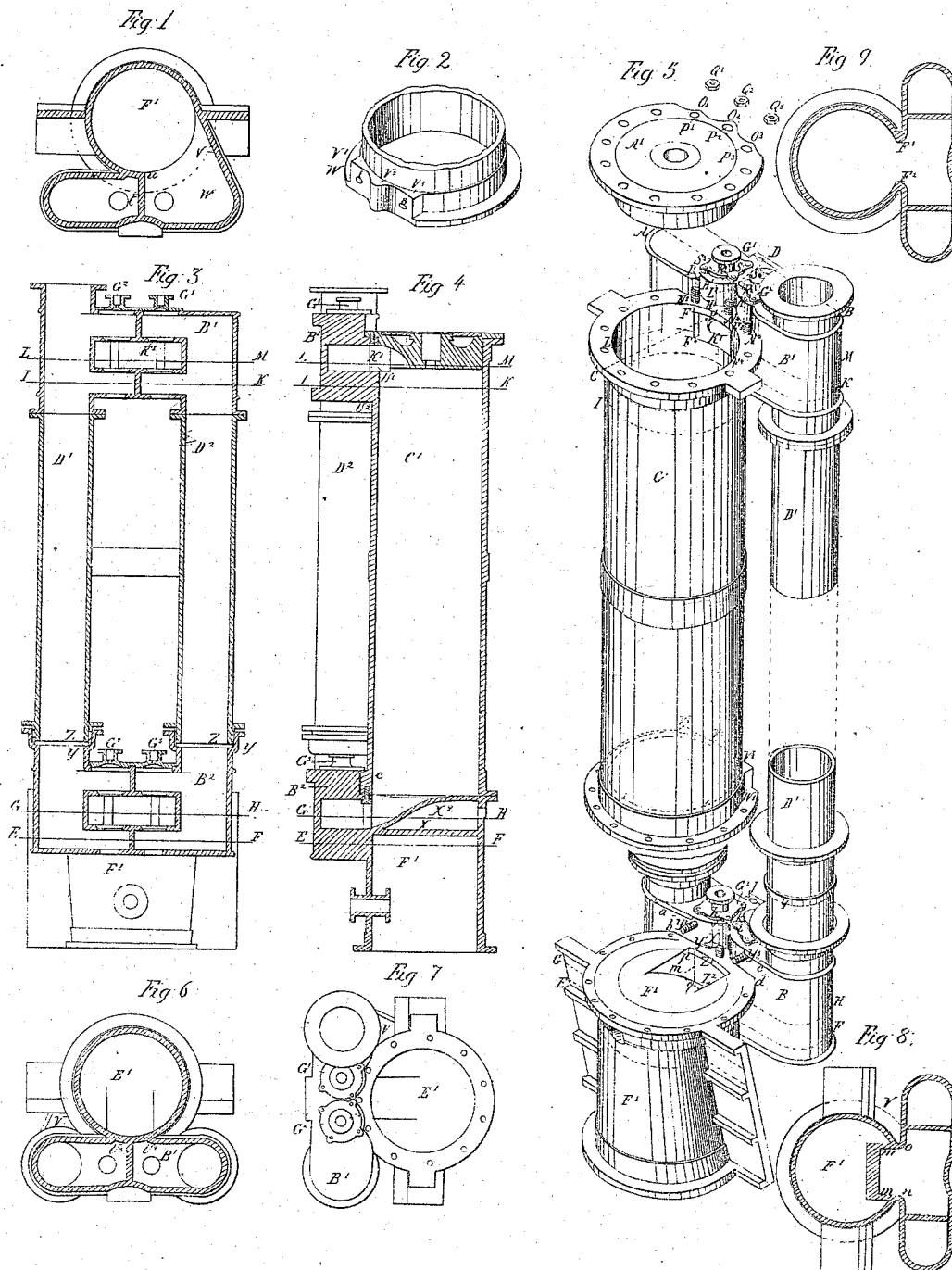


F. E. Sickels,
Reciprocating Steam Engine,

No. 4,202,

Patented Sep. 19, 1845.



UNITED STATES PATENT OFFICE.

FREDK. E. SICKELS, OF NEW YORK, N. Y.

MODE OF CONNECTING STEAM-CYLINDERS WITH STEAM-CHESTS.

Specification forming part of Letters Patent No. 4,202, dated September 19, 1845; Reissued June 1, 1858, No. 565.

To all whom it may concern:

Be it known that I, FREDERICK ELSWORTH SICKELS, of the city, county, and State of New York, have invented a new and useful mode of forming, fastening, and connecting steam-chests to the cylinder or cylinder and condenser of puppet-valve steam-engines, by which they can be more practically, efficiently, and closely connected together, with less labor and weight in construction and more economy in operation than by any mode heretofore adopted, and that the following is a full, clear, and exact description of the principle or character thereof which distinguishes it from all other things before known and of the manner of making, constructing, and using the same, reference being had to the accompanying drawings making part of this specification, in which—

Figure 1 is a horizontal section through the condenser and chest; Fig. 2, an isometrical view of the lower end of the cylinder; Fig. 3, a vertical section through the steam chest and side pipes, taken at the line A B of Fig. 5; Fig. 4, a vertical section through the center of the steam chest and cylinder, taken at the line C D of Fig. 5; Fig. 5, an isometrical view of the steam chest, side pipes, top and bottom of the cylinder, cylinder, and the condenser, showing these parts before they are put together; Fig. 6, a horizontal section through the steam chest and cylinder at the line I K of Figs. 3, 4, and 5; Fig. 7, a top view of the steam chest and cylinder; Fig. 8, a horizontal section through the condenser and steam chest at the line G H of Figs. 3, 4, and 5; and Fig. 9, a horizontal section through the cylinder and steam chest at the line L M of Figs. 3, 4, and 5.

The same letters are used in all the figures to indicate like parts.

In forming the connection of a steam cylinder with the steam chest of puppet valve engines, it has long been known to engineers, that the closeness of this connection is important in an economical point of view, not only on account of the weight and cost of materials employed in making a long connection, but because all the steam contained in this connection is condensed or otherwise lost at each stroke of the engine; and hence various devices have been resorted to by engineers to surmount this difficulty: the steam chest has been variously arranged and

located, but still all these devices have presented a large area between the chest and the cylinder, for the steam chest being cast separate from the cylinder sufficient room must be left to form the connection by bolted flanches, which necessarily occupy much room.

To remedy these evils is the object of my invention, the nature of which consists in casting the steam chests in one piece with the steam cylinder, or one with the cylinder and the other with the condenser and the cylinder bottom, by making the side of the cylinder the side of the steam chest, and so of the condenser; and also in so forming and adapting the appendages of these parts as to enable them to come together and to unite the cylinder head with the cylinder and the cylinder bottom with the cylinder within the narrow compass left between the steam chest and cylinder when they are brought in such close proximity; the flanch on the cylinder and cylinder bottom being dispensed with toward the steam chest and instead thereof a joint made between the chest and the cylinder by packing, or driving, and screws inserted from the inside of the steam chest and screwing into the solid metal of the cylinder; for the lower steam chest, and for the upper end, recesses being made in the side of the steam chest to admit the requisite screw bolts for securing the cylinder head.

In the accompanying drawings (C') represents the cylinder, the upper end of which is cast in one piece with the steam chest (B'), by bringing the two so close together as to divide them by one single partition, which partition consists of that portion of the cylinder which divides it from the steam chest, the two communicating by means of the steam opening (K'). This union and close proximity of the cylinder and steam chest renders it necessary to adopt some new mode of attaching the cylinder head (A') to the cylinder, for the flanches in each cannot extend around that portion of their circumference toward the steam chest, which extends up above the cylinder head. To effect this end, that portion of the side of the steam chest which extends above the termination of the cylinder is curved, as indicated by the lines (H', H², H³, H⁴), to form three recesses (I', L', M') leaving an equal thickness of metal around the circular apertures covered by the bonnets (G', G²),

and in each of these three recesses there is a bolt (N' , N^2 , N^3), the middle one with a head and introduced in its hole in the bridge (J') from the steam opening (K'), and the other two screwed into the solid metal of the partition between the cylinder and steam chest. The cylinder head is formed with three projections (O' , O^2 , O^3) to fit in these recesses, and with holes P' , P^2 , P^3 to fit over the screw bolts (N' , N^2 , N^3) which then receive the nuts (Q' , Q^2 , Q^3), to secure the two together, instead of the continuation of the usual flanches, which are used in the other portions of the circumference.

The width of the steam opening K' is formed by the curved lines of the cylinder and the inside of the steam chest running into each other at (F' , F^2) and its height is represented by (F^3 , F^4). That portion of the outside of the steam chest below the steam opening (K') and extending in depth from (U') to (U^2), (Fig. 4) and in width from (U^3) to (U^4), (Fig. 6) is made of a circular form and is a portion of the interior surface of the cylinder.

If it be desired to have the condenser at some considerable distance from the cylinder, then the lower steam chest can be cast with the cylinder in like manner as the upper one above described, and then the cylinder bottom can be secured in the same manner. But when the condenser is placed in the same line with the cylinder and near to it, then I cast the cylinder bottom (E') the condenser F' and the steam chest (B^2) all in one piece, an air chamber (X^2) being formed between the cylinder bottom E' and the condenser top X to act as a non-conductor of caloric, and thus prevent the reduced temperature of the condenser from being communicated to the cylinder bottom.

The flanch on the lower end of the cylinder from W' to W^2 is discontinued in part, and instead thereof three projections (V' , V^2 , V^3) are made, the surfaces of which correspond with that portion of the steam chest between ($a b$) and ($c d$) extending up from the cylinder bottom, and which is curved in at (X'), between the two apertures covered by the bonnets (G^3 , G^4) to receive the middle projections V^2 , into which is tapped the screw bolt (Y'), introduced through the bridge (Z') of the steam open-

ing (Z^2); and the other two projections receive the two screw bolts (Y^2 , Y^3), that are introduced from within the steam chest and tapped into these projections; and the object of these projections is to give sufficient metal for these screws, and their surface is made to fit the surface of the steam chest to form a steam tight joint of metal, cement, &c., which must be parallel with the axis of the cylinder instead of at right angles thereto, as along the flanch (W'), the continuation of the flanches being there inadmissible.

The steam passage (Z^2) from the cylinder to the steam chest is formed by reason of the side of the steam chest, the channel partition (m) and the condenser terminating where they meet at (n) and (o), making an opening in depth from (p) to (q).

The manner of forming the communication between the steam chest and the condenser is clearly indicated at Fig. 1 which is a horizontal section through the opening, taken at the line $E F$ of Figs. 3, 4, and 5; (W) is the bottom of the steam chest and ($s r$) one of its sides formed by the continuation of the condenser; and the channel way is formed by this side ($s r$), the partition (t) in the middle which unites with the condenser at (u), and the bottom (W) and top (v).

I do not claim Letters Patent simply for casting the steam chests with the cylinder, or with the cylinder bottom and condenser, but

What I do claim as my invention and desire to secure by Letters Patent, is—

Casting the steam chests with the cylinder, or one with the cylinder and the other with the cylinder bottom and condenser, by making the side of the steam chest the side of the cylinder or condenser in combination with the manner of fitting the cylinder head and the lower end of the cylinder to the chests and the mode of making the attachments without the continuation of the flanches, thus dispensing with the nozzles and nozzle flanches and their attachments and saving at each stroke the steam contained in the nozzles, all as herein described.

FREDERICK ELSWORTH SICKELS.

Witnesses:

CHS. M. KELLER,
TRUMAN COOK.