



New connection on: : 20-11-2020 : 07:52:12 - Last disconnection on: : 20-11-2020 : 07:51:50

V 4.0.0.44803(LP,U,linux) (Rev:43856 2017-04-27 09:03:29 +0200#{D201820}) (RPM D201820)

Welcome to EPOQUE Rebuild under the Production Environment

[EPODOC: SS 22] multistage and pump+ and tie and rod+ and assembly and intermediate and flange+ and /ic (F04D)

Results in EPODOC 0

[SS 23] ring and section and (pump or segmen+) and (outer 1w bolt) and intermediate and flange+ and /ic (F04D)

Results in EPODOC 0

[SS 24] pump and intermediate and flange+ and tie and rod+ and/ic (F04D)

Results in EPODOC 6

[SS 25] ..li



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PN - [MX2019000152](#) A 20190829

PR - US201615196418 20160629; WO2017US27103 20170412

AP - [MX20190000152](#) 20170412

DT - I

CCI - [F04D1/066](#) ; [F04D29/628](#)

CCA - [F05D2260/31](#)

CI - F04C7/00 (US)
- F04C19/001 (US)
- F04C19/005 (US)
- F04D1/066 (EP, KR)
- F04D29/628 (EP)

CA - F04C2240/20 (US)
- F04D29/628 (KR)
- F05D2210/11 (KR)
- F05D2260/31 (EP, KR)

PA - ITT MFG ENTERPRISES LLC [US]

TI - RING SECTION **PUMP** HAVING **INTERMEDIATE TIE ROD** COMBINATION.

AB - A ring section **pump** features a low-pressure end configured to receive fluid to be pumped into the ring section **pump**; a high-pressure end configured to provide the fluid

to be pumped from the ring section **pump**; and an **intermediate tie rod** combination having a **intermediate flange** with upper **tie rods** configured to couple together the **intermediate flange** and the high-pressure end and with lower **tie rods** configured to couple together the **intermediate flange** and the low-pressure end. The low-pressure end has an inlet **flange**; the high-pressure end has an outlet/discharge **flange**; and the upper **tie rods** couple together the **intermediate flange** and the outlet/discharge **flange** and the lower **tie rods** couple together the **intermediate flange** and the inlet **flange**.

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- PN - [CN109642580](#) A 20190416
- PR - US201615196418 20160629; WO2017US27103 20170412
- AP - [CN20178051567](#) 20170412
- DT - I
- CT - || STSE (A)
[US2281631](#) A 19420505 [X] (MAX SPILLMANN, et al)
[X] 1-20
* 说明书第1页左栏第27行-第2页右栏第27行, 附图1-5 *;
[DE1109527](#) B 19610622 [X] (KLEIN SCHANZLIN & BECKER AG)
[X] 1-20
* 说明书第1栏第1行-第3栏第12行, 附图1-6 *;
[GB933185](#) A 19630808 [X] (KLEIN SCHANZLIN & BECKER AG)
[X] 1-20
* 说明书第1页右栏第56行-第3页左栏第64行, 附图1-4 *;
[CN102606484](#) A 20120725 [X] (SHANGHAI APOLLO MACHINERY CO)
[X] 1-20
* 说明书第60-132段, 附图1-7b *
- CCI - [F04D1/066](#) ; [F04D29/628](#)
- CCA - [F05D2260/31](#)
- CI - F04C7/00 (US)
- F04C19/001 (US)
- F04C19/005 (US)
- F04D1/066 (EP, KR)
- F04D29/628 (EP)
- CA - F04C2240/20 (US)
- F04D29/628 (KR)
- F05D2210/11 (KR)
- F05D2260/31 (EP, KR)
- PA - ITT MFG ENTERPRISES LLC
- TI - RING SECTION **PUMP** HAVING **INTERMEDIATE TIE ROD** COMBINATION
- AB - A ring section **pump** is disclosed and features a low-pressure end configured to receive fluid to be pumped into the ring section **pump**; a high-pressure end configured to provide the fluid to be pumped from the ring section **pump**; and an **intermediate tie rod** combination having a **intermediate flange** with upper **tie rods** configured to couple together the **intermediate flange** and the high-pressure end and with lower **tie rods** configured to couple together the **intermediate flange** and the low-pressure end. The low-pressure end has an inlet **flange**; the high-pressure end has an outlet/discharge **flange**; and the upper **tie rods** couple together the **intermediate flange** and the outlet/discharge **flange** and the lower **tie rods** couple together the **intermediate flange** and

the inlet **flange**.

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PN - [AU2017289481](#) A1 20190124
PR - US201615196418 20160629; WO2017US27103 20170412
AP - [AU20170289481](#) 20170412
DT - I
CCI - [F04D1/066](#) ; [F04D29/628](#)
CCA - [F05D2260/31](#)
CI - F04C7/00 (US)
- F04C19/001 (US)
- F04C19/005 (US)
- F04D1/066 (EP, KR)
- F04D29/628 (EP)
CA - F04C2240/20 (US)
- F04D29/628 (KR)
- F05D2210/11 (KR)
- F05D2260/31 (EP, KR)
PA - ITT MFG ENTERPRISES LLC
TI - Ring section **pump** having **intermediate tie rod** combination
AB - A ring section **pump** features a low-pressure end configured to receive fluid to be pumped into the ring section **pump**; a high-pressure end configured to provide the fluid to be pumped from the ring section **pump**; and an **intermediate tie rod** combination having a **intermediate flange** with upper **tie rods** configured to couple together the **intermediate flange** and the high-pressure end and with lower **tie rods** configured to couple together the **intermediate flange** and the low-pressure end. The low-pressure end has an inlet **flange**; the high-pressure end has an outlet/discharge **flange**; and the upper **tie rods** couple together the **intermediate flange** and the outlet/discharge **flange** and the lower **tie rods** couple together the **intermediate flange** and the inlet **flange**.

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PN - [CA3029397](#) A1 20180104
PR - US201615196418 20160629; WO2017US27103 20170412
AP - [CA20173029397](#) 20170412
DT - I
CCI - [F04D1/066](#) ; [F04D29/628](#)
CCA - [F05D2260/31](#)
CI - F04C7/00 (US)
- F04C19/001 (US)
- F04C19/005 (US)
- F04D1/066 (EP, KR)
- F04D29/628 (EP)
CA - F04C2240/20 (US)
- F04D29/628 (KR)
- F05D2210/11 (KR)

- F05D2260/31 (EP, KR)

PA - ITT MFG ENTERPRISES LLC [US]

TI - RING SECTION **PUMP** HAVING **INTERMEDIATE TIE ROD** COMBINATION

AB - A ring section **pump** features a low-pressure end configured to receive fluid to be pumped into the ring section **pump**; a high-pressure end configured to provide the fluid to be pumped from the ring section **pump**; and an **intermediate tie rod** combination having a **intermediate flange** with upper **tie rods** configured to couple together the **intermediate flange** and the high-pressure end and with lower **tie rods** configured to couple together the **intermediate flange** and the low-pressure end. The low-pressure end has an inlet **flange**; the high-pressure end has an outlet/discharge **flange**; and the upper **tie rods** couple together the **intermediate flange** and the outlet/discharge **flange** and the lower **tie rods** couple together the **intermediate flange** and the inlet **flange**.

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PN - [WO2018004778](#) A1 20180104

PR - US201615196418 20160629

AP - [WO2017US27103](#) 20170412

DT - *, Rep

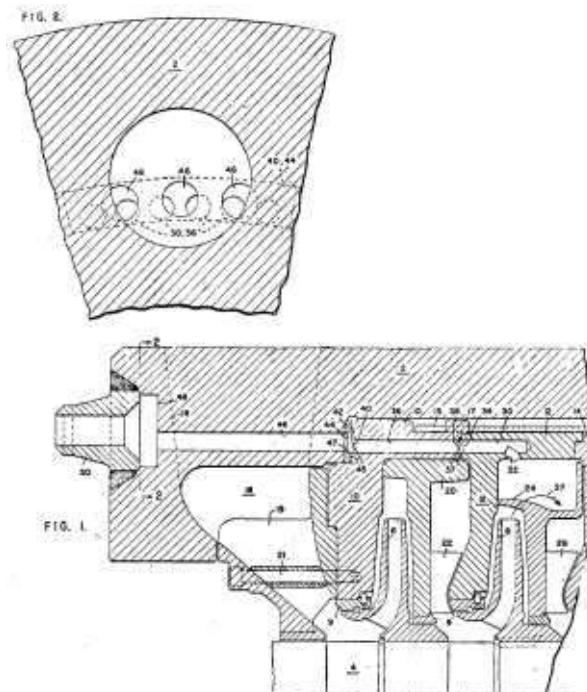
CT - |EP| ISR (A1)
[GB933185](#) A 19630808 [XAI] (KLEIN SCHANZLIN & BECKER AG)
[X] 1-3,5,6,8,9,11,15-20
* page 1, line 9 - page 3, line 64 *
* figure - *
[A] 10
[I] 4,7,12-14;
[US2281631](#) A 19420505 [XI] (MAX SPILLMANN, et al)
[X] 1-3,5-9,13-20
* abstract *
* page 1, line 16 - page 2, line 22 *
* figure - *
[I] 4,10-12;
[DE1109527](#) B 19610622 [XAI] (KLEIN SCHANZLIN & BECKER AG)
[X] 1-3,5,6,8,9,15-20
* column 2, line 45 - column 3, line 12 *
* figure - *
[A] 10
[I] 4,7,11-14;
[US5201633](#) A 19930413 [XAI] (PEU JEAN C [FR])
[X] 1-3,6,8,9,15-20
* abstract *
* column 4, line 21 - column 10, line 11 *
* figure - *
[A] 11,13,14
[I] 4,5,7,10,12;
[WO2013143446](#) A1 20131003 [XI] (SHANGHAI APOLLO MACHINERY CO [CN])
[X] 1-9,11,15-20
* abstract *
* figures 1-3 *
[I] 10,12-14

CCI - [F04D1/066](#) ; [F04D29/628](#)

- CCA - [F05D2260/31](#)
- CI - F04C7/00 (US)
- F04C19/001 (US)
- F04C19/005 (US)
- F04D1/066 (EP, KR)
- F04D29/628 (EP)
- CA - F04C2240/20 (US)
- F04D29/628 (KR)
- F05D2210/11 (KR)
- F05D2260/31 (EP, KR)
- PA - ITT MFG ENTERPRISES LLC [US]
- TI - RING SECTION **PUMP** HAVING **INTERMEDIATE TIE ROD** COMBINATION
- AB - A ring section **pump** features a low-pressure end configured to receive fluid to be pumped into the ring section **pump**; a high-pressure end configured to provide the fluid to be pumped from the ring section **pump**; and an **intermediate tie rod** combination having a **intermediate flange** with upper **tie rods** configured to couple together the **intermediate flange** and the high-pressure end and with lower **tie rods** configured to couple together the **intermediate flange** and the low-pressure end. The low-pressure end has an inlet **flange**; the high-pressure end has an outlet/discharge **flange**; and the upper **tie rods** couple together the **intermediate flange** and the outlet/discharge **flange** and the lower **tie rods** couple together the **intermediate flange** and the inlet **flange**.

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- PN - [GB956731](#) A 19640429
- PR - US19610130989 19610811
- AP - [GB19620014918](#) 19620417
- DT - *, Rep
- CCI - [F04D1/063](#) ; [F04D17/125](#) ;
[F04D29/406](#) ; [F04D29/42](#)
- CCA - [F04D27/0215](#) ; [F04D27/023](#)
- CI - F04D1/063 (EP)
- F04D17/125 (EP)
- F04D29/406 (EP)
- F04D29/42 (EP)
- CA - F04D27/0215 (EP)
- F04D27/023 (EP)
- PA - LAVAL STEAM TURBINE CO
- TI - Improvements in or relating to multiple stage centrifugal pumps, compressors or the like
- AB - 956,731. Centrifugal pumps and compressors. DE LAVAL STEAM TURBINE CO. April 17, 1962 [Aug. 11, 1961] , No. 14918/62. Heading F1C. In a multistage centrifugal **pump**, compressor, or the like comprising a housing



containing a casing formed by a number of annular sections assembled in stacked relationship, successive stage impeller means rotating within the casing and means for bleeding fluid from an **intermediate** stage of the **pump**, compressor, or the like, the bleed means comprises at least one axially directed passage in the casing formed by intercommunicating passages in adjoining sections thereof, one of the annular sections having a radially directed passage therein connecting the first-mentioned passage with the interior of the casing, and a passage in the housing communicating with the first-mentioned passage and leading to the outside of the housing. In the centrifugal **pump** shown, an outer steel casing 2 contains an inner casing formed by joining concentric annular interstage portions, such as 12 and 14, and an end portion 10 by **tie rods** 15 (see Specification 956,732) which are anchored at their ends by shoulders engaging a **flange** 17 and are installed in a heated condition. The liquid is supplied through inlet 16, volute 18 and guide vanes 19 to the first stage impeller 6, from where it flows through diffuser 20 to the remaining stages. Some of the liquid leaves the second stage through a group of six by-pass ports 32, arranged approximately opposite the cross-over passage of the second-stage diffuser 24, and thence passes through six passages 30 in portion 12, six aligned passages 36 in portion 10 and three passages 46 in the outer casing 2. Circumferential channels 34, 38, 40, 44 interconnect the passages. The passages 46 discharge into a chamber 48 which is connected

through welded connection 50 to auxiliary equipment or the like. The channel 44 and holes 47, aligned with the passages 46, are provided in an annular stainless steel insert 42 welded to the casing 2. Portion 10 is pulled against the insert 42 by bolts (not shown) anchored in the casing 2. Two connections 50 spaced approximately 180 degrees apart, each associated with a separate cross-over passage in the same diffuser, may be provided to feed separate units, or they may be connected 'externally to combine their output. A number of separate connections may be provided which are circumferentially spaced and each associated with a different stage of the **pump**, thereby providing a selection of pressures. The interstage portions 12, 14 are machined from duplicated stock parts, and the diffusers 20, 24 may be similarly constructed.

[SS 25]