

No. 865,842.

PATENTED SEPT. 10, 1907.

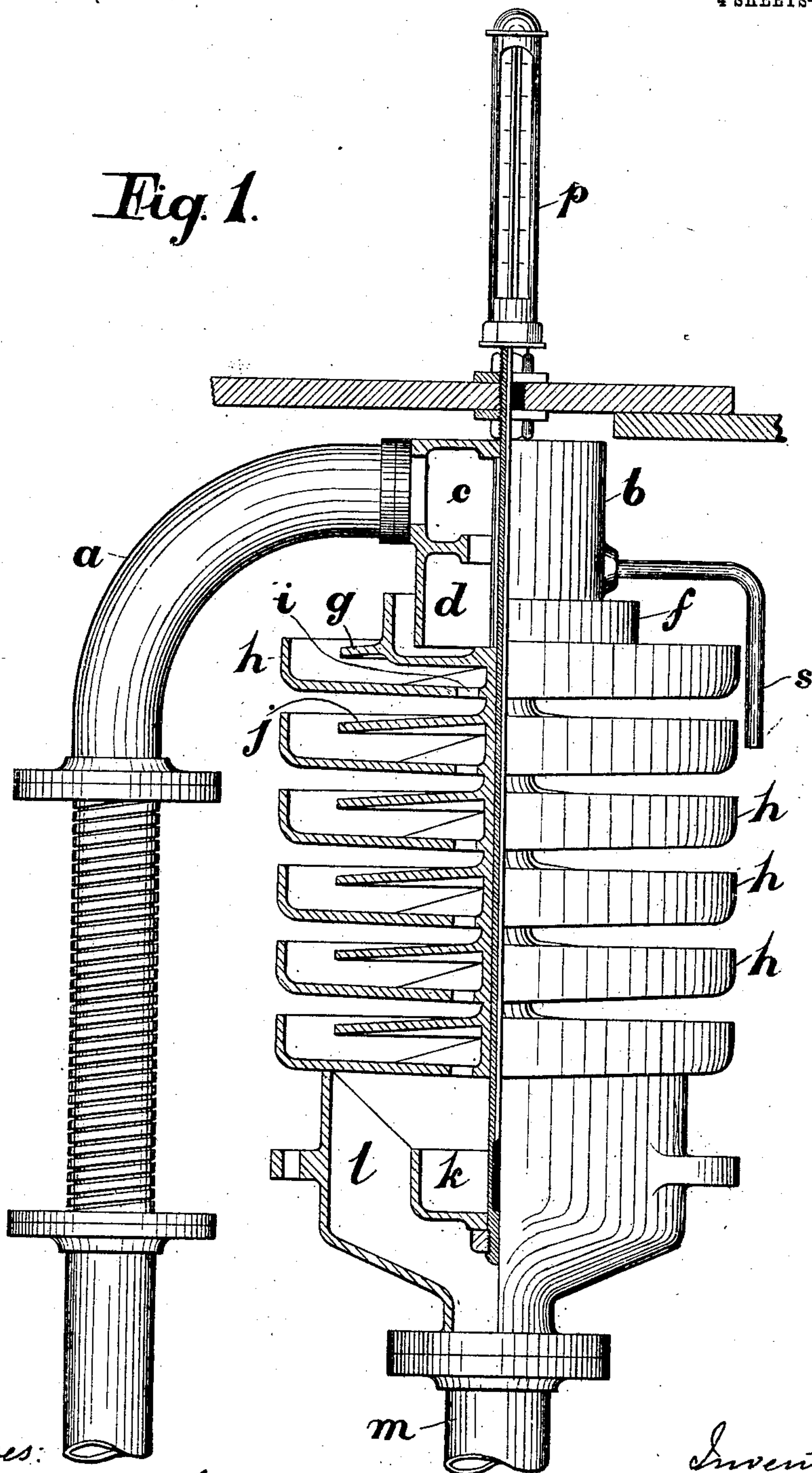
G. WILKINSON.

DIRECT CONTACT FEED WATER HEATER FOR STEAM BOILERS.

APPLICATION FILED DEC. 11, 1906.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

Jacob Schaefer
Harry Wagner

Inventor.

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by Herbert W. Jenner
Attorney.

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4 SHEETS—SHEET 2.

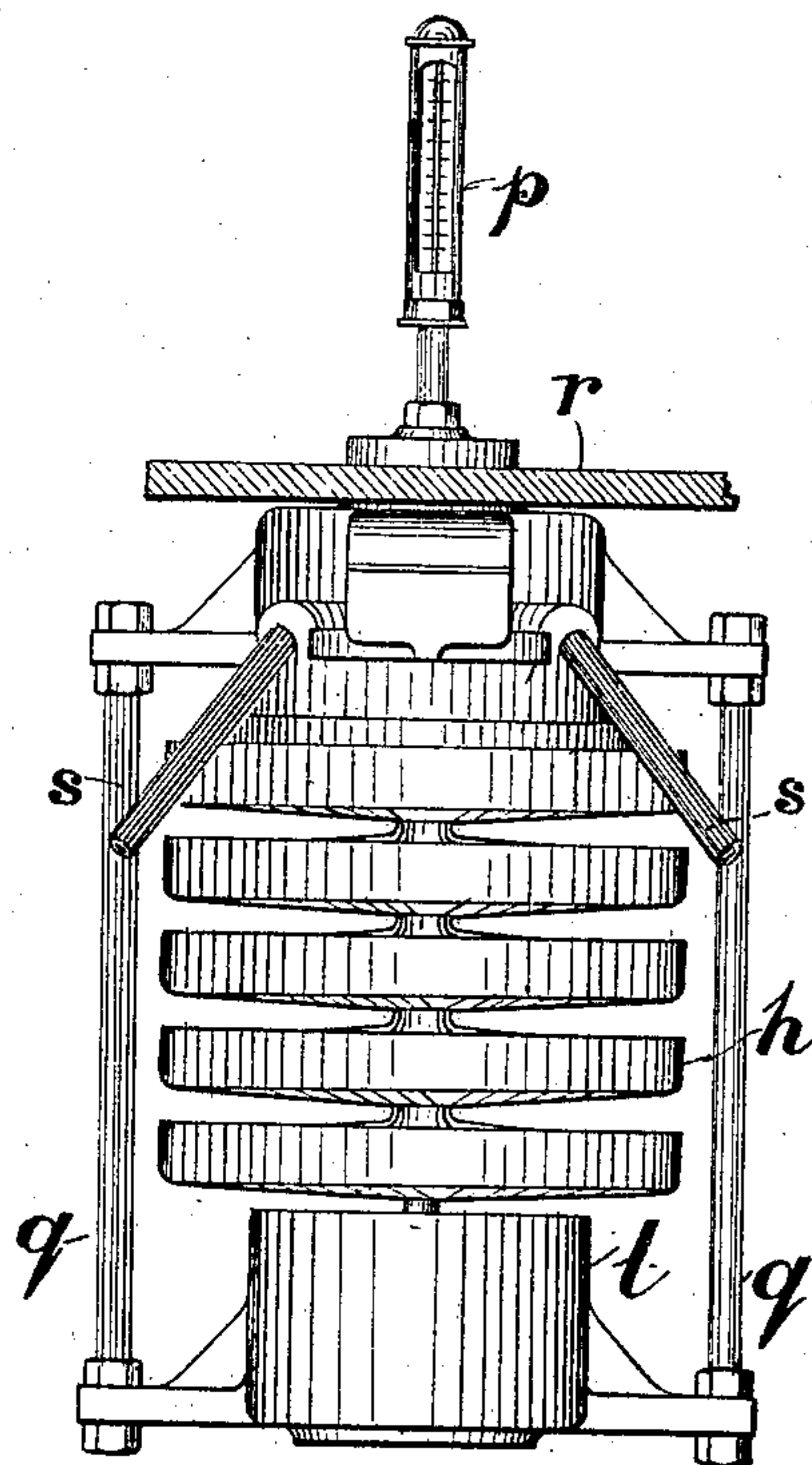


Fig. 2.

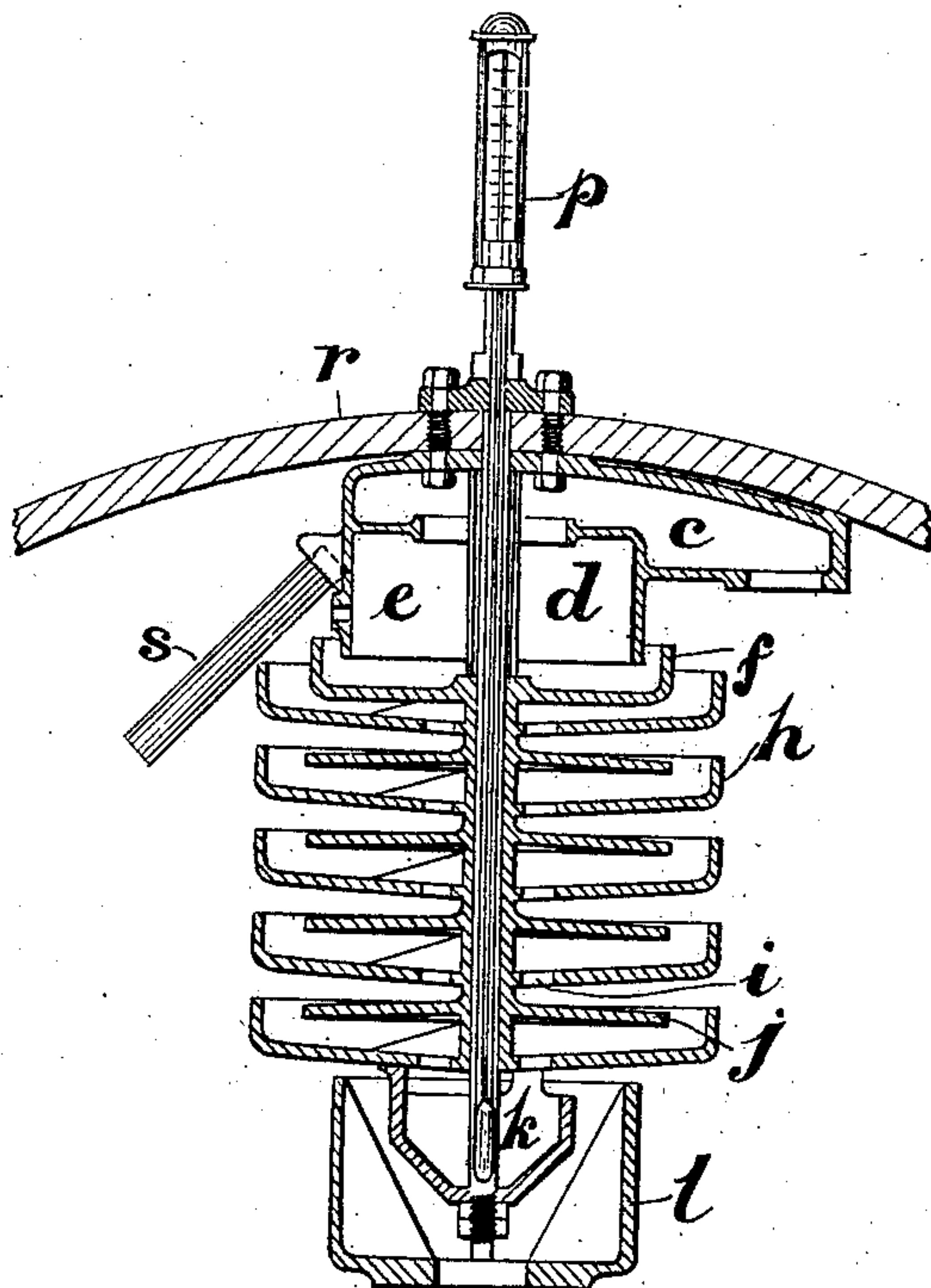


Fig. 3.

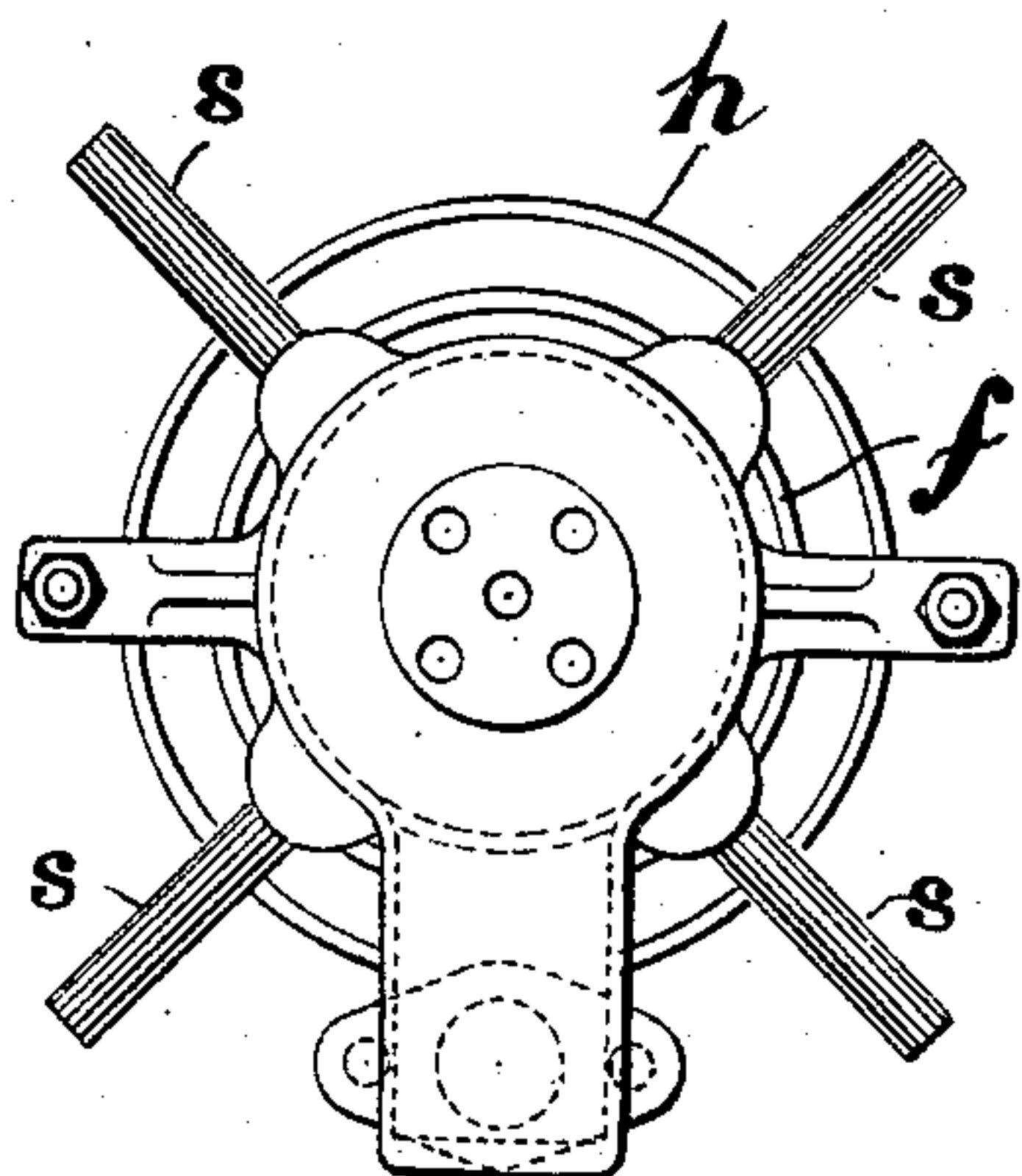


Fig. 4.

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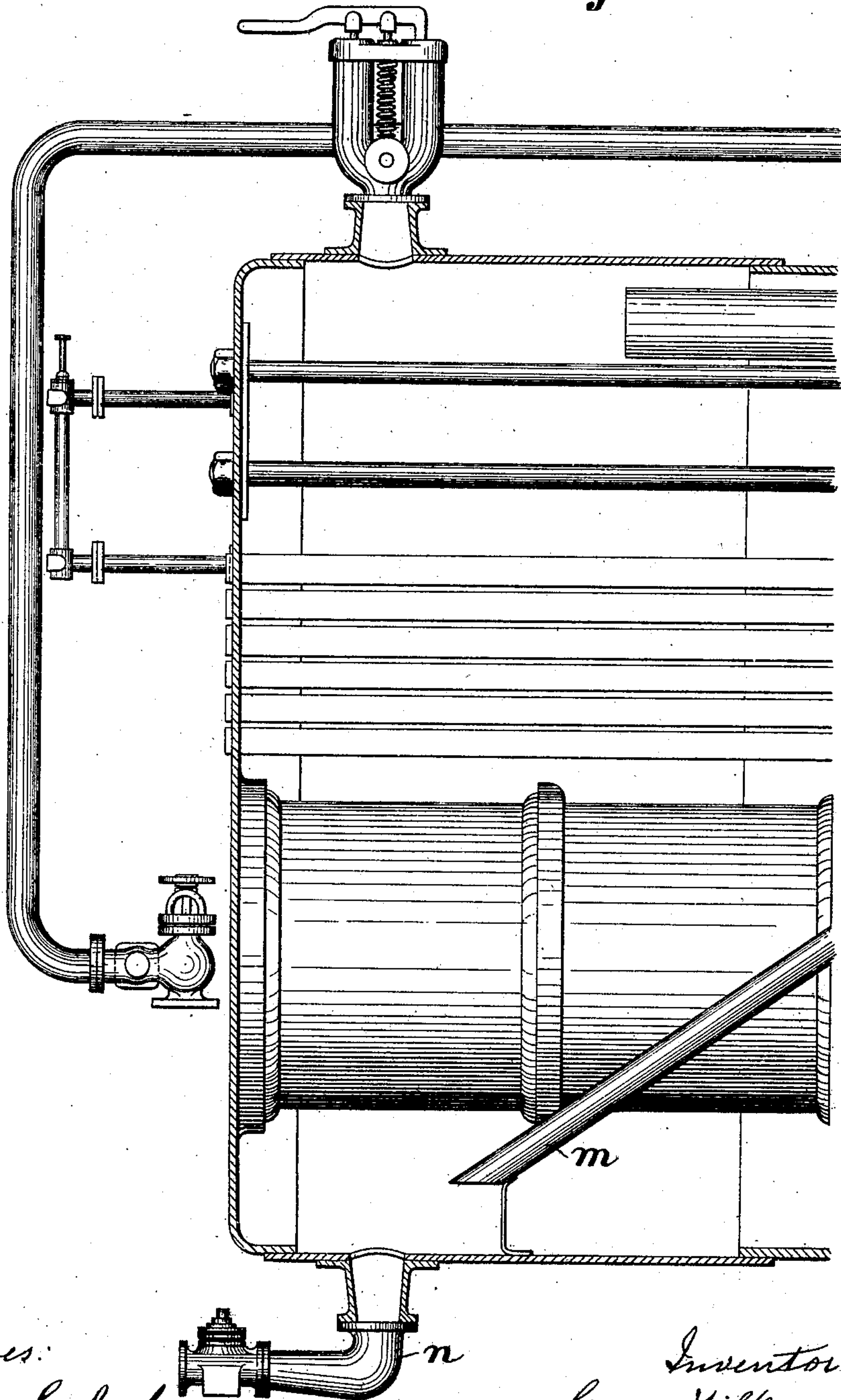
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4 SHEETS—SHEET 3.

Fig. 5.



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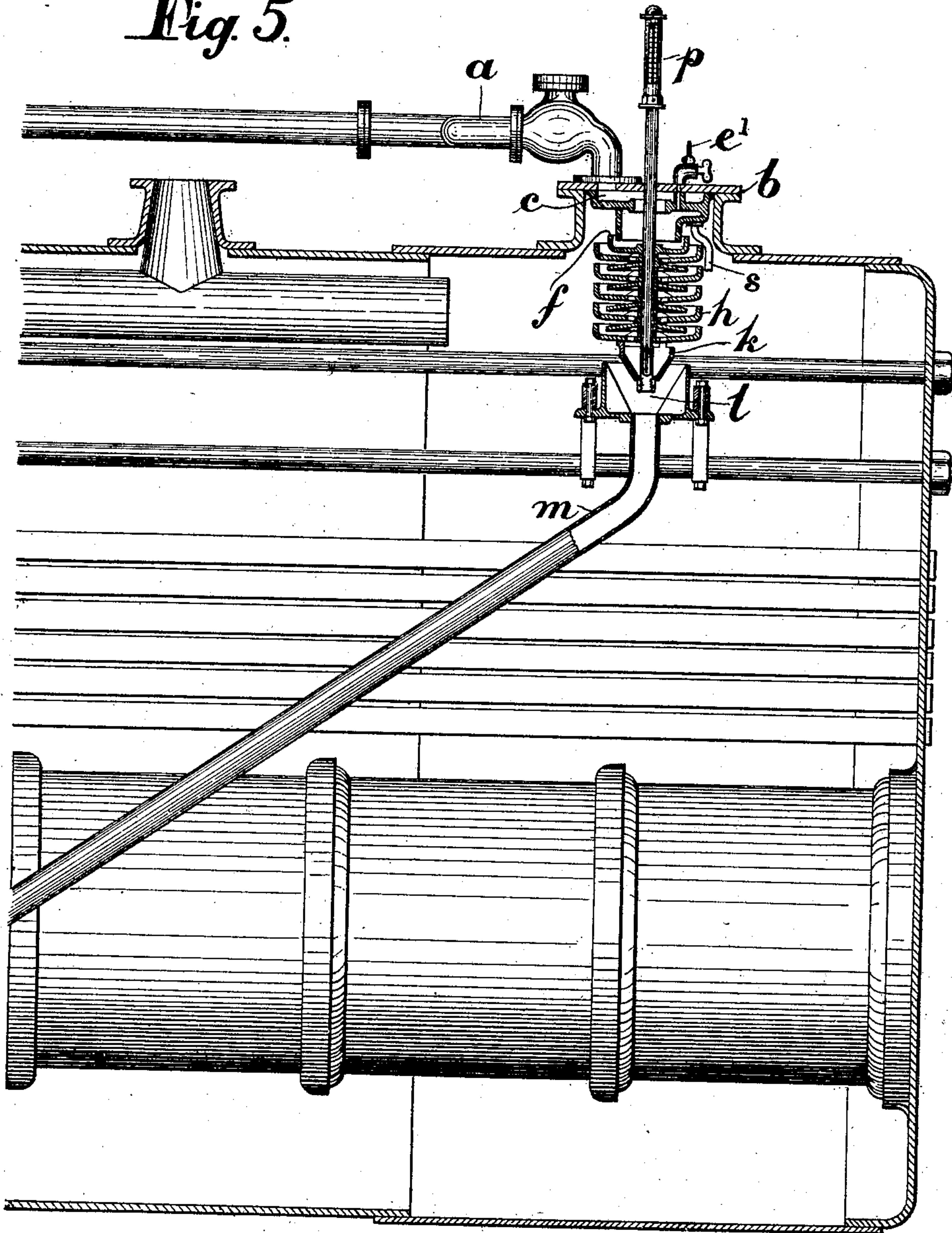
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4 SHEETS—SHEET 4.

Fig. 5.



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UNITED STATES PATENT OFFICE.

GEORGE WILKINSON, OF HARROGATE, ENGLAND.

DIRECT-CONTACT FEED-WATER HEATER FOR STEAM-BOILERS.

No. 865,842.

Specification of Letters Patent.

Patented Sept. 10, 1907.

Application filed December 11, 1906. Serial No. 347,300.

To all whom it may concern:

Be it known that I, GEORGE WILKINSON, residing at Beech Mount, Harrogate, in the county of York, Eng-

land, engineer, have invented certain new and useful
5 Improvements in and Relating to Direct-Contact Feed-
Water Heaters for Steam-Boilers and the Like; and I
do hereby declare the following to be a full, clear, and
exact description of the invention, such as will enable
others skilled in the art to which it appertains to make
10 and use the same.

My invention relates to improvements in feed water
heaters of the type in which the feed water is finally
heated within the steam space of the boiler by direct
contact with the steam.

15 My improved apparatus may be used in cases where
cold feed water is used, but I prefer to use in connec-
tion therewith feed water which has been previously
raised in temperature by passing through an economizer,
an exhaust steam feed heater, or other equivalent ap-
20 paratus.

In the drawings, Figure 1 is an elevation, half in sec-
tion, of one form of the apparatus. Figs. 2, 3, and 4 are
respectively elevation, section, and plan of the pre-
ferred form adapted to a Lancashire boiler. Fig. 5 is
25 spread over two sheets, one-half on each sheet, and each
half is marked Fig. 5. Fig. 5 shows a marine boiler
having my invention applied thereto.

Letter *a* indicates the ordinary feed water pipe, *b* the
de-aerating box which is divided into upper and lower
30 compartments *c* and *d*, the upper *c*, being intended to
receive the feed water which flows over the circular
opening into the bottom half *d* the air and gases being
liberated from the water and escaping to the atmos-
phere through the hole *e* (Fig. 3) to which a suitable
35 pipe and external control valve is fitted, or by the pipe
and valve *e*¹ (Fig. 5). The lower compartment *d* opens
into the receiving vessel *f*, over the edge of which the
feed water trickles, falling on to the inclined surface of
a ring *g* (Fig. 1) surrounding the vessel *f*, thence into a
40 dish or tray *h*, and through openings *i* therein on to a
conical plate *j*, and so on over a series of dishes and
conical plates (the number depending upon the vertical
space available) until it is conducted into the settling
tank *k*. From this tank it overflows into the envelop-
45 ing chamber *l*, and down the stand pipe *m* to the bot-
tom of the boiler, near the blow-off pipe *n*. Letter *p*
indicates the thermometer, and *q* (Fig. 2) bolts by
which the lower receptacle *l* is carried from the top box
b, which is bolted to the shell of the boiler *r*. The ap-
50 paratus may, however, be supported by the longitudi-
nal stays of the boiler as shown in Fig. 5.

In order to maintain the water seal between the com-
partment *d* and receiving vessel *f* as previously men-

tioned, one or more equalizing pipes which for conven-
ience I designate "breathing pipes" *s* may be placed in 55
communication with the top of the said compartment
d, the other ends of these being open to the steam in the
boiler. In Fig. 4, four of these pipes are shown spaced
around the box, but three, six, or other number may be
employed. 60

I claim as my invention:—

1. In a feed-water heater, the combination, with a
water inlet pipe, of a de-aerating box connected with the
said pipe and arranged inside the boiler, said box having 65
two superposed compartments and an air outlet from the
upper compartment, a vessel forming a water seal with
the lower compartment, a receiving tank for the heated
water arranged below the said vessel, and a delivery pipe
connected to the said tank and discharging into the water
space of the boiler. 70

2. In a feed-water heater, the combination, with a
water inlet pipe, of a de-aerating box connected with the
said pipe and arranged inside the boiler, said box having 75
two superposed compartments and an air outlet from the
upper compartment, a vessel forming a water seal with
the lower compartment, a receiving tank for the heated
water arranged below the said vessel, a series of dishes
having holes near their centers and plates under the said
holes, said dishes and plates being arranged alternately
and between the said vessel and tank, and a delivery pipe 80
connected to the said tank and discharging into the water
space of the boiler.

3. In a feed-water heater, the combination, with a vessel
arranged in the upper part of a boiler and provided with
means for supplying it with feed-water, of a series of 85
dishes having holes near their centers and plates under
the said holes, said dishes and plates being arranged
alternately below the said vessel in the steam space of
the boiler and operating to heat the feed-water as it
passes over them from the said vessel. 90

4. In direct contact feed water heaters for steam boil-
ers and the like, the combination with a receiving vessel
(*f*) from which the feed water descends in a finely
divided state in contact with the steam into a settling
tank (*k*), of inclined paths for the said water formed by 95
one or more dishes or trays (*h*) having annular openings
therein, and one or more conical plates (*j*) for purposes
described.

5. In direct contact feed water heaters for steam boil-
ers and the like, a de-aerating box (*b*) delivering the 100
feed water to a receiving vessel (*f*) so arranged that the
water in the said vessel *f* forms a water-seal around the
outlet of the de-aerating box, substantially as described.

6. In direct contact feed water heaters for steam boil-
ers and the like, the combination with a receiving vessel 105
(*f*) and settling tank (*k*), both contained within the
boiler, of a receiving tank (*l*) and pipe (*m*) conveying the
feed water from the said settling tank to a point near the
bottom of the water space of the boiler, and preferably
over or near the blow-off block (*n*) thereof. 110

In testimony whereof I affix my signature, in presence
of two witnesses.

GEORGE WILKINSON.

Witnesses:

JOSEPH RIDSVALE,
THOMAS E. COE.