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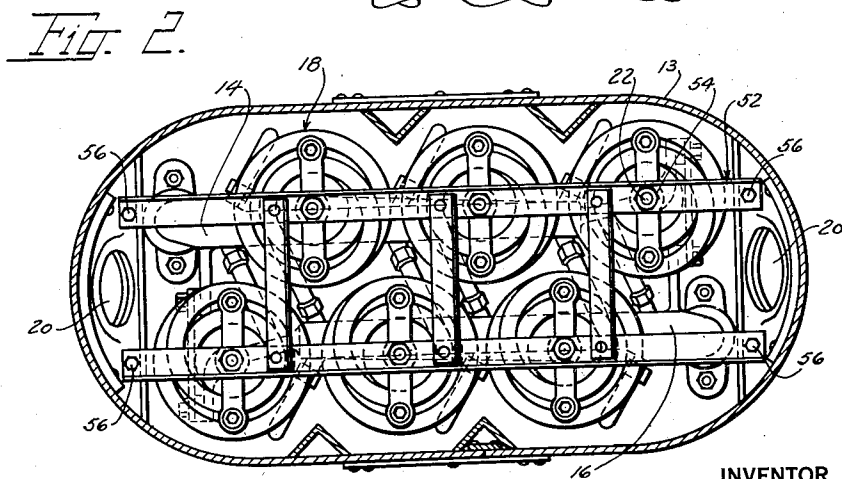
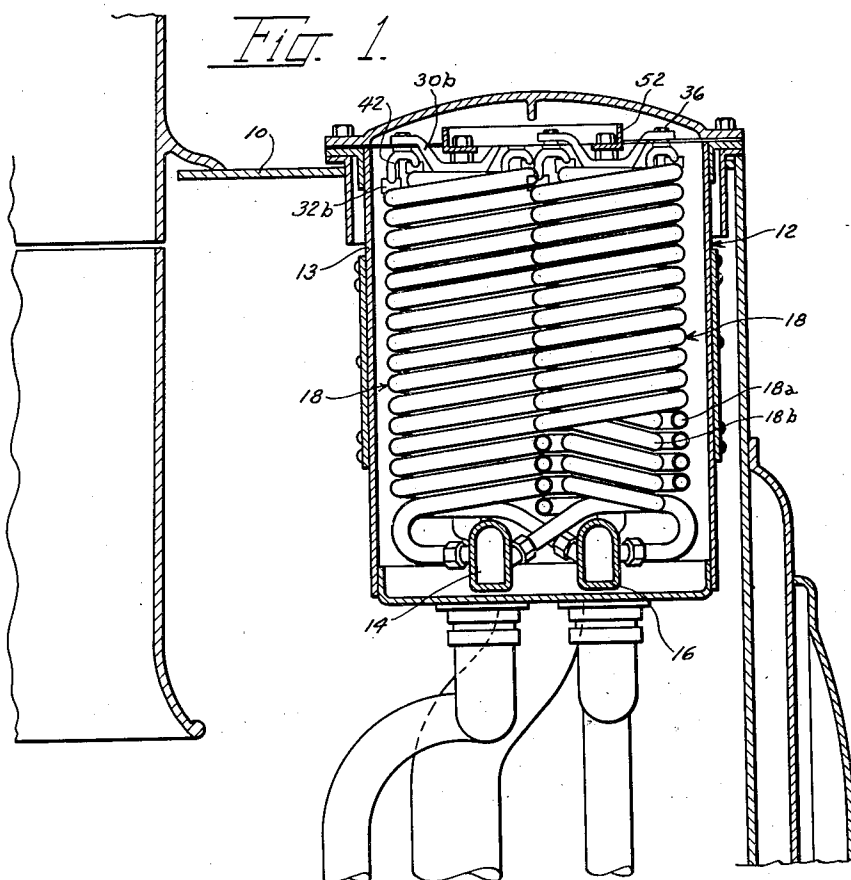
E. RAWSON

1,973,100

BRACING FOR COILED TUBULAR UNITS

Filed Aug. 24, 1933

2 Sheets-Sheet 1



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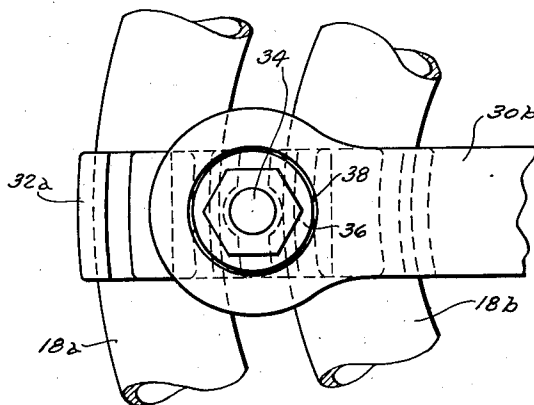
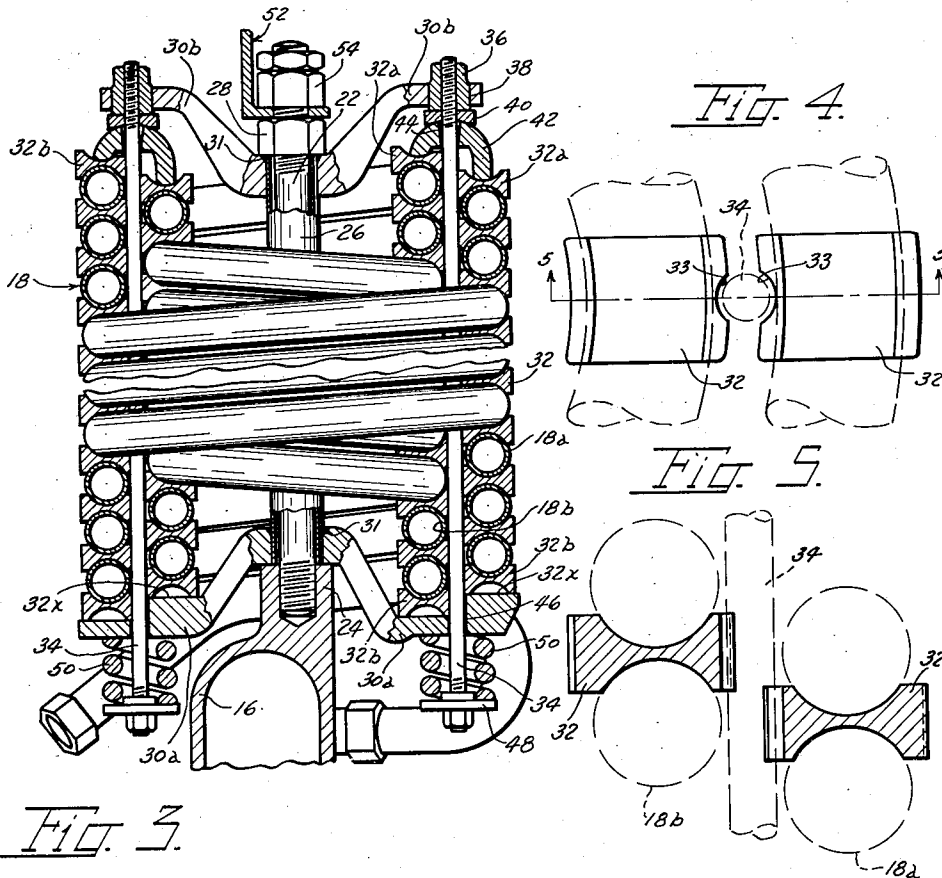
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UNITED STATES PATENT OFFICE

1,973,100

BRACING FOR COILED TUBULAR UNITS

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6 Claims. (Cl. 257-229)

My invention relates to the art of bracing coiled units.

It has been proposed to employ tubular units in heat exchangers in which the tubes are formed into spiral coils. A typical example of such structures is found in the patent to Griffin, No. 1,913,879. Such devices are often installed on locomotives or other vehicles in which the spiral units are subjected to a great deal of vibration. On steam driven vehicles in particular, such devices are often employed to preheat feed water for the boiler. In such instances, the spiral coils are subjected not only to vibrations from the vehicle, but also to pressure pulsations from the feed pump tending to cause them to expand and contract. The vibrations due to the motion of the vehicle and the expansions and contractions due to the pressure and temperature changes cause difficulties of various kinds such as the cutting of the coils due to rubbing against the braces and even the breaking of the coils.

It is an object of the present invention to provide an arrangement of coils and braces adapted for heat exchangers used on vehicles which will minimize the mechanical difficulties experienced with the units.

The novel features of the invention are pointed out in the appended claims. The invention, however, together with its objects and advantages, will best be understood from the following detailed description and its accompanying drawings of a heat exchanger which exemplifies the invention and which is selected from a number of possible embodiments thereof. In said drawings,

Fig. 1 is a vertical central sectional view of a portion of the smoke box of a steam locomotive having an exhaust steam feed water heater equipped with my invention.

Fig. 2 is a plan view of the feed water heater shown in Fig. 1, the cover plate having been removed.

Fig. 3 is a sectional elevation on an enlarged scale of one of the coil units and a portion of a header as shown in Figs. 1 and 2.

Fig. 4 is a fragmentary detail in plan of an intermediate portion of a coil shown in Fig. 3.

Fig. 5 is a fragmentary detail in section of an intermediate portion of a unit shown in Fig. 3.

Fig. 6 is a fragmentary detail in plan of a portion of the top coils of the unit shown in Fig. 3.

In the arrangement illustrated, the smoke box 10 of a locomotive boiler has a feed water heater 12 mounted therein. The heater 12 and its general arrangement with relation to the smoke box

10 are substantially the same as in said patent to Griffin. As illustrated, the heater 12 comprises an outer chamber within the lower portion of which are two parallel headers 14 and 16. Feed water to be heated enters the header 14 and flows through the helical units 18, 18 to the outlet header 16. Exhaust steam for heating the water in units 18 is introduced through apertures 20, 20 into the space within the heater which surrounds such units. Each of the units 18 is composed of an outer coil 18a and an inner coil 18b which are so arranged and connected that the feed water rises through one coil and descends through the other. As illustrated, the units 18 are arranged in two rows, one row of units having their vertical axes above the header 14 and the units in the other row having their vertical axes above the header 16. The outer coils 18a of one row of units are shown as connected to header 14 while the inner coils 18b of the other row of units are connected to header 14. Necessarily then, the inner coils of the former row of units are connected to the header 16 and the outer coils of the latter row of units are connected to the header 16. However, I do not limit myself to units of the two-coil type or indeed to units of the helical type.

As best illustrated in Figs. 3, 4, 5 and 6, each unit has mounted therein along its central axis (preferably vertical) a bolt 22. It has been found convenient to attach the bolts 22 to the headers 14 and 16 by threading them into lugs 24 on such headers. Surrounding each bolt 22 is a sleeve-like standard 26 shown as clamped between the end of the lug 24 and a nut 28 on the outer end of the bolt 22. Each standard 26 has fixed thereto one or more pairs of arms, bodies 31 of weld metal being shown for affixing the arms to the standards. The arm 30a at the inner end of standard 26 is paired with an arm 30b at the outer end of such standard and the arms of a given pair lie in a plane which intersects the axis of the unit 18 and the bolt 22. As shown, there are two pairs of arms 30a and 30b on each standard 26 and lying in the same plane through the axis of a given unit 18. The individual turns of the coils 18a and 18b are spaced apart by a series of spacer members 32, 32, which are preferably short and grooved to fit the outer surfaces of such turns. The spacer members 32 form a part of means including the arms 30a and 30b for preventing vibrations and oscillations of the coils of the units. In the arrangement shown, such means includes, in addition to members 32, a pair of bolts 34 each of which extends between

the coils 18a and 18b and runs through the arms 30a and 30b. At its one end, each bolt 34 carries a guide nut 36 adapted to slide in an aperture 38 in one of the arms 30b. Spaced from the nut 36 by an intermediate washer 40 is a clamp member 42 shown as having a U-shape and a central aperture 44 through which the bolt 34 extends. The ends of the U-piece 42 rest in grooves in the outer faces of members 32a, identical with spacer members 32, placed on the end faces of the end turns of the coils 18a and 18b. At their other ends, coils 18a and 18b have members 32b, identical with members 32, between the end faces of their end turns and the arms 30a, such arms having stepped surfaces 32x, 32x to compensate for the different axial positions of the end turns in the two coils and permit the use of identical members 32b. At its opposite end from nut 36, the bolt 34 extends through an aperture 46 in the arm 30a and carries a washer 48 held by suitable nuts so that a spring 50 which surrounds the bolt 34, intermediate washer 48 and arm 30a, thrusts the washer 48 away from such arm so as to place the bolt 34 under tension and press the series of members 32, 32a and 32b, together with the intervening coil turns, against the arms 30a. The coils of the units are thereby held against hurtful vibrations and oscillations, but the units can be readily connected to and disconnected from the headers 14 and 16 whenever desired. Preferably the ends of all the bolts 22 are fastened to a framework 52 so that their outer ends shall be braced against vibration. As shown, the framework 52 is made of light angle irons connected to the bolts 42 by nuts 54. Preferably the framework 54 is connected to the outer casing 13 of the heater 12 at points 56, 56. As appears best in Figs. 4, 5 and 6, the members 32 have notches 33 in their edges on their sides adjacent bolt 34 and such bolt projects into the notches 33, thereby locking members 32 against movement along the turns of coils 18a, 18a, and 18b. Bolt 34 thus acts in two capacities.

While I have illustrated my invention in connection with a particular type of coil unit, I do not limit myself in all cases to the details of the disclosure, it being understood that the claims are to be taken in their broad sense. In particular I do not limit myself in all cases to arm-like supports, or to helically coiled units, or to units having coils one within another. Neither do I limit myself to using my invention on steam driven vehicles.

Having thus described my invention, I claim:

1. A heat exchanger having spirally coiled tubular heating units, standards arranged axially of said units, parallel supports fixed to said standards and spaced axially thereon, each such support lying transversely of a certain standard, spacer members between adjacent turns of the coils of said units, and resilient means for pressing said members and said coils together and against the supports at one end of said supports.

2. A heat exchanger and having spirally coiled vertically extending tubular heating units, stand-

ards arranged axially of said units, transversely extending axially spaced arms arranged in pairs on said standards, each such pair lying in a plane which includes the axis of a certain standard, spacer members between the adjacent turns of the coils of said units, and resilient means pressing said members and said turns together and against the lower ones of said arms.

3. A heat exchanger and having helically coiled vertically extending tubular heating units, said units having inner and outer coils connected in series, standards arranged axially of said units, transversely extending axially spaced arms arranged in pairs on said standards, each such pair lying in a plane which includes the axis of a given standard, spacer members between adjacent turns of the coils of said units and formed to fit the outer surfaces of such turns, and resilient means for pressing said turns and said members together and against the lower ones of said arms.

4. A heat exchanger as set forth in claim 3 together with parallel headers having lugs thereon for supporting the standards.

5. A heat exchanger having spirally coiled vertically extending tubular heating units, said units having inner and outer coils, the coils of a given unit connected together at the top of the unit and the inlet and outlet of each unit being at the bottom, a pair of headers below said units and to which the units are connected, for flow of fluid therebetween, lugs on the upper sides of said headers, standards supported on and extending upwardly from said lugs, and arranged axially of said units, transversely extending axially spaced arms arranged in pairs on said standards, each such pair lying in a plane which includes the axis of a given standard, spacer members between the adjacent turns of the coils of said units, and means for pressing said turns and said members together and against the lower ones of said arms, said means including a bolt lying intermediate the inner and outer coils of a given unit and guided in the upper arm of a given pair, a spring arranged to thrust against the lower face of the lower arm of said given pair and against the lower end of said bolt, and means intermediate said nut and the upper ends of the coils of the given unit for transmitting the thrust of said spring to such unit.

6. The combination of a tubular helical double coil unit of spacer members between the turns of the coils of said unit, said members in both coils of said unit lying in a given plane through the axis of the coils and having notches in their edges, the notches in the edges of the members in one such coil facing the notches in the edges of the members in the other such coil, a bolt lying between the coils of said unit and arranged to lock said members against creeping along the turns of the coils, and means associated with said bolt for resiliently clamping said members and the turns of said unit together.

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