

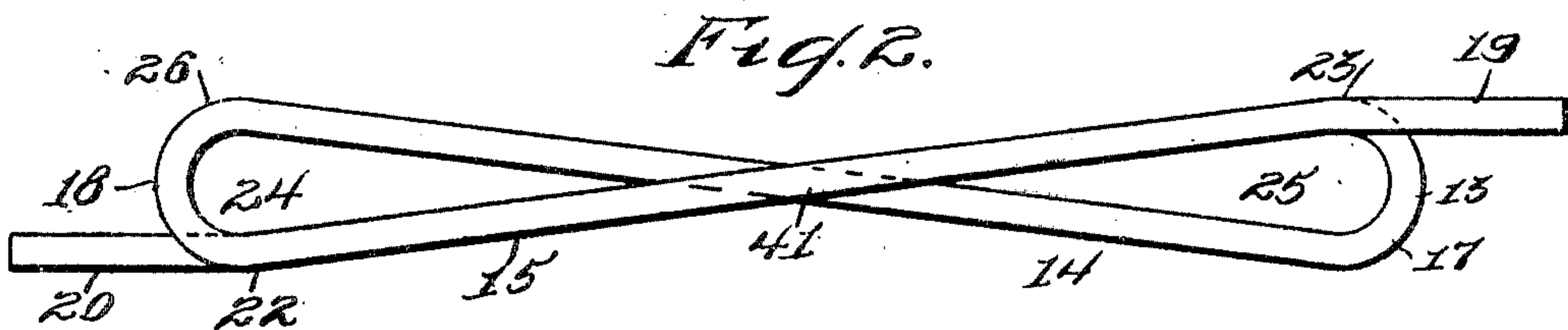
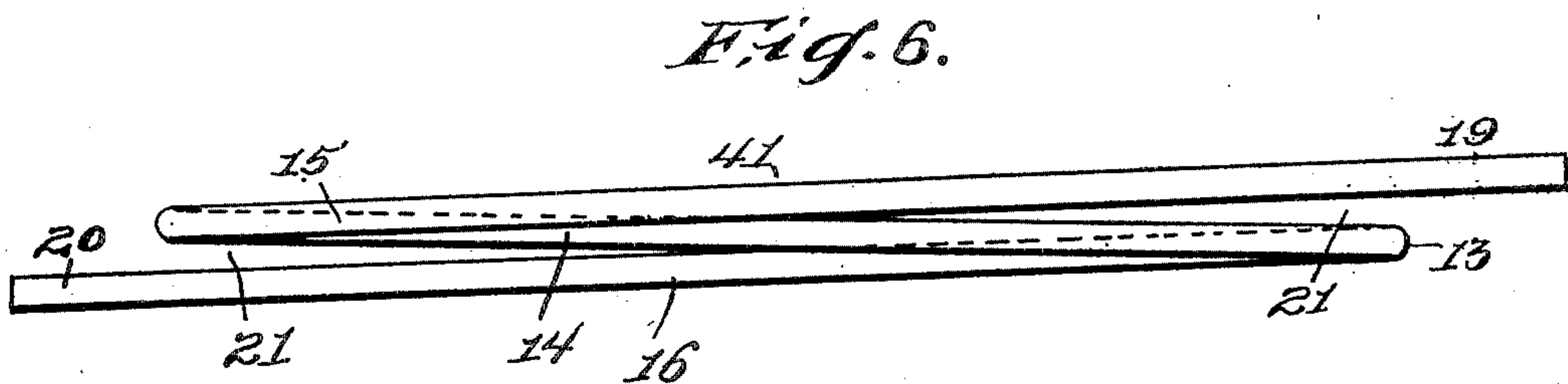
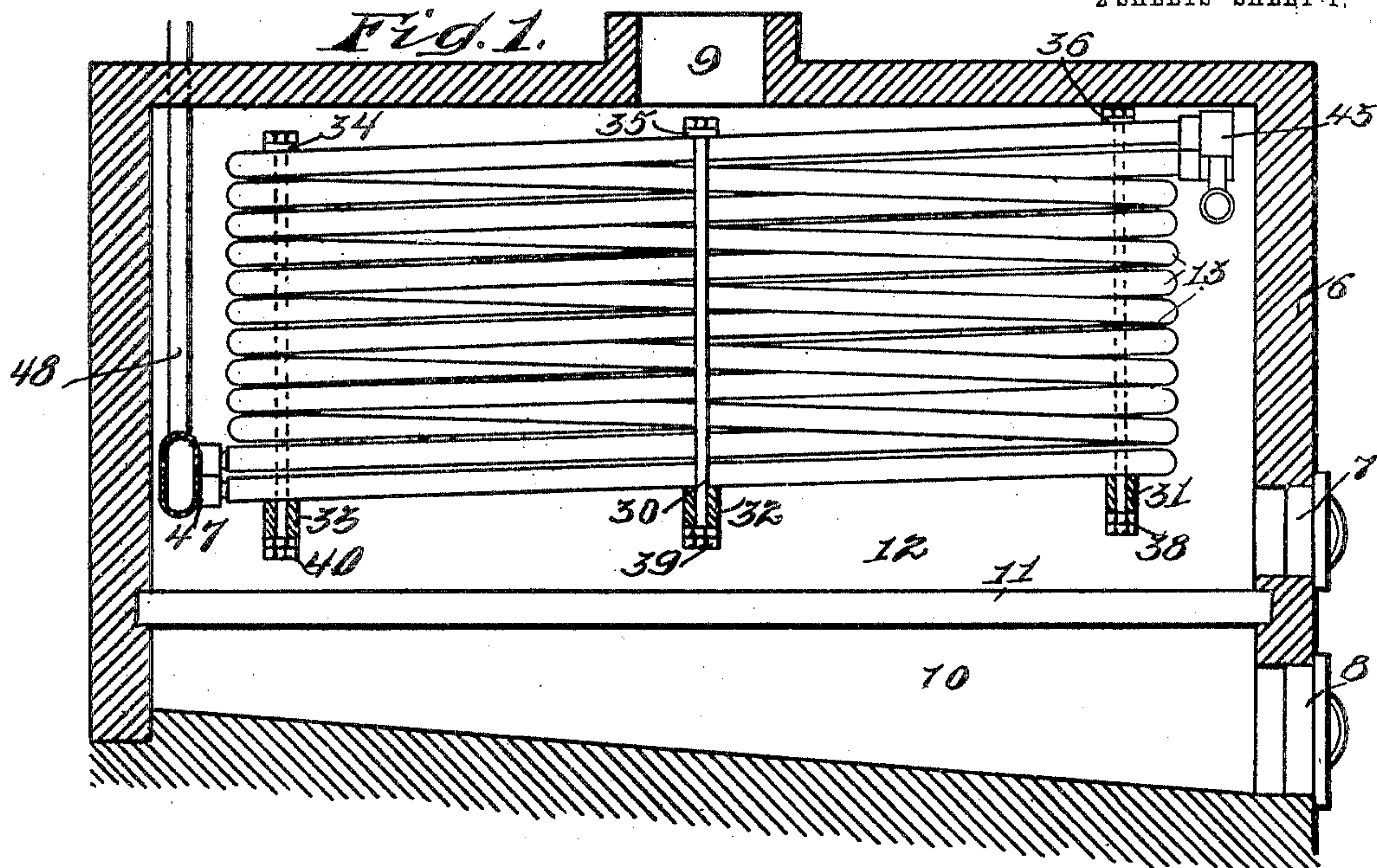
No. 797,762.

PATENTED AUG. 22, 1905.

W. I. TWOMBLY.
MULTIPLE COIL FLASH BOILER.

APPLICATION FILED DEC. 27, 1904

2 SHEETS—SHEET 1.



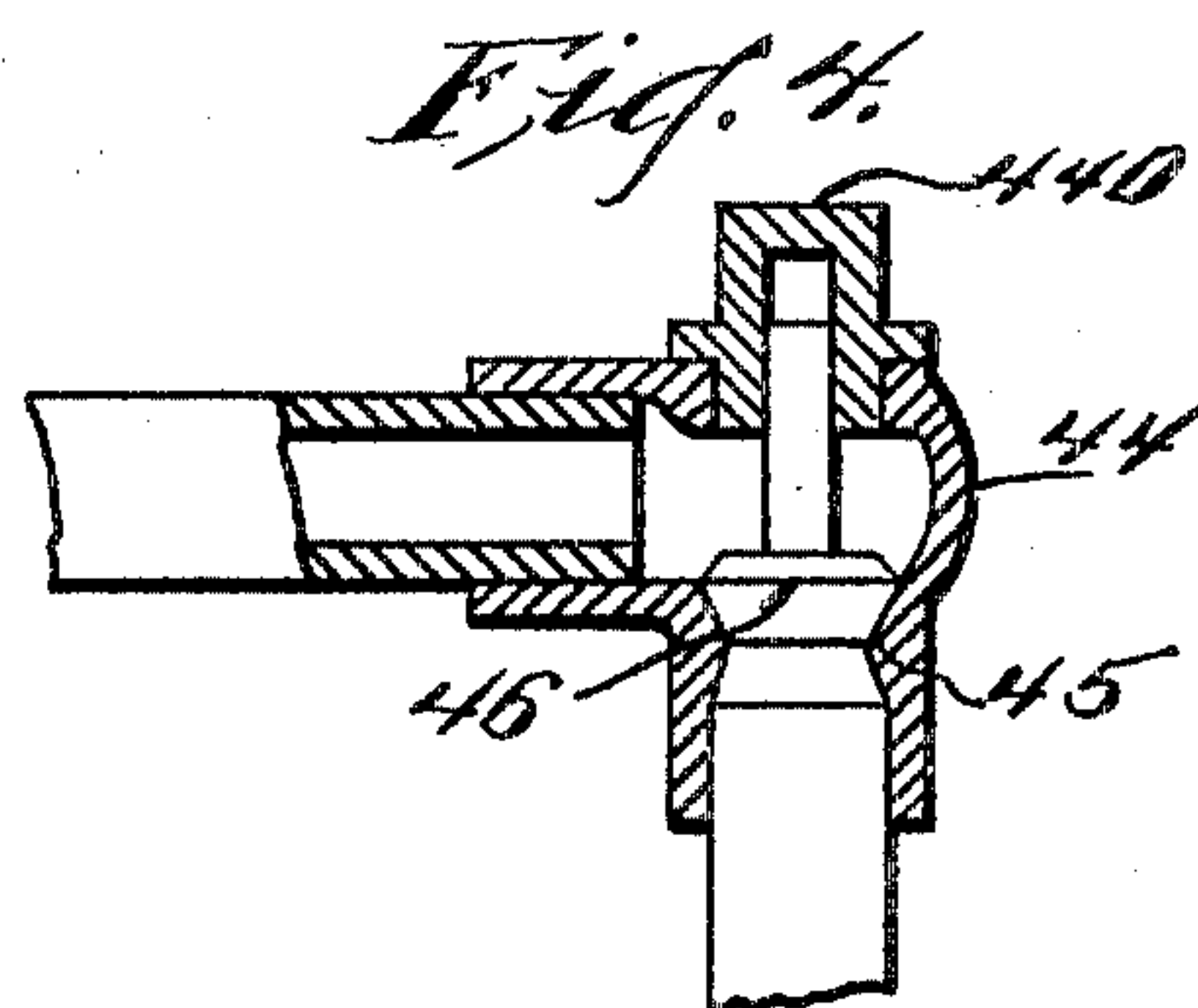
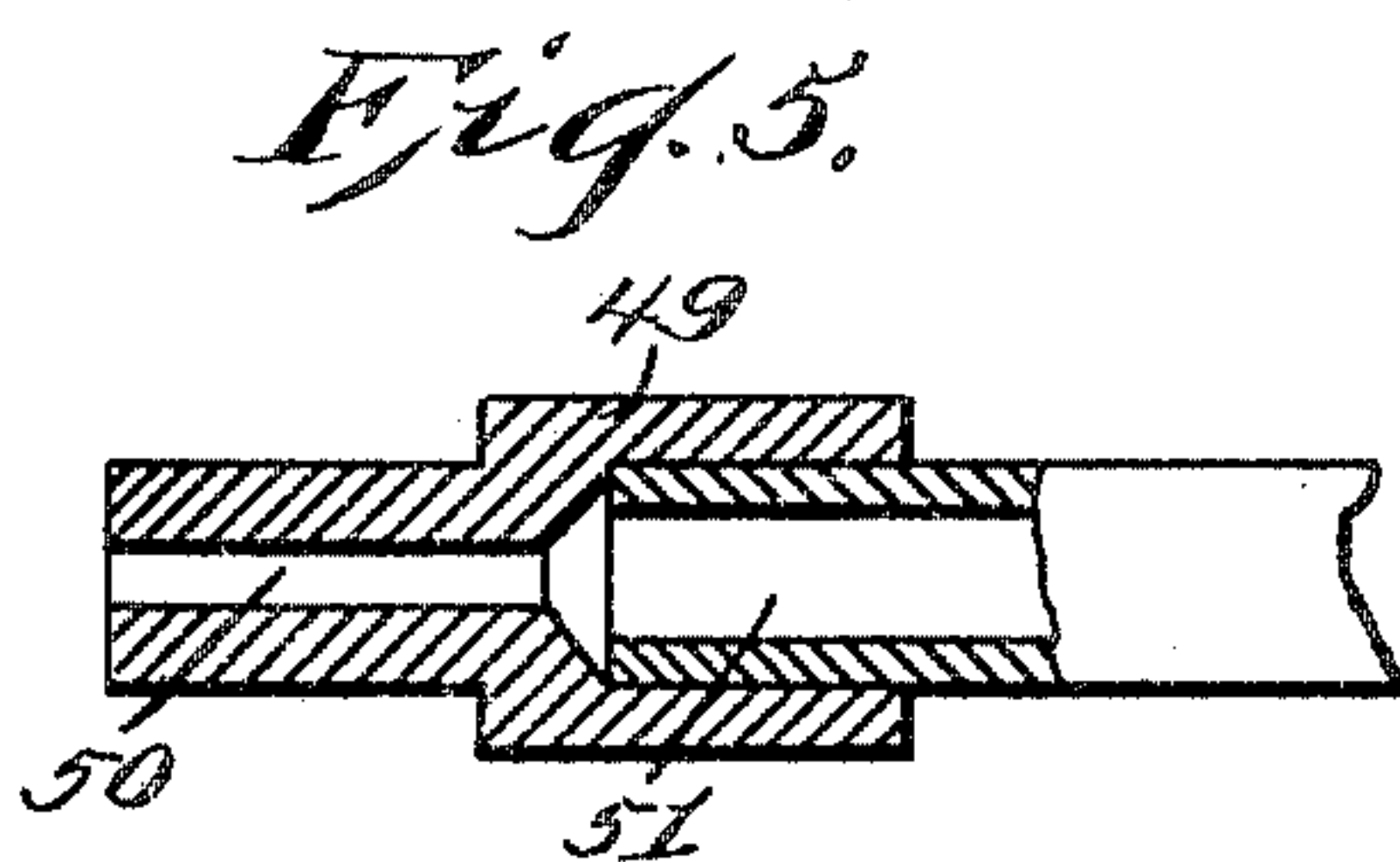
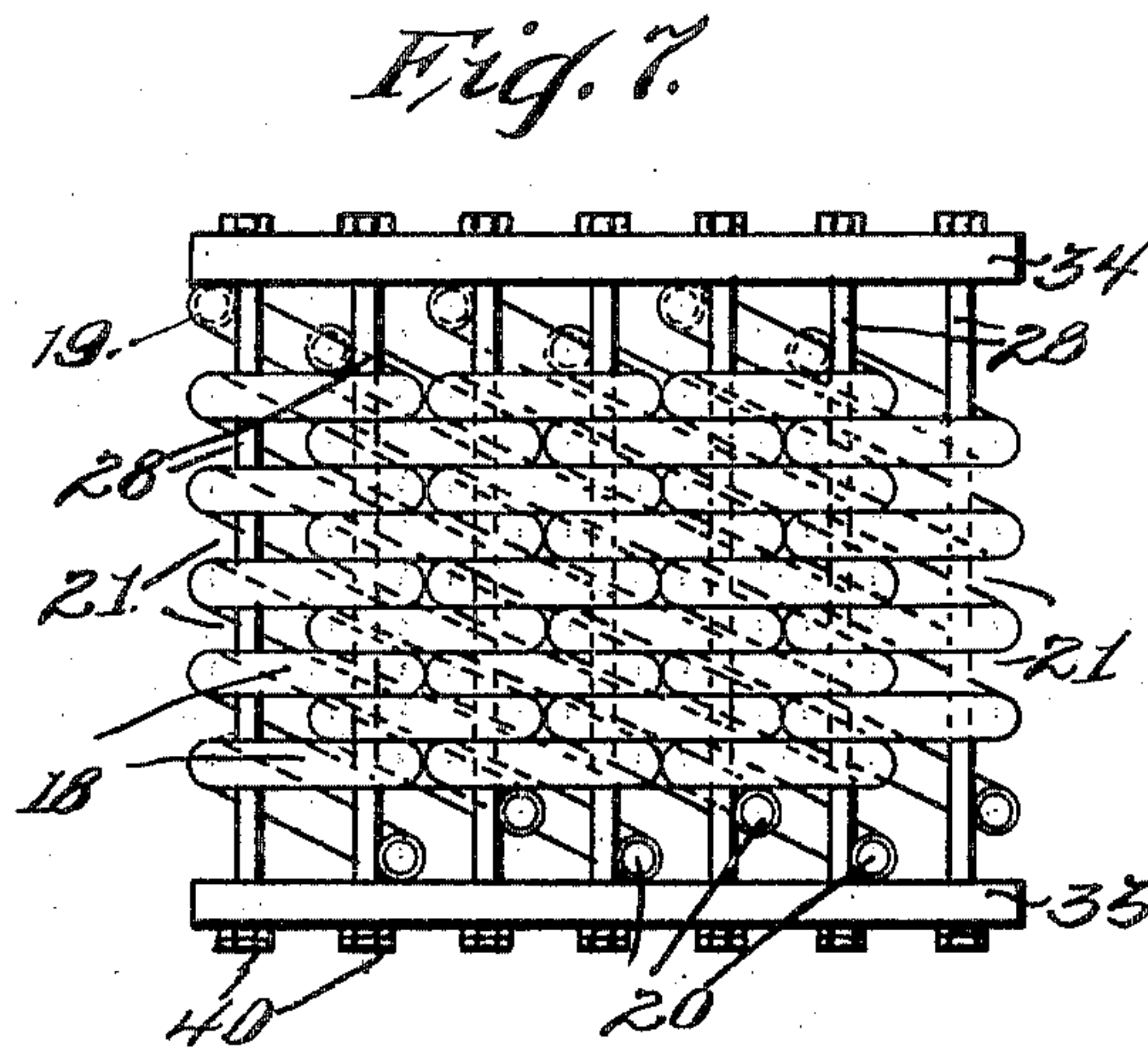
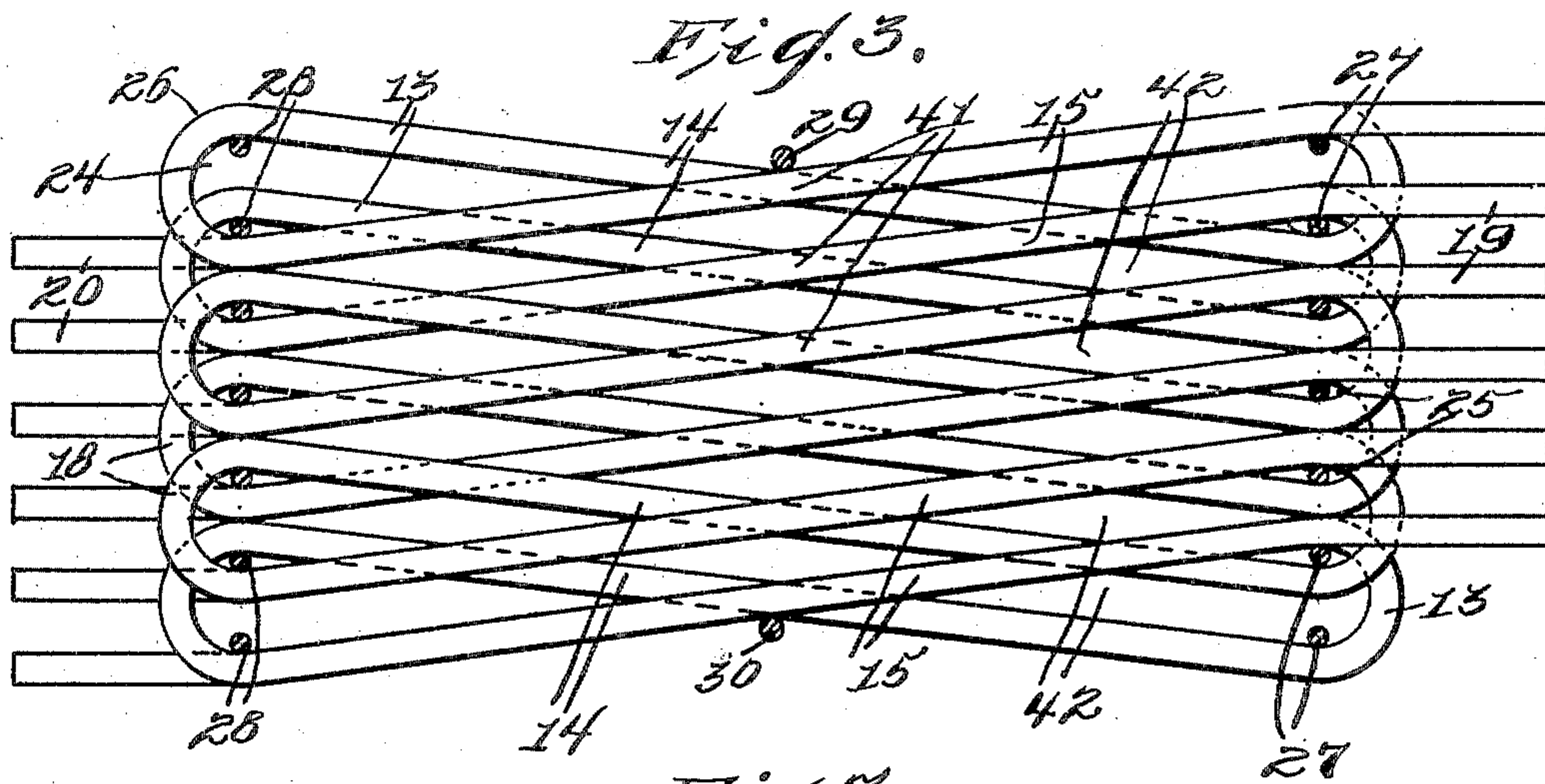
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J. H. Richards

W. I. TWOMBLY.
MULTIPLE COIL FLASH BOILER.

APPLICATION FILED DEC. 27, 1904

2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

WILLARD IRVING TWOMBLY, OF NEW YORK, N. Y., ASSIGNOR TO TWOMBLY POWER COMPANY, A CORPORATION OF NEW YORK.

MULTIPLE-COIL FLASH-BOILER.

No. 797,762.

Specification of Letters Patent.

Patented Aug. 22, 1905.

Application filed December 27, 1904. Serial No. 238,326.

To all whom it may concern:

Be it known that I, WILLARD IRVING TWOMBLY, a citizen of the United States, residing in Manhattan borough, New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Multiple-Coil Flash-Boilers, of which the following is a specification.

This invention has reference to means whereby water may be converted into steam practically instantaneous with the admission of the water to said means.

Such invention further comprehends such instrumentalities as will cause an equal distribution of water which will be automatically cut off when steam has been created to a pressure beyond that of the pressure of the water and the inflow of the water will be prevented until the steam shall have been partially exhausted.

It is further within the comprehension of this invention to so assemble or arrange a plurality of the aforesaid means that when the action or process just referred to takes place in what I will here call a "unit" such action may be repeated in the next succeeding unit and carried on throughout the various units, (if a combination of these be used,) so that the process of forming steam may be carried on intermittently or step by step from one to another of said means, it being understood that by such an arrangement the water will always flow to the unit or units offering the least amount of resistance to the water and that, as is obvious, this process will automatically be repeated back and forth—for instance, from beginning to end—through the various units of the means.

It is also further within the comprehension of this invention and one of the primary objects thereof to so construct the units that a plurality of them may be bunched together or staggered together and that, if desired, additional units can be added to increase the size and capacity of the boiler.

It is also further intended to provide a construction whereby the equal distribution of the water to the various units may be effected and maintained at will.

Specifically stated, the invention may comprehend what is known in the art as a "multiple-coil flash-boiler" adapted to convert water into steam and to effect such conversion

quickly and practically instantaneously with the introduction of the water.

It will be understood, of course, that any suitable means for intensely heating the units may be employed and that the heat will be preferably constantly maintained, whereupon, as is obvious, the steam may be superheated prior to its discharge.

The art of quickly creating steam simultaneously with the introduction of the water into a flash-boiler may be accomplished in any suitable manner and by any organization of parts which will give such results as are sought to be obtained by this invention and as hereinbefore broadly and generally set forth, and for the purpose of a better and more intelligent understanding of such an invention there is appended hereto a sheet of drawings whereon an embodiment of the invention is illustrated in Figure 1, which shows a plurality of units assembled into working form within a suitably-arranged casing or furnace, the view being in sectional elevation. Fig. 2 illustrates in plan a unit such as I may prefer to employ. Fig. 3 illustrates in plan a plurality of such units so interlaced or assembled as to give the greatest amount of efficiency. Fig. 4 shows a simple form of gravity-valve upon which may operate both the water and the steam. Fig. 5 shows a simple form of discharge-nozzle. Fig. 6 represents in elevation a fragment of the unit, and Fig. 7 is an end view of the nest of tubes.

In the various figures similar characters of reference apply.

As has been heretofore intimated, the drawings show an embodiment of the invention, and the structure herein disclosed need not necessarily be adhered to in the carrying out of this invention, although it may be the preferred form, and in such form the furnace or casing is designated by 6 and which may be provided with the usual fire-door 7, ash-door 8, vent 9, fire-pot 10, and grate 11.

It will be understood, of course, that according to the method desired for heating the coils or units the character of the device for heating will be modified. Within a chamber 12 of the casing 6 is situated a plurality of units 13, which in the present instance occupy a position parallel or substantially parallel with the longitudinal axis of the furnace 6. These units 13 may be embodied into any suitable

form or configuration whereby to obtain the best results, and as the invention depends largely upon these elements it may be necessary to use other forms and constructions than the one disclosed herein; but it is now believed that the construction shown in Fig. 2 on the drawings offers the most practical arrangement whereby to obtain the best results. The unit 13, as shown, may comprise the length of tubing or pipe, as the case may be, which may be so bent or formed as to produce in a single unit three lengths 14, 15, and 16, the lengths 15 and 16 in the present instance being located one beneath the other and so separated that the length 14 may pass between the two. These lengths are united by short bends or curved portions 17 and 18, respectively, and such lengths in the present instance cross each other at a point preferably central between the said two bends 17 and 18, and in the present instance the unit 13 thus formed is provided with means of connection to the supply and exhaust, such means for the sake of simplicity being continuations 19 and 20, respectively, of the lengths 15 and 16, respectively. As thus shown and described, it will be noted that this unit when placed with its lengths disposed in a horizontal plane will afford a gravity-feed, because the length 15 will gravitate toward the bend 18, and such gravitation will continue on through the length 14 to the bend 17 and on through the length 16, so that as the water is introduced into such unit it will not be possible for the same to be retarded so as to form a pocket. The retarding of the water can only be accomplished, as hereinbefore stated, by the pressure of the steam exceeding that of the pressure of the water. Thus far a single unit has been described, and it is obvious that provided it is intended to build up a row of these units the same process of formation may be carried out either with an elongated piece of stock or else by bending the portions 19 and 20 around the same form as the bends 17 and 18 and then uniting the various units. It is contemplated for the purposes of increased efficiency and capacity to not only unite a plurality of these units in vertical rows, but also to place a plurality of these rows side by side and stagger or interlace them together in some suitable manner—such, for instance, as is clearly illustrated in Fig. 3. This may be readily accomplished when it is borne in mind that length 14 of the units serves to separate the lengths 15 and 16, respectively, so that a space 21 will be produced between said lengths 15 and 16, and these spaces, as is obvious, will occur, for instance, at 22 and 23, respectively. The manner of forming the unit will also create spaces 24 and 25, respectively, somewhat elongated in a direction parallel to the spaces 22 and 23 hereinbefore referred to. When it is desired to interlace or stagger to-

gether a plurality of these units in a manner such as shown in Fig. 3, the portion 26 of the unit 13 will be introduced into a space 22 of a laterally-located unit, while the portion 52 will be inserted into a space 23 of an additional unit located on the opposite side of the unit whose portion 26 has been inserted into the unit mentioned, but not shown. It has been thought best to so describe the operation of interlacing these units by reference to Fig. 2 as not to confuse Fig. 3, which shows the units interlaced as a result of the operation just explained. In the form shown and for the purpose of causing the proper separation of these various units suitable sets of separators or rods 27 and 28 are so disposed in the intermeshed mass of units as to keep the various units 13 a suitable distance apart, as seen, for instance, in Fig. 3, and for the purpose of belting or hugging the plurality of units in place there may be provided suitable stays 29 and 30, respectively, which separators and stays may be held in any suitable manner—for instance, as by brackets 31, 32, 33, 34, 35, and 36—suitable jam-nuts 38, 39, and 40 being employed to hold the stays in their places.

Thus far, as described, it will be observed that a mass of intermingled elements or units may be provided; that the mass may be increased by adding units thereto; that the greater portion of the area of said units may be subjected to direct action of heat, the only portions receiving the indirect action being those at the crossings 41, and that numerous heating-spaces 42 are provided to lend increased efficiency to the structure thus formed.

As seen in Fig. 3, each of the intermingled units is provided with extensions 19 and 20, the former serving in the present instance as connections to a head 43, through which travels the supply of water to be converted into steam. This head in the present instance is provided (according to the number of rows of coils) with a plurality of valves 44, which in the present instance may comprise a simple gravity-valve comprehending a seat 45 with a gravity-valve head 46—such, for instance, as shown in Fig. 4. The valve-head may also be provided with a cap 440, whereby to gain access to the interior of the valve.

By arranging in the head the various valves in the manner just described it will be noted that I obtain an equal distribution of water throughout all of the various units.

The opposite set of extensions or connections 20 may, as shown in Fig. 1, be staggered into a head 47, which in the present instance may be provided with an exhaust-leader 48. These extensions, as shown, for instance, in Fig. 5, may be provided with a nozzle 49, having an orifice 50, whose area is suitably reduced with relation to the area 51 of the tubing of the unit 13, it being contemplated in the present instance to reduce the area of the

orifice 50 about one-half of the area 51 of the tubing, so as to allow the steam to back up in the units.

The process of quickly forming steam practically instantaneous with the admission of the water with a structure or apparatus such as has been delineated takes place substantially as follows:

The coils are suitably heated, and when the water is admitted to the head 43 the pressure of said water is sufficient to elevate the first valve-head 46, whereupon the water will flow into the coil connected with that valve. It will be remembered from the prior description that the piping of the units 13 constantly gravitate, so as to permit the water to readily flow through the entire unit, and almost instantaneously with the admission of the water the steam is formed. As soon as the pressure of the steam exceeds that of the pressure of the water the valve 46 will be closed, whereupon the water will continue to flow into the unit which offers the least amount of resistance and the flow will continue into this unit until the pressure of the steam exceeds that of the pressure of the water. This process will be continued on through the various units of the boiler and during the interval the steam created in some of the units will have been sufficiently partially exhausted, whereby the pressure in that particular unit will be less than the pressure of the water, when the latter will again flow in and the operation be repeated, and this operation may continue intermittently through the various elements of the boiler as long as the same is desired. During the operation also the water will be equally distributed throughout the system.

It will now be observed that this invention comprehends the construction of a novel unit adapted to receive and convert water into steam and that such unit is so constructed as to be readily intermingled or intermeshed with other units of like character, so as to make up a nest of such units and that such nest may be suitably heated for the purpose of producing a volume of steam and to cause such production to take place simultaneously, or practically simultaneously, with the introduction of the water into such nest.

It will be further observed that this process of forming steam by a structure such as described may be preferably carried on intermittently, or step by step, thus further increasing the efficiency of the device. Inasmuch as it is believed and it appears obvious that by causing an intermittent introduction and equal distribution of the water and an intermittent formation of the steam the combined results of such a device will be more readily obtained.

It will be observed that the unit comprehended in this invention, and which may be

preferably as shown, if desired, will convey the water from its source of supply in a direction transverse to the inflow and thereafter in a direction parallel to the inflow and that during certain periods of the travel of the water such travel will be somewhat retarded by the short turns or bends 17 and 18, respectively, so as to give the water a chance to be more readily and efficiently converted into steam.

It will be noted that inasmuch as the nozzles which are secured to the steam-discharge ends of the units are of smaller capacity than the capacity of the units the discharge of the steam will not be so rapid as the inflow of the water, and therefore the steam will not be fully exhausted immediately upon its formation, but rather that the steam will gradually exhaust as compared with the inflow of the water and that more water may be introduced into the boiler after such steam has been partially exhausted.

As has been heretofore remarked, it is not necessary in the interests of efficiency and within the comprehension of this invention to confine such invention to the precise arrangement of parts hereinbefore set forth and shown, as such parts may be organized in any suitable manner whereby to obtain the results contemplated by this invention.

It is also to be noted that by a constant application of the heat to the units or coils the steam created therein will be superheated, and therefore rendered more efficient, before its use.

It will be noted as an important feature of this invention that I provide a unit in which steam may be formed, and which unit is so constructed that it may be assembled with other units to make a compound nest through which the water may flow, and, further, that the distribution of the water may be carried on equally through the various units from a single head and that, if desired, the nest of units may be increased to any size, so as to increase the capacity of the boiler by simply staggering additional units to the nest already formed. It is believed that I am the first to make it possible to increase the size and capacity of a flash-boiler in this manner and also to cause equal distribution of the flow to the various units.

Having thus described my invention, I claim—

1. A flash-boiler comprehending a plurality of units, each of which comprises a pair of parallel tubes united by a transverse tube, said units being intermeshed by having certain portions of one unit inserted between spaces formed by the parallel tubes of another unit.

2. A flash-boiler comprehending a plurality of units, each of which comprises a pair of parallel tubes united by a transverse tube, said units being intermeshed by having certain

portions of one unit inserted between spaces formed by the parallel tubes of another unit, and connections proceeding from each unit.

3. A flash-boiler comprehending a plurality of units, each of which comprises a pair of parallel tubes united by a transverse tube, said units being intermeshed by having certain portions of one unit inserted between spaces formed by the parallel tubes of another unit, connections proceeding from each unit, and means for equidistantly disposing the units relatively to each other.

4. A flash-boiler comprehending a plurality of units, each of which comprises a pair of parallel tubes united by a transverse tube, said units being intermeshed by having certain portions of one unit inserted between spaces formed by the parallel tubes of another unit, connections proceeding from each unit, means for equidistantly disposing the units relatively to each other, and means to hug the units together.

5. In a flash-boiler the combination with a source of supply and an exhaust, of an intermediate system of steam-forming units, said system comprising a plurality of intermeshed units, and a gravity-valve for each unit.

6. In a flash-boiler the combination with a water-feed and an exhaust, of an intermediate system of units, said units being intermeshed, means for equidistantly separating said intermeshed units, means for hugging said units in position, means for automatically delivering and cutting off the flow of water to said

units, and discharge-nozzles for each unit whose area is considerably less than the area of the units.

7. In a flash-boiler the combination with a feed provided with a plurality of gravity-valves, of removable heads for each valve, an exhaust, an intermediate system of intermeshed steam-forming units each connected with a valve in said feed, and means for equidistantly separating the intermeshed units.

8. In a flash-boiler the combination with a feed provided with a plurality of gravity-valves, of removable heads for each valve, an exhaust, an intermediate system of intermeshed steam-forming units each connected with a valve in said feed, means for equidistantly separating the intermeshed units, and means for holding said units together and in place.

9. In a flash-boiler the combination with a water-feed and an exhaust, of an intermediate system of units, said units being intermeshed, means for equidistantly separating said intermeshed units, means for hugging said units in position, means for causing an equal distribution of the flow of water to said units, and discharge-nozzles for each unit whose area is considerably less than the area of the units.

Signed at Nos. 9 to 15 Murray street, New York, N. Y., this 24th day of December, 1904.

WILLARD IRVING TWOMBLY.

Witnesses:

FRED. W. BARNACLO,
JOHN O. SEIFERT.