

June 6, 1944.

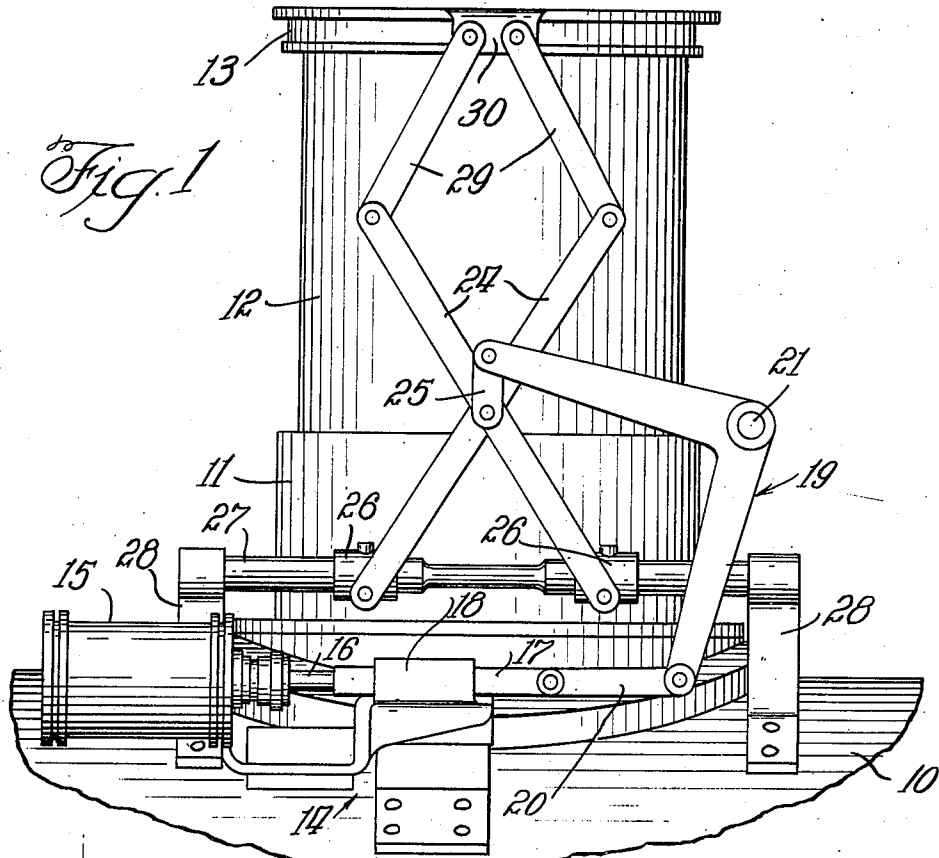
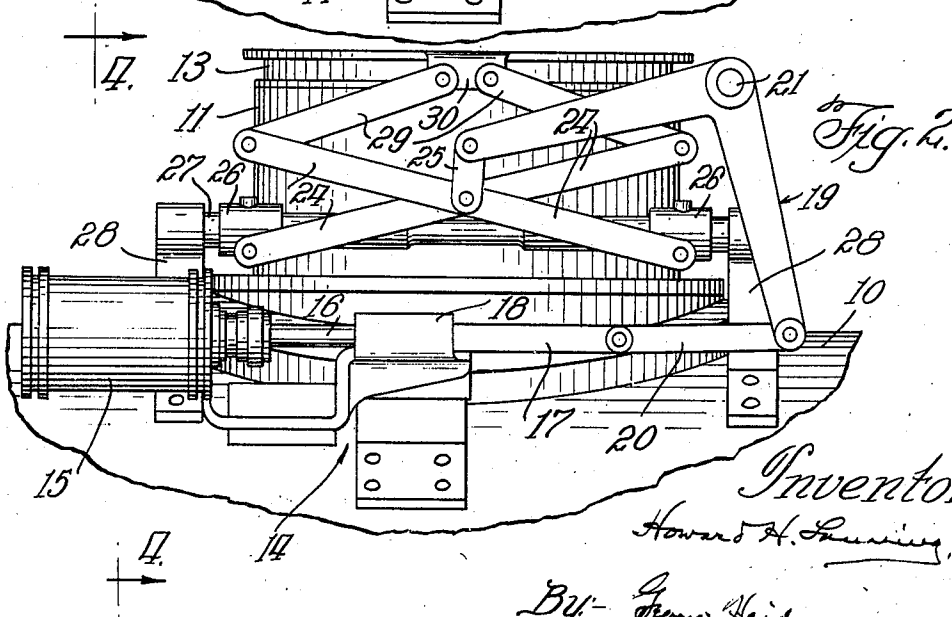
H. H. LANNING

2,350,512

SMOKE STACK

Filed Oct. 12, 1942

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

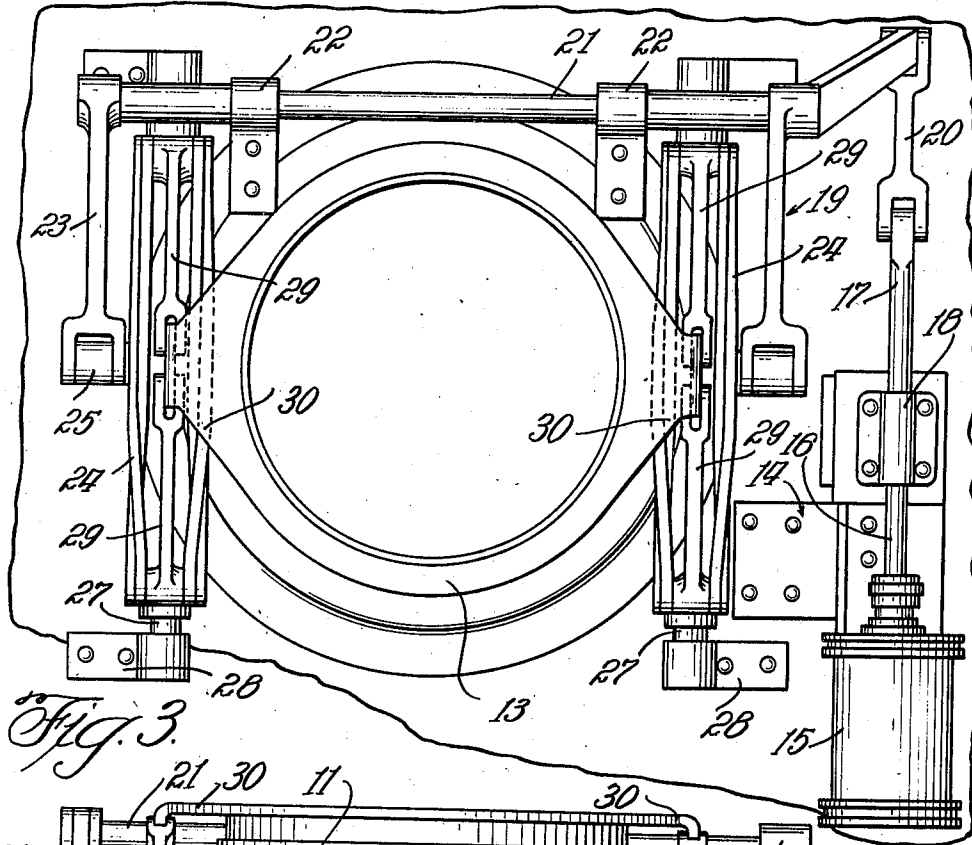


Fig. 3.

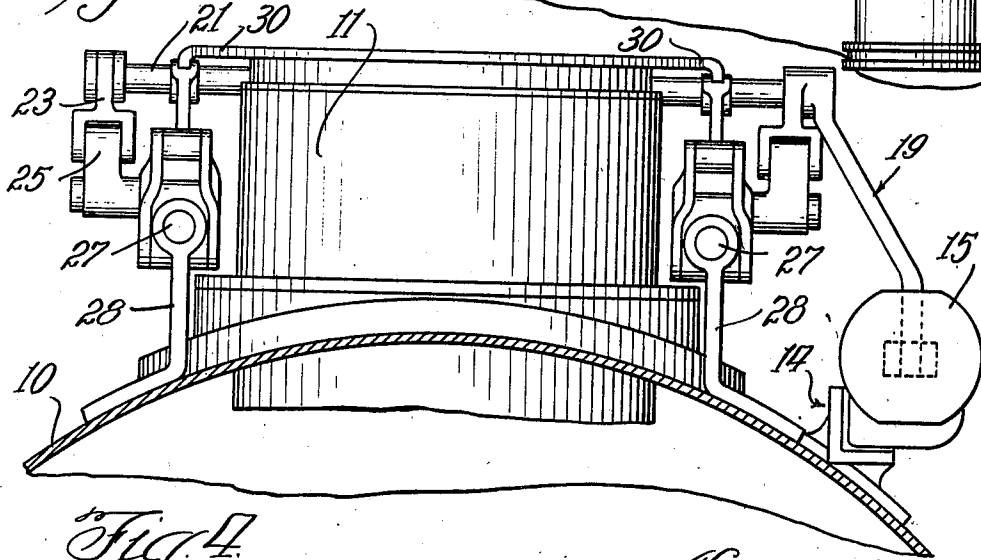


Fig. 4.

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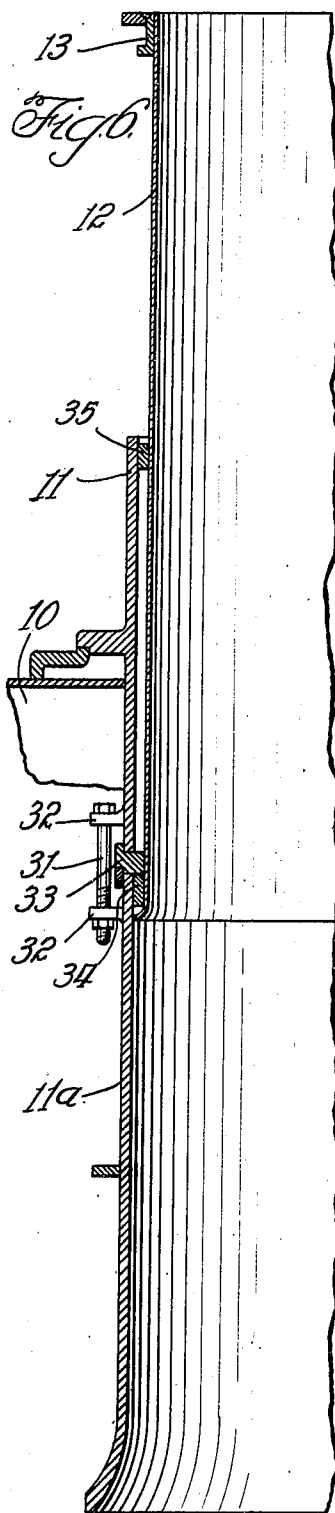
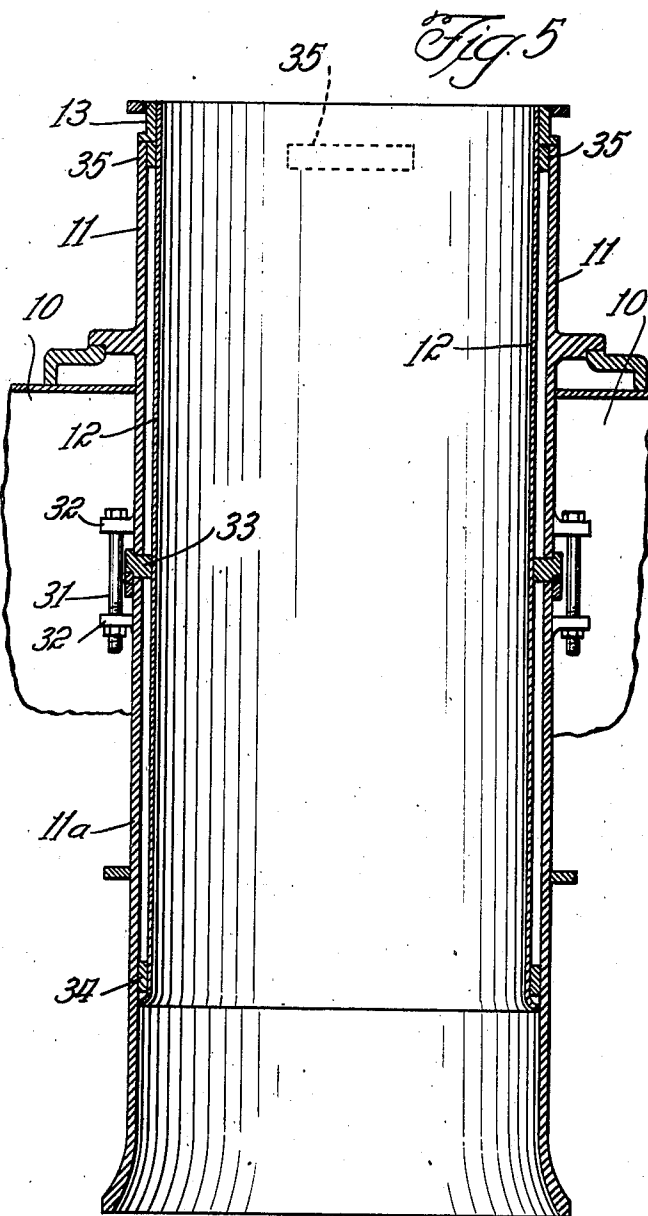
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SMOKE STACK

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,350,512

SMOKESTACK

Howard H. Lanning, Topeka, Kans.

Application October 12, 1942, Serial No. 461,827

7 Claims. (Cl. 110—184)

My invention relates more particularly to a telescopic sectional smoke stack especially intended for the large locomotives of present day construction which afford but little overhead clearance when entering the train sheds or enclosures of the various stations along the right-of-way; the invention contemplating means whereby one section of the stack is permitted to telescope into the rigid or base section of the stack when the locomotive approaches or enters a train shed or a restricted overhead area and on the other hand, said section may be readily extended after the locomotive leaves the station.

The invention has for its object the provision of a stack section whose extended condition or collapsed relation readily may be effected by suitable power actuated mechanism and the power supply controlled by the locomotive crew from the cab of the locomotive.

The objects and advantages of my invention will be readily comprehended from the detailed description of the accompanying drawings, wherein:

Figure 1 is a side elevation of a portion of a locomotive shell with attached smoke stack and extension operating means, with the extension in extended or raised position.

Figure 2 is a similar view illustrating the stack extension in retracted or lowered position.

Figure 3 is a top plan view.

Figure 4 is a side elevation, viewed in the direction of the arrows 4—4 Figure 2.

Figure 5 is a vertical sectional view of the locomotive smoke stack and my improved movable extension which is shown in retracted position.

Figure 6 is a longitudinal sectional view of one-half of the smoke stack and extension in raised position.

In the particular exemplification merely a portion of a locomotive shell at the smoke box end is shown at 10, provided with the usual rigidly held smoke stack 11, which, in present day large locomotives, must be kept within certain vertical dimensions or overhead clearance.

When the locomotive is in operation on the right-of-way and particularly during high speed operation, it is desirable to elevate the smoke and gas outlet of the stack above the plane of the outlet orifice of the rigid or main section 11 of the smoke stack and hence the stack 11 is provided with a movable section 12 arranged to telescope into the main section 11; the section 12 being of predetermined vertical dimensions. The upper end of the movable section 12 prefer-

ably is provided with a flange portion 13 which is adapted to rest on the upper end of the non-movable stack 11 when the extension 12 is in retracted position and prevents the movable extension 12 dropping down into the smoke box of the locomotive.

The locomotive smoke box shell 10 is provided with a suitable bracket 14 which supports an air cylinder 15 provided with a movable piston reciprocated through the admission of compressed air or other pressure medium (with which locomotives are usually supplied) controllable from the cab of the locomotive; the air or pressure medium supply line not being shown. The piston rod 16 has an extension or bar 17 secured to its outer end; the bar being slidable in a suitable bracket 18. The outer end of bar 17 is pivotally connected with the free end of one arm of a bell-crank lever 19 through the medium of a connecting link 20. The bell-crank lever 19, intermediate its ends, is secured to a shaft 21, disposed transversely of the stack, see Figure 3, the shaft being rotatably mounted in the brackets 22 secured to the rigid smoke stack 11. The other end of shaft 21 is provided with an arm 23, see Figure 3, whose function corresponds to that of the upper end or arm of bell-crank lever 19. The upper arm of bell-crank lever 19 is operatively connected with the intermediate pivotal point of the toggle levers 24 by means of a connecting link 25. The outer or free end of arm 23 also is provided with a connecting link 25 which in turn is secured to the central pivot point of toggle levers 24 arranged on the opposite side of the stack and similar to the levers more clearly shown in Figures 1 and 2.

The lower ends of the toggle levers 24, on opposite sides of the stack, are pivotally connected to the sleeves or shoes 26 which are slidably mounted on the shafts or guide bars 27 on opposite sides of the stack, and whose ends are supported by suitable brackets 28 which in turn are secured to the smoke box or locomotive shell 10.

The upper ends of both sets of toggle levers 24 are pivotally connected to the lift levers or links 29, 29 whose upper ends in turn are pivotally connected to the bracket portions or ears 30, 30 which are a part of the flange section 13 which surrounds or extends about the movable stack section 12, as shown in Figure 3.

With the movable stack section in the retracted or lowered position shown in Figure 2, admission of air, or other fluid medium, under pressure into the stuffing box at the right hand end of the cylinder 15 (through operation of a suitable

valve located in the cab of the locomotive) causes piston 16, its extension or bar 17 and connecting link 20 to move the lower end or arm of the bell-crank lever 19 toward the left in Figure 2. This rocking movement of bell-crank lever 19 (and also of arm 23 secured to the pivot shaft 21) exerts an upward pull on the central pivot points of toggle levers 24, thereby moving the toggle levers at both sides of the stack into the extended condition shown in Figure 1 and exerting an upward pressure on the lift levers 29 which in turn lift or raise the movable stack section 12 into the position shown in Figure 1. With toggle levers 24 arranged on opposite sides of the stack, oscillation of bell-crank lever 19 causes simultaneous oscillation of link 25 on the opposite side of the stack and hence a balanced condition is obtained and easy operation produced.

When the toggle levers 24 are extended as heretofore described, the shoes 26 are caused to travel toward the center of the shafts or guide bars 27; such movement continuing until the piston strikes the back head of the cylinder 15; the mechanism being maintained in the position shown in Figure 1 as long as the piston remains adjacent the back head of the cylinder 15, by the pressure in the cylinder.

The stack extension or section 12 may be raised to the height desired by selection of the degree of movement of the piston in the cylinder 15.

My improved construction permits a relatively high or great movement of the stack extension or section 12 with a very small piston travel and, therefore, short power cylinder. The limited space available at the smoke stack or modern locomotive boilers prohibits the use of a power cylinder of sufficient length to raise the stack extension or movable section high enough to be of benefit. To retract or lower the extension 12, pressure medium is admitted to the opposite or left hand end of cylinder 15.

The flanged portion or ring 13 at the upper end of the movable section 12 is adapted to seat on the upper perimeter of the non-movable stack 11 as shown in Figures 2 and 5 when the extension is lowered and thus provides a suitable gas seal which prevents a downward suction or passage of the gases into the annular chamber or space between the extension 12 and the non-movable stack section 11, while at the same time affording suitable support for the movable section 12.

In Figures 5 and 6 the internal construction of the smoke stack is shown consisting of the upper immovable section 11, secured to the locomotive smoke box shell 10, and the lower or inside section 11^a, the two sections being secured together by bolts 31 which extend through the lugs 32 formed on the adjacent ends of the two sections 11, 11^a; the abutting ends of the sections being provided with suitable sealing rings. One of these sealing rings, namely ring 33, is provided with an internal annular flange which extends into the annular chamber or space between the stack and movable section 12 for the purpose of effecting a gas sealing relation with the band or ring 34—which is secured externally to the lower end of the movable section 12—when the latter is extended or raised. As is apparent the flanged rings 13 and 33 provide seals for the passage between the extensible section 12 and the immovable stack section 11 when the section 12 either is in lowered or in raised position (see Figures 5 and 6) and prevents the gases being drawn down through the annular passage; the

flanged ring 33 and the ring 34 also tending to position and guide the section 12; the section 12 being also guided by the segmental pieces 35 secured on the inside of the smoke stack 11 at the upper end thereof.

In order to permit application of the flanged ring 33 to the smoke stack 11, the ring is made in two sections and the two sections suitably secured together.

The exemplification, with a horizontally disposed cylinder and piston, is believed to be a simple embodiment of the invention although the power operated piston may be differently disposed and certain structural modifications may be possible without, however, departing from the spirit of my invention as defined in the appended claims.

What I claim is:

1. A smoke stack comprising a vertically movable section adapted to telescope into an immovable lower section; toggle levers arranged at the side of the lower section with the upper ends operatively connected with the movable section; horizontally arranged guide means on which the lower ends of the toggle levers are slidably mounted; rocker means secured adjacent the stack and operatively connected with said toggle levers so as to induce extending and retracting movements of the toggle levers; and controllable power operated means connected with said rocker means.

2. A smoke stack comprising the combination of a locomotive fixedly secured smoke stack, a movable section arranged in telescopic relation with said stack; toggle levers arranged at the side of the stack with the upper ends operatively connected with the movable section, while the lower ends are slidably mounted to move toward and away from each other; rocker means arranged adjacent the stack and operatively connected with said toggle levers so as to induce expanding and retracting movements of the toggle levers; and a pressure medium receiving cylinder arranged on the locomotive and provided with a piston whose rod is operatively connected with said rocker means, whereby the position of the movable section may be controlled.

3. A smoke stack comprising an immovable section, a movable section arranged to telescope into the immovable section; a pair of toggle levers arranged at opposite sides of the stack with the upper ends of the levers operatively connected with the upper end of the movable section, while the lower ends of the levers are slidably mounted adjacent the stack to move toward or away from said other; a rocker shaft mounted adjacent the stack and provided with arms operatively connected with the intermediate pivot points of said levers whereby said pivot points are made to move vertically; and a power operated piston operatively connected with said rocker shaft.

4. A smoke stack comprising an immovable section; a vertically movable section arranged in telescopic relation with said first section; means arranged on the movable section whereby the degree of downward movement of the movable section into the first section is determined; toggle levers arranged at the sides of the stack with their lower ends mounted to slide in a horizontal path; lift levers pivotally connected to the upper ends of said toggle levers and to the movable section; a power cylinder provided with a horizontally reciprocable piston; and a bell-crank lever operatively connected with the piston

and with the intermediate pivotal point of said toggle levers whereby said movable section is raised or lowered during reciprocation of the piston.

5. A smoke stack comprising an immovable stack section; a vertically movable section arranged in telescopic relation with said first section; a power cylinder provided with a reciprocable piston; and differential mechanism operatively connected with the piston and with the movable section whereby reciprocatory movement of the piston effects vertical movement of the movable section and the section is maintained in extended or retracted position.

6. A locomotive smoke stack comprising an immovable section; a telescopically arranged movable section; a power medium receiving cylinder arranged adjacent the smoke stack and provided with a horizontally reciprocable piston; vertically extensible toggle levers arranged on opposite sides of the stack; horizontally slidable shoes arranged at opposite sides of the stack and connected with the lower ends of the toggle levers whereby said ends are made to move in a horizontal path; a rocker shaft disposed transversely

of the stack and provided with arms operatively connected with the intermediate pivot points of said toggle levers; means intermediate the piston and said rocker shaft whereby the latter is actuated; and lift levers pivotally secured to the upper ends of said toggle levers and to the movable section.

7. A smoke stack for locomotives and the like comprising an immovable stack section; a movable section arranged in telescopic relation with the immovable section; a power cylinder mounted adjacent said stack and provided with a horizontally reciprocating piston; guide bars disposed transversely on opposite sides of the stack and arranged substantially parallel with said piston; toggle levers arranged on opposite sides of the stack with their lower ends slidably connected with said guide bars; lift levers pivotally connected to the upper ends of the toggle levers and to the movable section; and rocker mechanism operatively connected with the end of the piston and with the intermediate pivotal points of the toggle levers.

HOWARD H. LANNING.