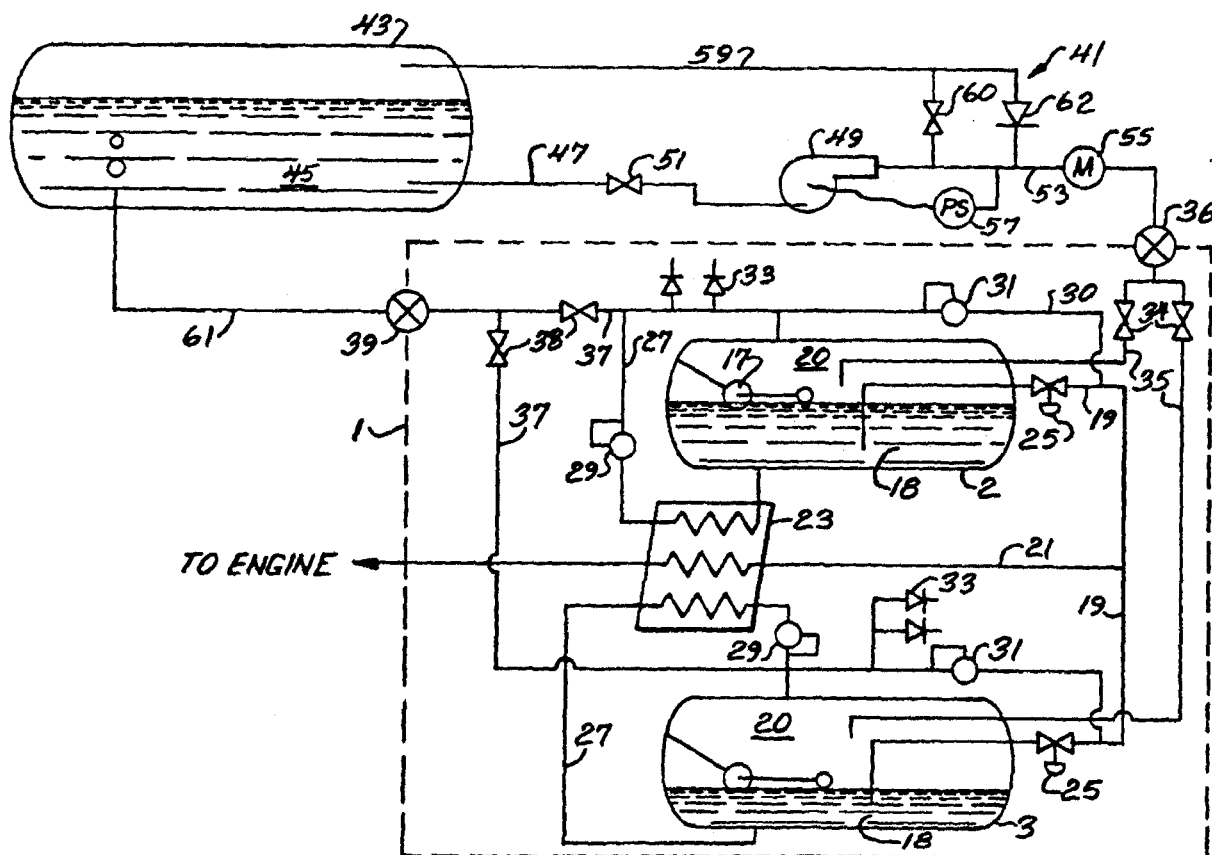
3233935 3/1984 Fed. Rep. of Germany .
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Primary Examiner—Ronald C. Capossela
Attorney, Agent, or Firm—Rockey and Rifkin

[57] ABSTRACT

The delivery system of the invention consists of a pair of LNG fuel tanks mounted on a vehicle. A solenoid valve associated with each tank allows the vehicle operator to select the tank from which LNG is to be delivered to the engine. An automatic override system is provided whereby if the pressure in the non-selected tank rises above a predetermined level, the operator's tank selection is overridden and gas from the non-selected tank is used until the pressure falls below the predetermined level. This override system eliminates the need to vent gas to the atmosphere to avoid pressure build up and thereby eliminates waste of the LNG. Each tank is also provided with a pressure building capability such that the gas will always be delivered to the engine with sufficient pressure. The system is designed such that LNG from a stationary low pressure storage tank can be delivered at high pressure to refuel the tanks. Finally, a variable insulation barrier is provided in the fuel tanks to minimize heat transfer between the LNG and gas head.

8 Claims, 2 Drawing Sheets



129

123 128



Europäisches Patentamt
European Patent Office
Office européen des brevets



Publication number: 0 525 329 A2

12

EUROPEAN PATENT APPLICATION

Application number: 92109125.2

Int. Cl.⁵: F04B 15/08

Date of filing: 29.05.92

Priority: 31.05.91 US 708891

Danbury, Ct. 06817-0001(US)

Date of publication of application:
03.02.93 Bulletin 93/05

Inventor: Clark, Dennis John
127 Fairbanks Avenue
Kenmore, New York 14223(US)

Designated Contracting States:
BE DE ES FR IT LU

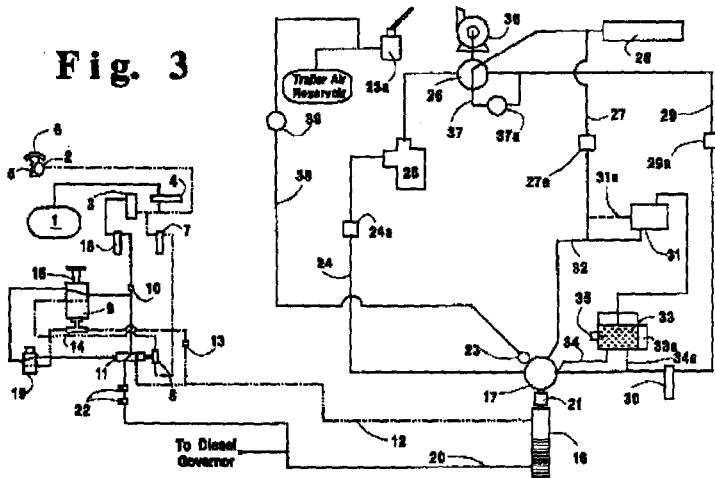
Applicant: UNION CARBIDE INDUSTRIAL
GASES TECHNOLOGY CORPORATION
39 Old Ridgebury Road

Representative: Schwan, Gerhard, Dipl.-Ing.
Elfenstrasse 32
W-8000 München 83(DE)

Variable speed hydraulic pump system for liquid trailer.

- The present invention relates to a hydraulic pump system comprising:
- (a) a variable displacement pump;
 - (b) an engine used to drive the variable displacement pump;
 - (c) a power takeoff unit for engaging or disengaging the engine to the variable displacement pump;
 - (d) a hydraulic motor driven by the variable displacement pump via hydraulic fluid pressure;
 - (e) a liquid pump driven by the hydraulic motor;
 - (f) a hydraulic fluid cooler in communication with the hydraulic motor;
 - (g) a hydraulic fluid reservoir in communication with the cooler and the inlet of the variable displacement pump;
 - (h) hydraulic piping and/or hose for connecting said hydraulic motor, cooler reservoir and variable displacement pump; and
 - (i) filters located within the hydraulic piping and/or hose.

Fig. 3



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129 129



⑬ BUNDESREPUBLIK
DEUTSCHLAND



DEUTSCHES
PATENTAMT

⑫ Gebrauchsmuster
⑩ DE 296 10 113 U 1

⑤ Int. Cl.⁸:
F 17 C 5/00

⑪ Aktenzeichen:	296 10 113.3
⑫ Anmeldetag:	8. 8. 96
⑬ Eintragungstag:	12. 9. 96
⑭ Bekanntmachung im Patentblatt:	24. 10. 96

DE 296 10 113 U 1

⑦ Inhaber:
Hasenkopf, Christian, 92521 Schwarzenfeld, DE;
Götz, Ulrich, 92224 Amberg, DE

⑧ Vertreter:
Wasmeler, Graf, 93055 Regensburg

⑥ Füllanlage zum Füllen von Druckgasflaschen o.dgl. Druckgasbehälter

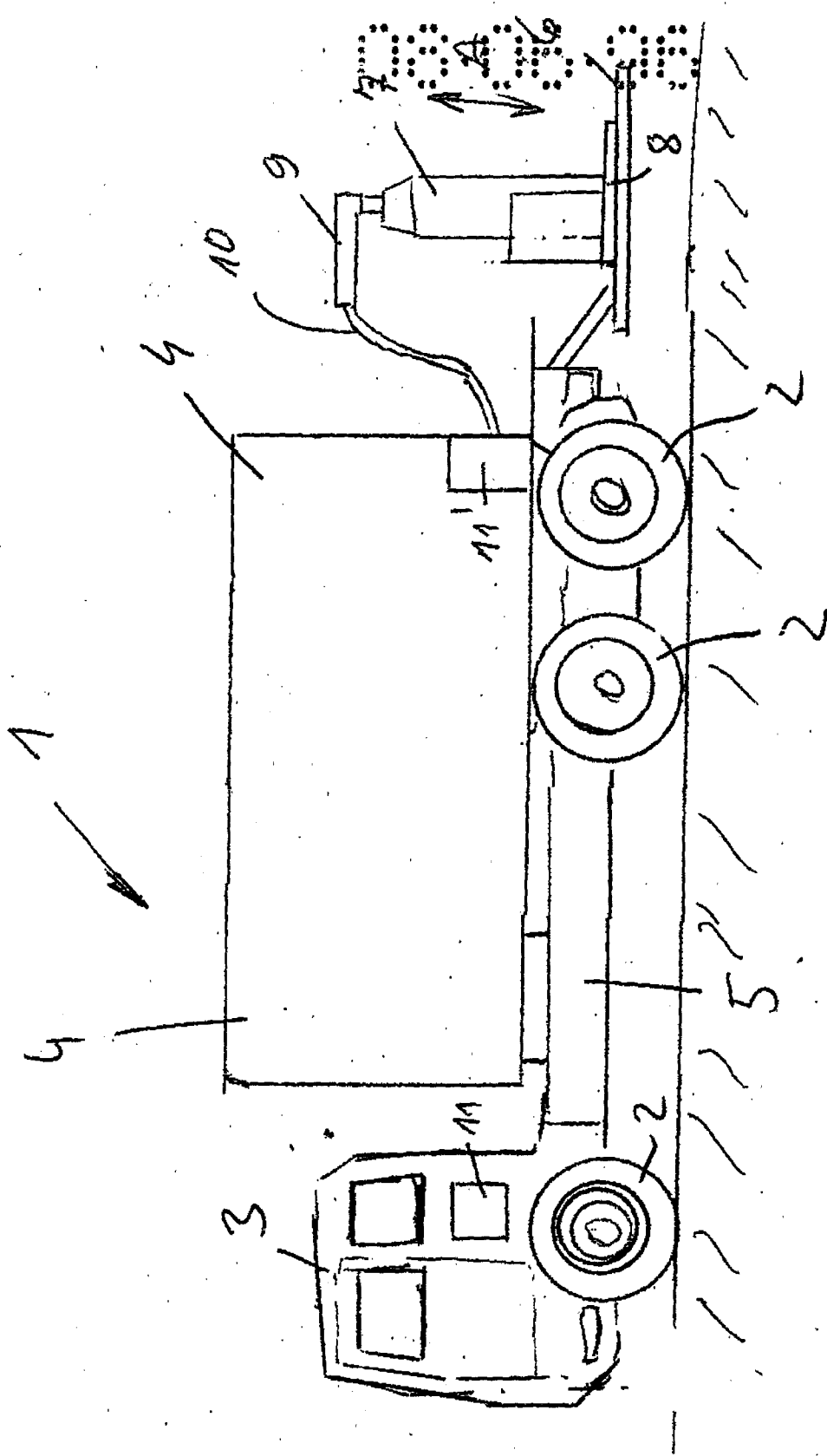
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128 130

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US005603360A

United States Patent [19]

[11] Patent Number: 5,603,360

Teel

[45] Date of Patent: Feb. 18, 1997

[54] METHOD AND SYSTEM FOR
TRANSPORTING NATURAL GAS FROM A
PIPELINE TO A COMPRESSED NATURAL
GAS AUTOMOTIVE RE-FUELING STATION

5,253,682 10/1993 Haskett et al. 141/67
5,301,723 4/1994 Goode 141/82

Primary Examiner—David J. Walczak
Assistant Examiner—Steven O. Douglas

[76] Inventor: James R. Teel, P.O. Box 208, Bull
Shoals, Ark. 72619

[57] ABSTRACT

[21] Appl. No.: 454,531

[22] Filed: May 30, 1995

[51] Int. Cl.⁶ B65B 1/04

[52] U.S. Cl. 141/21; 141/18; 141/25;
141/114; 141/231; 222/389; 137/267

[58] Field of Search 141/18, 114, 25,
141/26, 28, 39, 67, 82, 98, 231, 21; 222/386.5,
389, 95, 105, 146.5; 137/267

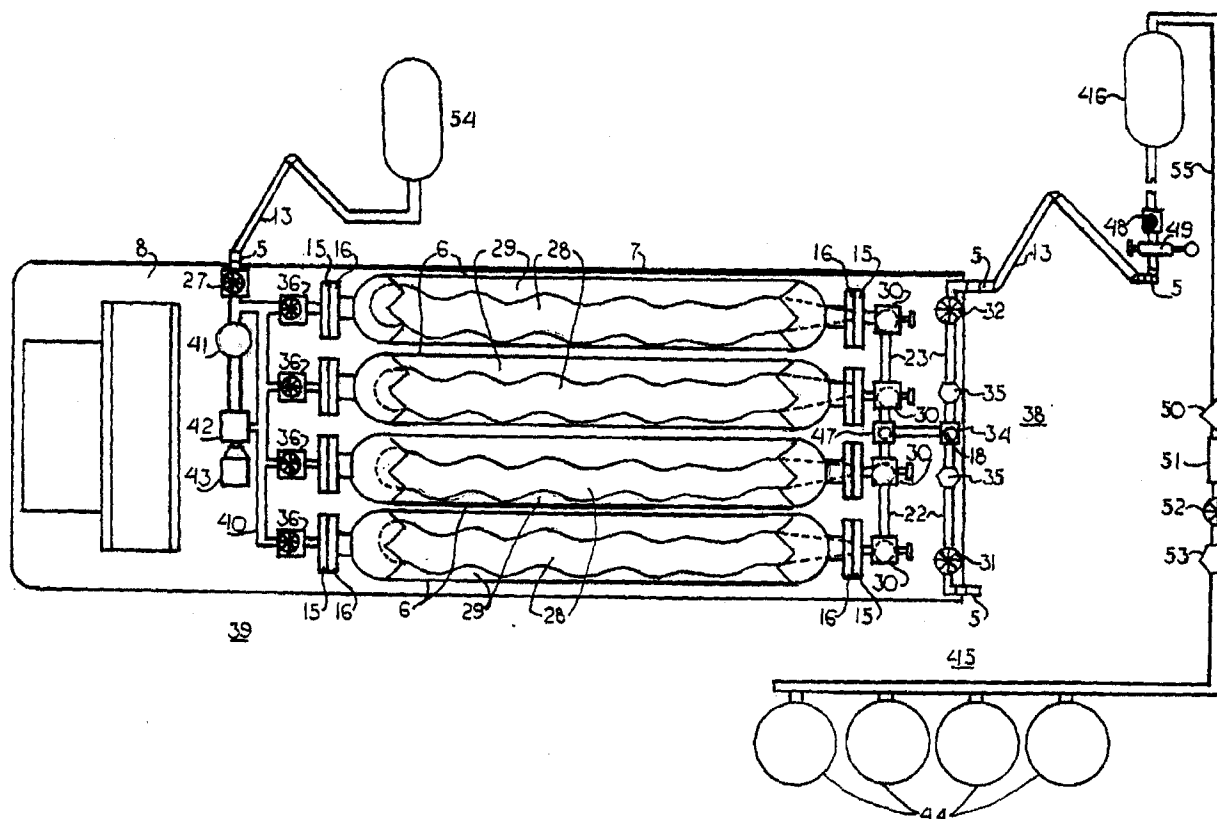
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A system for delivering natural gas, from a pipeline, is loaded onto a movable transport by flowing the gas into multiple pressure vessels equipped with internal flexible bladders which will contain the gas until the pressure in the vessels equalize with the pressure in the pipeline. At that time, the transport will be moved to a compressed natural gas (CNG) re-fueling station. At the re-fueling station, the multiple pressure vessels will be connected to an un-loading conduit leading to the storage facilities. The natural gas will be un-loaded by pressure differential until pressures equalize, then pressurized hydraulic fluid will be pumped into the annulus between the bladder and the steel walls of the pressure vessel which will deflate the bladder and squeeze the remaining gas out of the bladder to storage. The transport is then disconnected from the un-loading facilities and returned to the pipeline for re-filling with natural gas.

6 Claims, 3 Drawing Sheets



133

127
132



US005676180A

United States Patent [19]
Teel

[11] **Patent Number:** 5,676,180
[45] **Date of Patent:** Oct. 14, 1997

[54] **METHOD AND SYSTEM FOR STORING AND HYDRAULICALLY-PRESSURIZING COMPRESSED NATURAL GAS (CNG) AT AN AUTOMOTIVE RE-FUEL STATION**

Primary Examiner—Henry J. Recla
Assistant Examiner—Steven O. Douglas

[57] **ABSTRACT**

[76] **Inventor:** James R. Teel, P.O. Box 208, Bull Shoals, Ark. 72619

A system for delivering natural gas, from a moveable transport or pipeline, is off-loaded at an automotive re-fueling station, or other end-user facility, into one or more storage vessels equipped with internal flexible bladders. The pressure of the gas, stored inside the bladders, will be increased to levels sufficient for re-filling automotive on-board storage tanks, or other end uses, by pumping a hydraulic fluid in the annulus between the bladder and the walls of the steel storage vessels, thereby collapsing the flexible bladder and squeezing gas out to an on-board storage tank. The use of a hydraulic pump, instead of a more-expensive compressor, to pressurize the gas, results in significant cost savings which reduces the overall cost of CNG at the station, making CNG (the "preferred alternative fuel") less expensive than gasoline and/or diesel, which will enable CNG to replace gasoline and/or diesel as the primary fuel for automobiles, trucks, and busses.

158

[21] **Appl. No.:** 615,690

[22] **Filed:** Mar. 13, 1996

[51] **Int. Cl.⁶** B65B 1/04

[52] **U.S. Cl.** 141/18; 141/21; 141/25;
222/389; 137/267

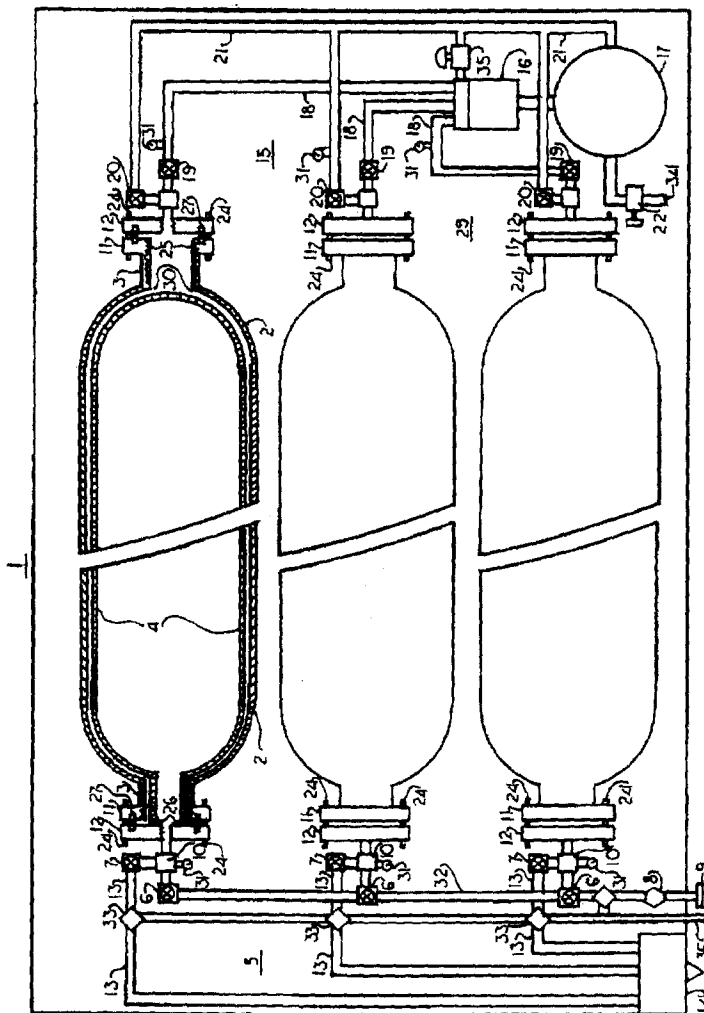
[58] **Field of Search** 141/18, 114, 25,
141/26, 28, 39, 67, 82, 98, 231, 21; 222/386.5,
389, 95, 105, 146.5; 137/267

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3 Claims, 2 Drawing Sheets





US 20010050167A1

(19) **United States**

(12) **Patent Application Publication**
Buysse et al.

(10) Pub. No.: **US 2001/0050167 A1**
(43) Pub. Date: **Dec. 13, 2001**

(54) **HYDRAULIC OIL COOLER AND
SUPPLYING VESSEL PRESSURE
STABILIZER**

Publication Classification

(51) Int. Cl.⁷ **B60H 3/00; B61D 27/00;
B60H 1/00; G05D 15/00;
G05D 16/00; G05D 23/00**
(52) U.S. Cl. **165/279; 165/42; 165/202**

(76) Inventors: **John Buysse, St. Paul, MN (US); Rick
Story, Jacksonville, FL (US)**

Correspondence Address:
**William M. Hienz III
Dicke, Billig & Czaja, P.A.
Suite 1250
701 Fourth Avenue South
Minneapolis, MN 55415 (US)**

(57) **ABSTRACT**

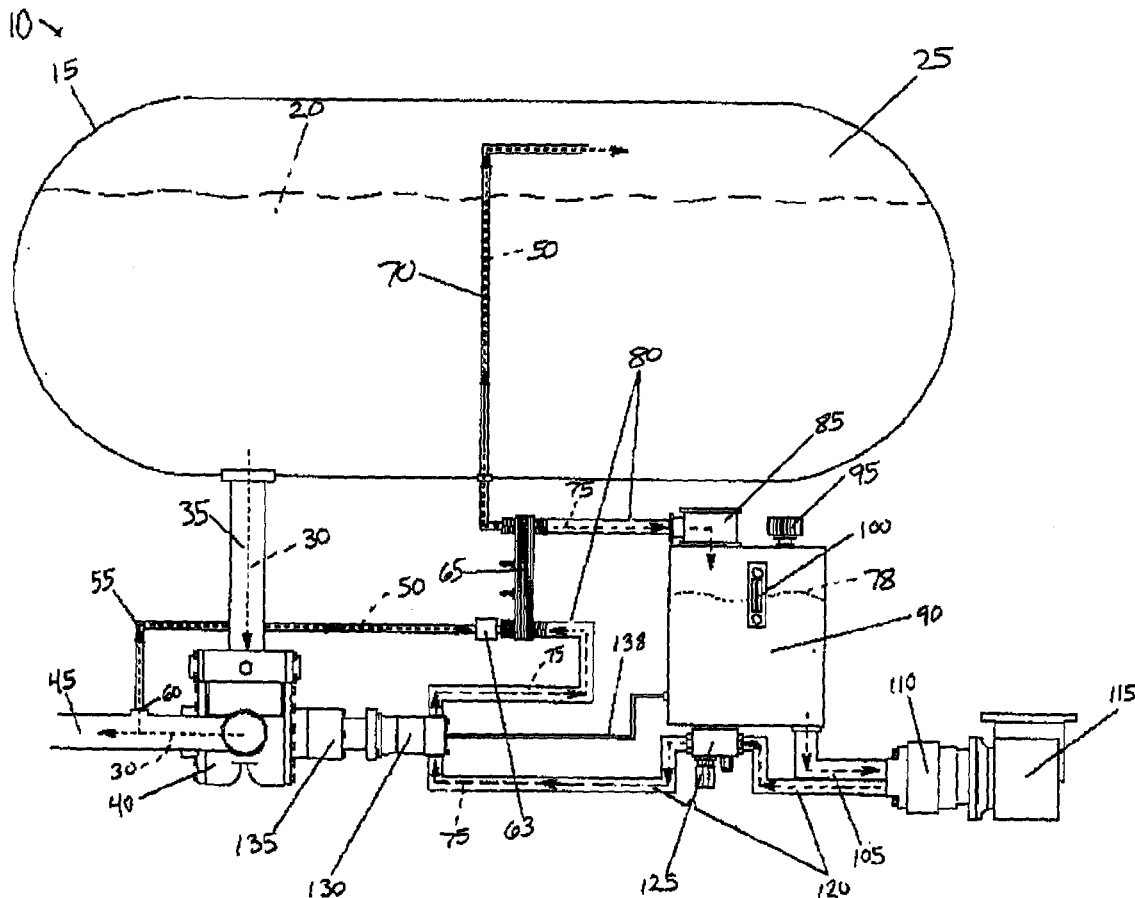
A fluid delivery system for e.g. a vehicle includes a tank for holding fluid product, such as propane, a pump for pumping the fluid product from the tank, the pump being driven by hydraulic fluid, and a heat exchanger for using the fluid product to cool the hydraulic fluid. The heat exchanger also causes the fluid product to increase in temperature. The heated fluid product is returned to the tank, in the form of a vapor, for example. Embodiments of the invention provide a number of advantages, including increased pump flow rates, reduced cavitation and increased pump life, and elimination of a heat-exchanger fan.

(21) Appl. No.: **09/747,431**

(22) Filed: **Dec. 22, 2000**

Related U.S. Application Data

(63) Non-provisional of provisional application No.
60/174,138, filed on Dec. 31, 1999.



change state as readily are contemplated for use as first fluid 20. Supplying vessel 15 also defines vapor space 25 disposed above first fluid 20.

[0034] Discharge flow path 30 is in fluid communication with supplying vessel 15. Discharge flow path 30 is disposed to receive first fluid 20 from supplying vessel 15 for discharge from supplying vessel 15 and, according to embodiments of the invention, from fluid handling system 10 to e.g. receiving tanks or the like at homes, farms, small business, etc. According to embodiments of the invention, discharge flow path 30 is defined, at least in part, by suction inlet port or pump inlet port 35, product pump 40 and pump outlet discharge line 45. Product pump 40 is a pumping mechanism that is constructed and disposed to move first fluid 20 along discharge flow path 30.

[0035] Return flow path 50 is in fluid communication with discharge flow path 30 and, ultimately, with supplying vessel 15. Return flow path 50 is disposed to receive first fluid 20 from discharge flow path 30 for return to supplying vessel 15. According to the illustrated embodiment, return flow path 50 is defined, at least in part, by product/coolant line 55, which intersects pump discharge line 45 at intersection point 60, heat exchanger 65, and liquid/vapor return line 70. Product/coolant line 55 is connected to heat exchanger 65 via flow control 63.

[0036] Fluid handling system 10 also comprises heat-exchange flow path 75, which is disposed to contain second fluid 78, which is e.g. hydraulic fluid or oil for actuating pump 40. Second fluid 78 is free of fluid communication with first fluid 20, according to embodiments of the invention.

[0037] According to the illustrated embodiment, heat-exchange flow path 75 is defined, at least in part, by hydraulic return line 80, which is connected via hydraulic filter 85 to hydraulic tank assembly 90. Hydraulic tank assembly 90 includes hydraulic breather 95 and site/level oil gauge 100, according to the illustrated embodiment. Hydraulic suction line 105 connects hydraulic tank assembly 90 to hydraulic pump 110, which is connected to power take-off (PTO) 115. Hydraulic pressure lines 120 and hydraulic flow and PSI block 125 connect hydraulic pump 110 to deliver second fluid 78 for actuating product pump 40 via hydraulic motor 130, which is mounted by hydraulic motor mounting assembly 135. Thus, pump 40 is in fluid communication with heat-exchange flow path 75.

[0038] Case drain line 138 connects hydraulic tank assembly 90 to hydraulic motor 130.

[0039] In operation, pump 40 is activated to move first fluid 20 along discharge flow path 30 for discharge from supplying vessel 15 and/or fluid handling system 10. First fluid 20 in discharge flow path 30 is in the form of a liquid at intersection point 60 according to embodiments of the invention, as is first fluid 20 in return flow path 50 at point 60.

[0040] The temperature of first fluid 20 in return flow path 50 is cooler upon entering heat exchanger 65 than second fluid 78 in heat-exchange flow path 75. In heat exchanger 65, thermal transfer occurs between first fluid 20 and second fluid 78. According to one embodiment, second fluid 78, e.g. hydraulic oil, is cooled by first fluid 20, e.g. propane, and first fluid 20 is heated by second fluid 78. Thus, heat

exchanger 65 is constructed and disposed to cause a temperature change in both first fluid 20 and second fluid 78, and the temperature of first fluid 20 is generally less than the maximum desired temperature of second fluid 78.

[0041] In summary, fluid handling system 10, which can be disposed on a vehicle, such as a truck, comprises tank 15 for holding fluid product 20, pump 40 for pumping fluid product 20 from tank 15, pump 40 being driven by hydraulic fluid 78, and heat exchanger 65 for using fluid product 20 to cool hydraulic fluid 78. Fluid product 20 can be propane. Further, heat exchanger 65 heats propane or other first fluid 20 and causes it to vaporize. The vaporized propane in liquid/vapor return line 70 than is pumped and returned either to vapor space 25 or the liquid space of tank 15. In other words, heat exchanger 65 heats fluid product 20 and returns it to tank 15.

[0042] Three control blocks can be offered as options to the FIG. 1 embodiment, as will now be described with respect to FIGS. 2-7.

[0043] The first of the three control blocks is temperature-sensing, heat-generating block 140, shown generally in FIG. 2 and in detail in FIG. 3. Block 140 is disposed in heat-exchange flow path 75, just before heat exchanger 65, in the illustrated embodiment. Block 140 includes valve body 145, temperature sensing cartridge 150, heat-generating cartridge 155, hydraulic oil inlet and outlet ports 160, 165, hydraulic oil pressure port 168, and hydraulic oil pressure gauge 170. Block 140 senses the temperature of the hydraulic oil or other second fluid 78 by temperature sensing cartridge valve 150. It then will internally either route the e.g. hydraulic oil over hydraulic heat generating cartridge valve 155 and then into heat exchanger 65, or it will route the hydraulic oil directly to heat exchanger 65, bypassing hydraulic heat-generating cartridge valve 155. The temperature at which block 140 switches the routing from one to the other can be changed to meet the requirements for a particular environment or application.

[0044] Thus, temperature sensor 150 is in communication with heat-exchange flow path 75 for sensing the temperature of second fluid 78. Heat generator 155 is also in communication with heat-exchange flow path 75, and is constructed and disposed for heating second fluid 78 in response to an indication from temperature sensor 150.

[0045] Block 140 presents significant advantages. A cold outside air temperature or other ambient environment produces a colder tank and therefore less vapor pressure within the tank. In other words, the fluid product within the tank is more condensed. This cooler temperature causes pump 40 to draw a vacuum within tank 15 more quickly, potentially starting cavitation in pump 40 at an earlier time. Heating second fluid 78 causes increased thermal transfer to first fluid 20, increasing the reduced vapor pressure in tank 15 and tending to diminish the cavitation problem. Additionally, heated fluid 78 provides e.g. start-up advantages in fluid handling system 10.

[0046] The second unique, optional control block for fluid handling system 10 is pressure-sensing, heat-generating control block 175, shown in FIG. 4 in heat-exchange flow path 75 and shown in more detail in FIG. 5. Block 175 senses vapor pressure in supplying vessel 15 via sensing line 180 routed between vessel 15 and control block 175. Via



(10) DE 10 2004 052 010 A1 2006.04.27

(12)

Offenlegungsschrift

(21) Aktenzeichen: 10 2004 052 010.0
(22) Anmeldetag: 20.10.2004
(43) Offenlegungstag: 27.04.2006

(51) Int Cl.⁸: **F17C 13/02** (2006.01)
G01L 27/00 (2006.01)

(71) Anmelder:
**Fachhochschule Nordhausen, 99734 Nordhausen,
 DE**

(74) Vertreter:
Rumrich, G., Dipl.-Ing. Pat.-Ing., Pat.-Anw., 09116
Chemnitz

(72) Erfinder:
Mühlenbeck, Gerd, Prof. Dr.-Ing., 37445
Walkenried, DE; Hebenstreit, Benjamin, Dipl.-Ing.,
99976 Beberstedt, DE; Schmidt, Hans-Jürgen,
99765 Auleben. DE

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TRG 765:

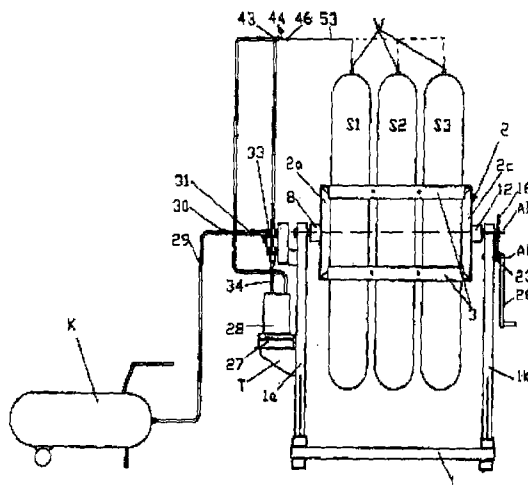
Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen

Prüfungsantrag gemäß § 44 PatG ist gestellt.

(54) Bezeichnung: Prüfstand für druckbeaufschlagte Sicherheitseinrichtungen

(57) Zusammenfassung: Die Erfindung betrifft einen Prüfstand für druckbeaufschlagte Sicherheitseinrichtungen (S1, S2, S3), die mit einem Prüfdruck durch flüssiges Druckmedium beaufschlagbar sind, wobei das flüssige Druckmedium aus einem Behälter bereitgestellt wird und der Druck des flüssigen Druckmediums mit einer Pumpe (33) erzeugbar und mittels eines Druckmessers ablesbar/erfassbar ist. Erfindungsgemäß ist die Pumpe (33) über eine erste Druckmittelleitung (34) mit dem Wasserbehälter (28) verbunden, wobei von der ersten Druckmittelleitung (34) eine zweite Druckmittelleitung (37) zu einem Dreiwegekugelhahn (43) führt und ein Höchstdruckschlauch (45) mit dem Dreiwegekugelhahn (43) verbunden ist. Weiterhin führt von dem Dreiwegekugelhahn (43) zum Wasserbehälter (28) eine dritte Druckmittelleitung (51), wobei an den Höchstdruckschlauch (45) die zu prüfende Sicherheitseinrichtung anschließbar und durch Erfassung

- des Druckabfalls des Prüfdrucks mit dem Druckmesser und/oder
 - einer Änderung der sich im Wasserbehälter (28) befindlichen Menge an Druckmedium oder
 - des Austritts an Druckmedium aus der Sicherheitseinrichtung
- prüfbar ist.





(12) **United States Patent**
Emmer et al.

(10) **Patent No.: US 7,069,730 B2**
(45) **Date of Patent: Jul. 4, 2006**

(54) **LIQUID AND COMPRESSED NATURAL GAS DISPENSING SYSTEM**

(75) Inventors: **Claus D. Emmer**, Prior Lake, MN (US); **Jesse Gamble**, Burnsville, MN (US); **Craig Zelasko**, Burnsville, MN (US); **Thomas K. Drube**, Lakeville, MN (US)

(73) Assignee: **Chart Inc.**, Burnsville, MN (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **10/654,289**

(22) Filed: **Sep. 2, 2003**

(65) **Prior Publication Data**
US 2005/0016185 A1 Jan. 27, 2005

Related U.S. Application Data
(60) Provisional application No. 60/407,042, filed on Aug. 30, 2002.

(51) **Int. Cl.**
F17C 7/02 (2006.01)
F17C 9/02 (2006.01)
F17C 7/04 (2006.01)
B65B 1/20 (2006.01)
B65B 1/28 (2006.01)
(52) **U.S. Cl.** **62/50.1; 62/50.2; 62/48.1; 141/11; 141/82**
(58) **Field of Classification Search** **62/50.1, 62/50.2, 45.1, 48.1; 141/11, 82**
See application file for complete search history.

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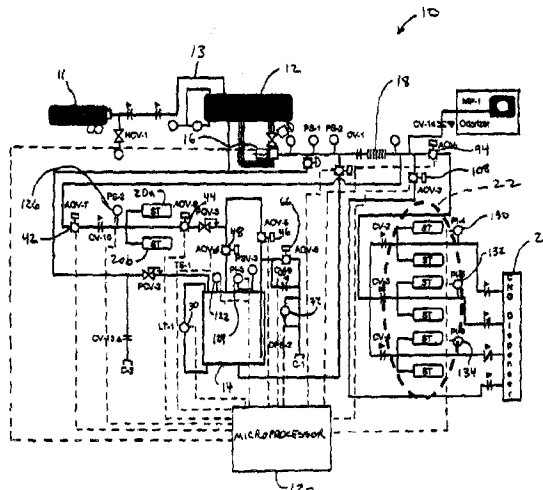
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Primary Examiner—William C. Doerrler
(74) **Attorney, Agent, or Firm**—DLA Piper Rudnick Gray Cary US LLP

(57) **ABSTRACT**

A system dispenses both liquid natural gas (LNG) and compressed natural gas (CNG). A bulk tank contains a supply of LNG which is pumped to a smaller storage tank. After the storage tank is refilled, LNG from the bulk tank is pumped to a vaporizer so that CNG is produced. The CNG may be routed to the LNG in the storage tank to condition it. It is also used to recharge a pressurizing cylinder that is placed in communication with the head space of the storage tank when it is desired to rapidly dispense LNG to a vehicle. A bank of cascaded storage cylinders alternatively may receive CNG from the vaporizer for later dispensing through the system CNG dispenser. The CNG from the vaporizer may also be dispensed directly via the system CNG dispenser.

18 Claims, 5 Drawing Sheets



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LNG in the storage tank via a dip tube to saturate it at the pressure required by the vehicle to which it is dispensed. CNG from the vaporizer may alternatively be directed to a pressurizing cylinder so as to recharge it. When dispensing of LNG is desired, the head space of the storage tank is placed in communication with the pressurizing cylinder so that the LNG may be rapidly dispensed.

The CNG from the vaporizer may alternatively be routed to the CNG Module of the system. The CNG Module includes a bank of cascaded storage cylinders which receive and store the CNG from the vaporizer for later dispensing via the system CNG dispenser to a vehicle or other use device. The CNG alternatively may be routed directly from the vaporizer to the vehicle via the system CNG dispenser. An odorizer communicates with the outlet of the vaporizer to add odorant to the CNG in accordance with safety regulations.

Operation of the system may be automated by a controller that communicates with the pump, system valves and pressure, temperature and liquid level sensors or gages. In addition, the system pump may be submerged in LNG in the bulk tank or a sump to eliminate cool-down time.

The following detailed description of embodiments of the invention, taken in conjunction with the appended claims and accompanying drawings, provide a more complete understanding of the nature and scope of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic of an embodiment of the liquid and compressed natural gas dispensing system of the present invention;

FIG. 2 is an enlarged schematic of the liquid natural gas portion of the system of FIG. 1;

FIG. 3 is an enlarged schematic of the compressed natural gas portion of the system of FIG. 1;

FIG. 4 is an enlarged schematic of the pump and bulk tank of a second embodiment of the system of the present invention;

FIG. 5 is an enlarged schematic of the pump and a sump of a third embodiment of the system of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

An embodiment of the system of the present invention is indicated in general at 10 in FIG. 1. The system 10 is self-contained and dispenses liquid natural gas (LNG) and compressed natural gas (CNG) from a horizontal cryogenic bulk tank, indicated at 12, at sites where limited height requirements are an issue. The system, including the bulk tank 12, may be housed, for example, within a 40 foot ISO container and thus may be rapidly installed at a site either temporarily or permanently. The system, as explained below, may also be easily automated.

While the system of the present invention is described below in terms of dispensing CNG and LNG to vehicles, it could alternatively be used to dispense other types of cryogenic fluids to other types of use devices.

The bulk tank 12 of the system 10 preferably has a capacity of approximately 5000 gallons for storing LNG. It may be refilled by a transport 11 carrying a supply of LNG through line 13. The system 10 also includes a smaller LNG storage tank, indicated at 14, that preferably has a volume between 150 gallons to 300 gallons.

As will be described in greater detail below, a pump 16 transfers LNG from the bulk storage tank to either the

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smaller liquid storage tank 14 or a vaporizer 18 whereby CNG is produced. The pump is preferably a high pressure reciprocating pump with a relatively low flow rate (such as 3 to 4 gallons per minute). The CNG is either routed to pressurizing cylinders 20a and 20b, for use in pressurizing the LNG in storage tank 14, or to a bank of cascaded storage cylinders, indicated in phantom at 22, for storage or dispensing directly via dispenser 24.

The LNG portion (or "LNG Module") of the system is indicated in general at 29 in FIG. 2. A liquid level gauge 30 detects the quantity of LNG in storage tank 14. When the LNG level in tank 14 drops below a predetermined level, valves 32 and 34 are opened and pump 16 is activated. As a result, LNG flows to storage tank 14 through lines 36 and 38. Due to the action of pump 16, the incoming LNG is warmer than the LNG in the tank 14. The warmer LNG enters tank 14 through its bottom so as to allow the incoming LNG to mix with the LNG already present in the tank so as to raise its temperature to saturate it at the pressure required by the vehicle being filled.

When the liquid level gauge 30 indicates that the storage tank 14 has been filled to the appropriate level, valves 32 and 34 are closed and the flow of LNG into tank 14 terminates. As such, the liquid level gauge 30 can also be used as a meter to determine the amount of LNG dispensed by the last patron to use the system. More specifically, the amount of LNG dispensed may be calculated by comparing the liquid level at the start of the refill of the storage tank 14 with the liquid level in storage tank 14 at the end of the refill. The tank may optionally be provided with a second opening and a meter, such as a turbine meter, for example, may be attached and used to determine how many gallons (liters/meters, etc) were dispensed.

The heat provided by the LNG added during the refill of storage tank 14 may not be sufficient to bring the LNG therein to saturation at the desired temperature and pressure. Under such circumstances, it is necessary to divert some of the LNG leaving pump 16 through vaporizer 18 so that CNG is produced and directed to the storage tank 14. This is accomplished by closing valve 34 and opening valves 42, 44 and 46. It should be noted that valve 48 remains closed. As a result, LNG from bulk tank 12 travels through lines 36, 52 and 54 to dip tube 56. The warmer CNG gas bubbles through the LNG 62 in the storage tank until it is saturated at the desired pressure (as dictated by the requirements of the vehicle being refilled). The bubbling gas from the dip tube also serves to mix and stir the LNG in the storage tank 14.

CNG from vaporizer 18 may alternatively be routed to pressurizing cylinders 20a and 20b for use in pressurizing the storage tank 14 during dispensing of LNG. This is accomplished by closing valve 44. The pressure within pressurizing cylinders is maintained at approximately 4500 psi. Once storage tank 14 is filled with LNG, and the LNG therein is conditioned, and the pressurizing cylinders 20a and 20b are recharged, pump 16 may be shut off so that the flow of LNG from the bulk tank 12 terminates. Valve 42 is then closed. Alternatively, as described in greater detail below, pump 16 may continue to send LNG through vaporizer 18 for use in recharging the cascaded cylinders 22 (FIGS. 1 and 3).

When it is desirable to dispense LNG, the storage tank 14 may be quickly pressurized by CNG from the pressurizing cylinders 20a and 20b. This is accomplished by opening valves 44 and 48 so that CNG enters the head space 63 of storage tank 14 through line 64. Valve 66 is opened and, as a result, LNG is transferred to the vehicle tank at around 40 GPM through dispensing line 68. The LNG dispenser

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