Nov. 24, 1931. W. M. SHEEHAN 1,833,094

LOCOMOTIVE FRAME

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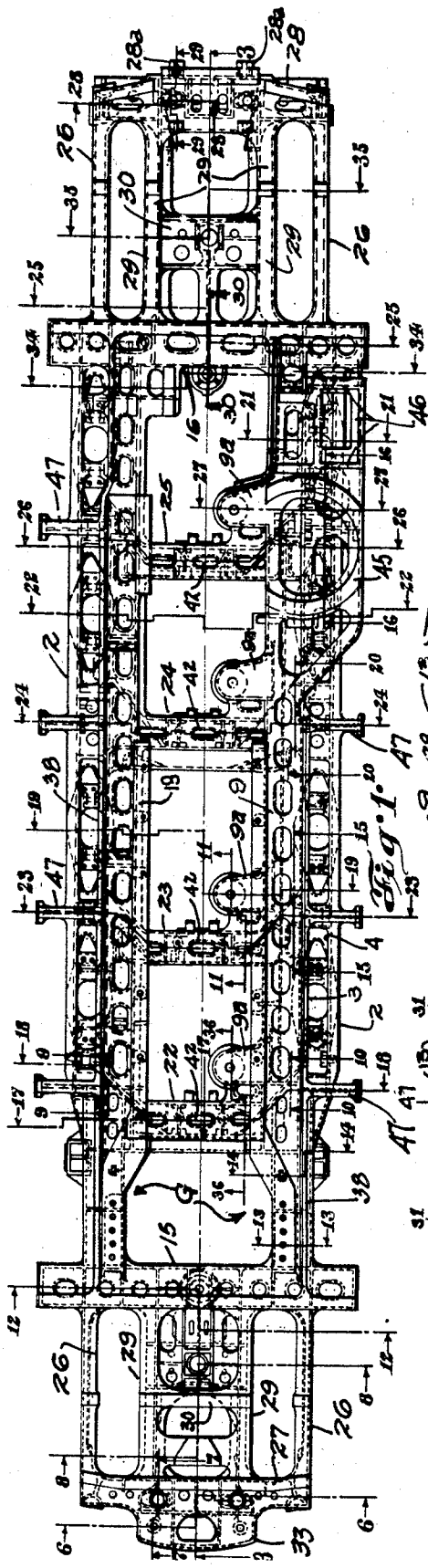


Fig. 1.

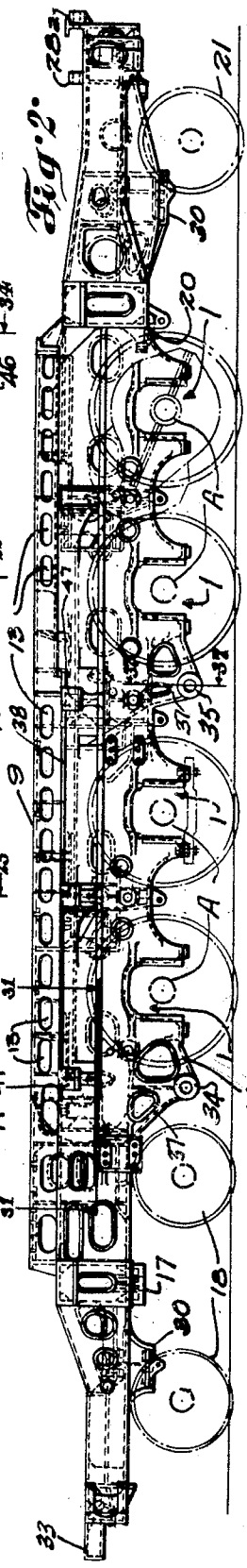


Fig. 2.

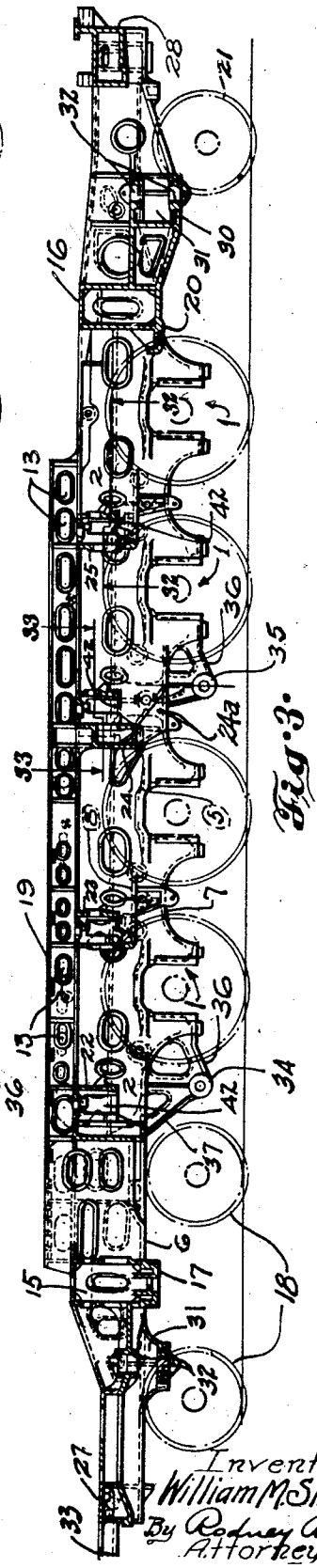


Fig. 3.

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LOCOMOTIVE FRAME

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Fig. 4.

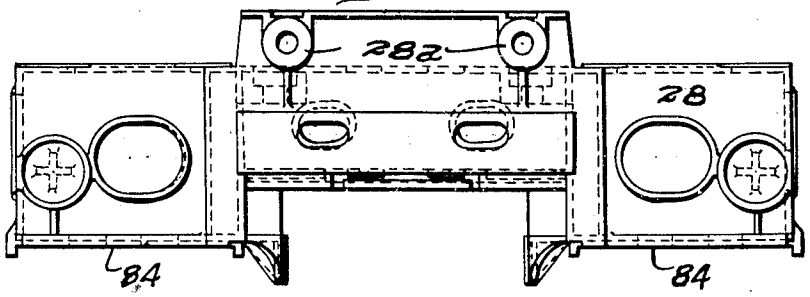


Fig. 5.



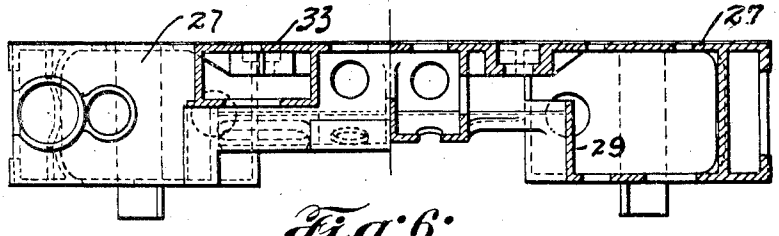


Fig. 6.

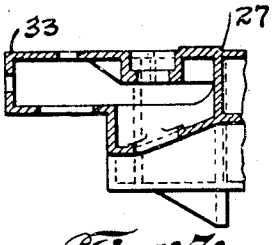


Fig. 7.

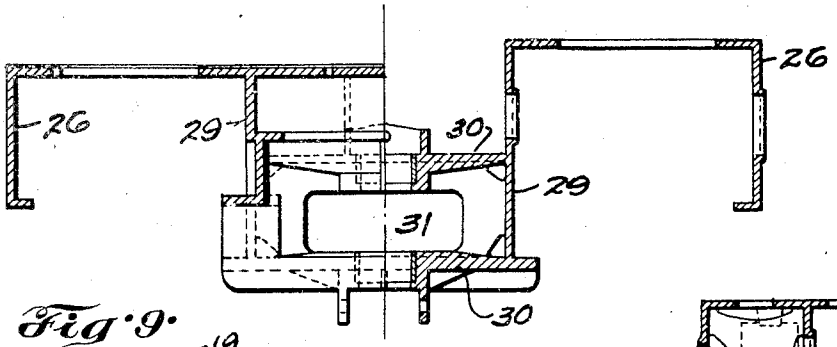


Fig. 8.

Fig. 9.

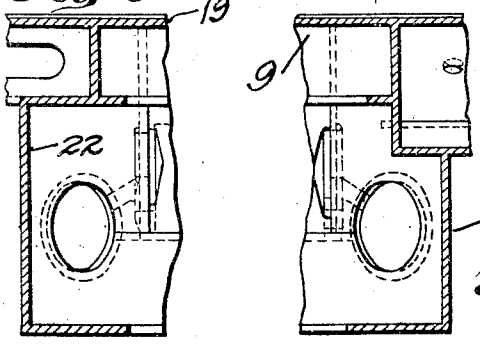


Fig. 10.

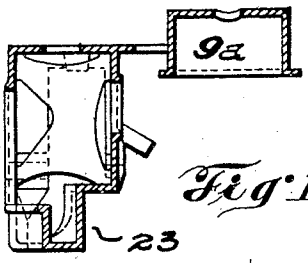


Fig. 11.

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LOCOMOTIVE FRAME

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Fig. 12.

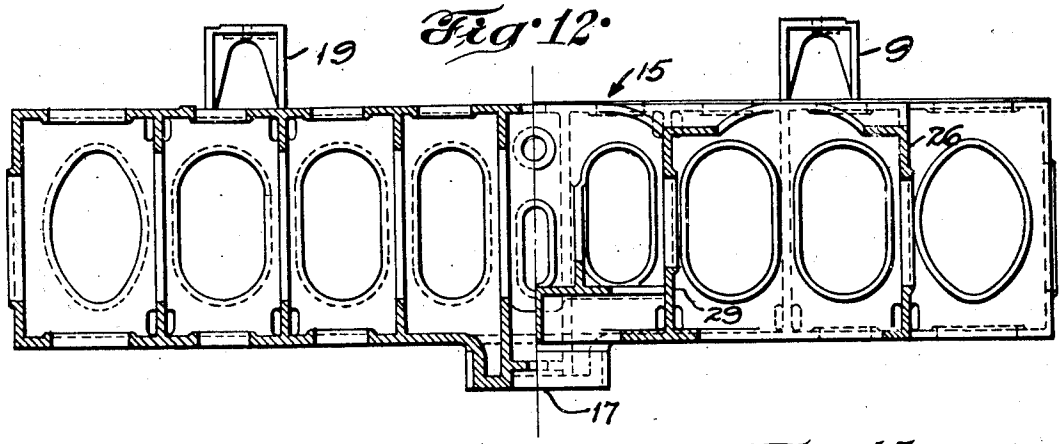


Fig. 13.

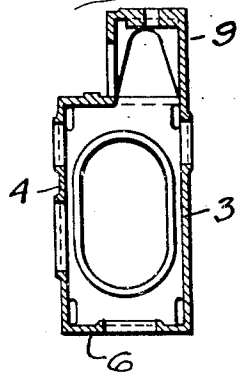


Fig. 14.

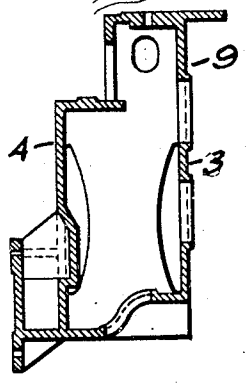


Fig. 15.

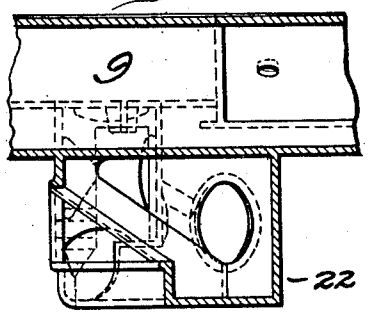


Fig. 16.

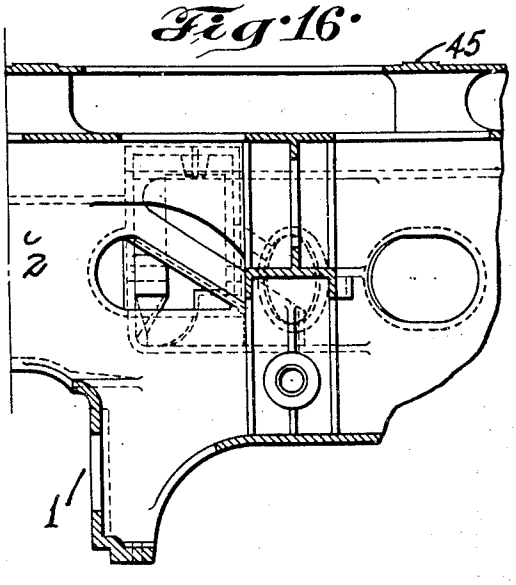
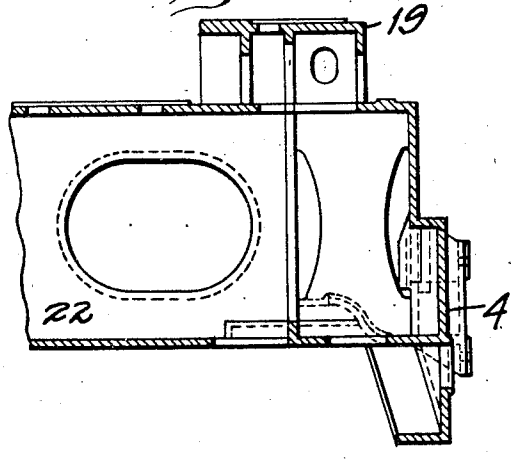


Fig. 17.



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Fig. 18.

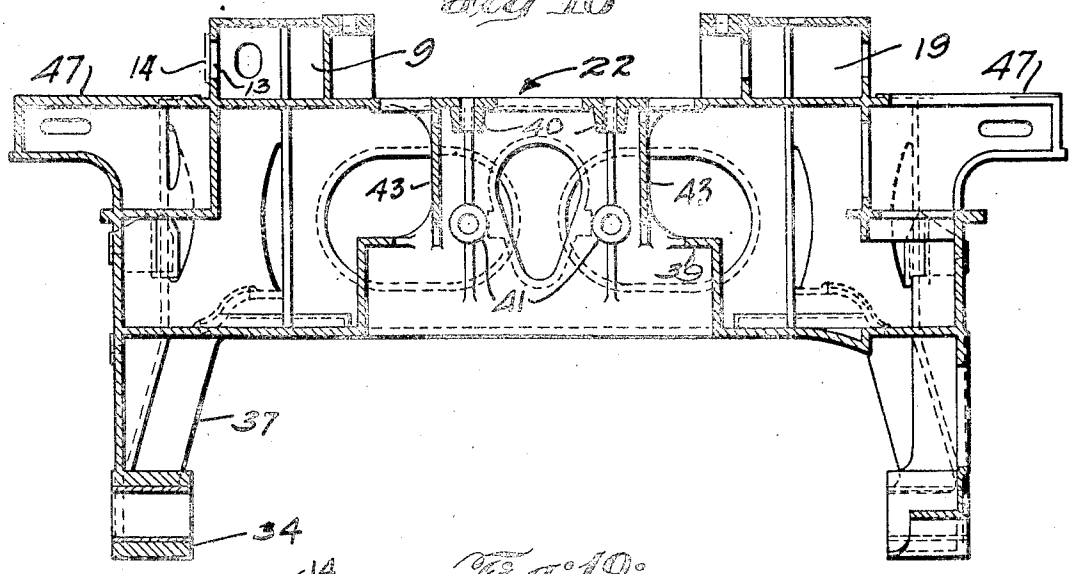


Fig. 19.

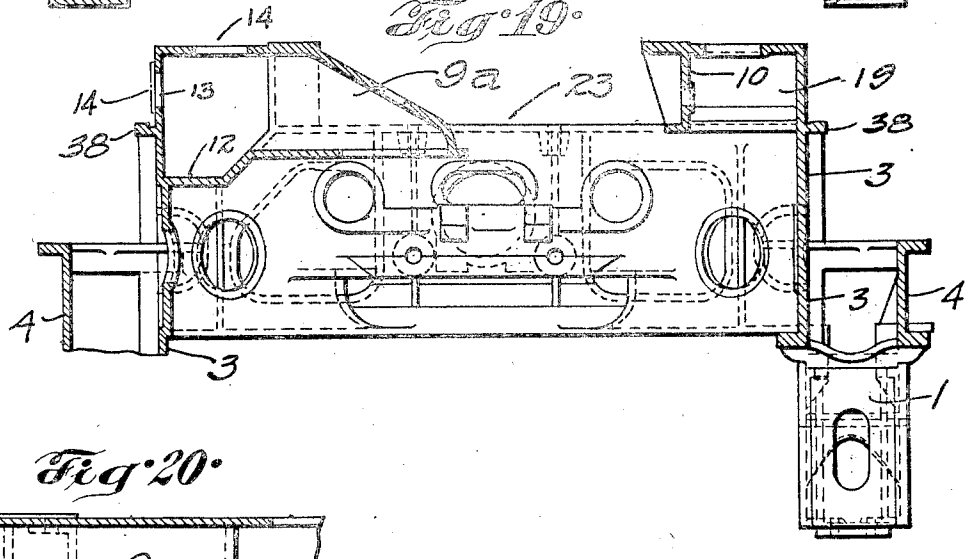
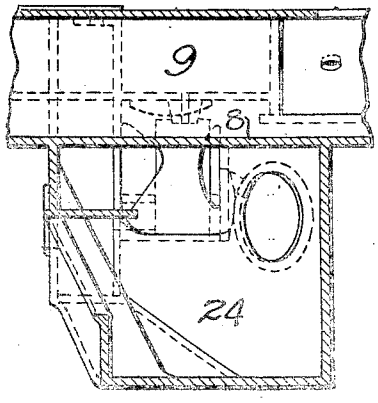


Fig. 20.



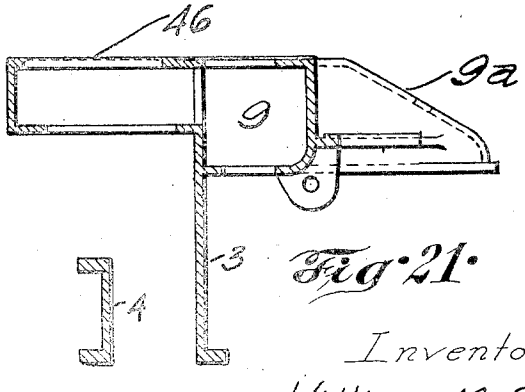


Fig. 21.

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Fig. 22.

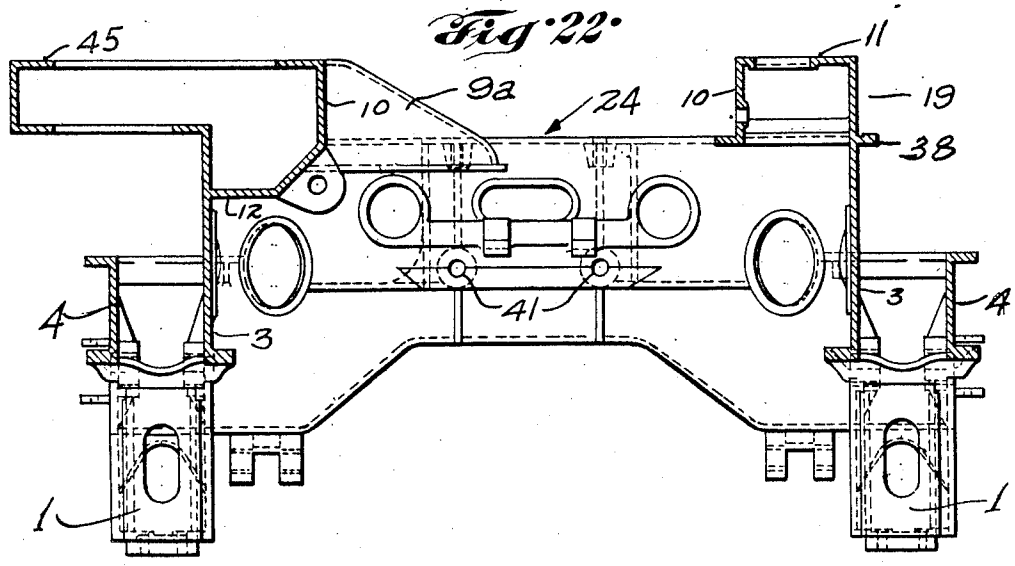


Fig. 23.

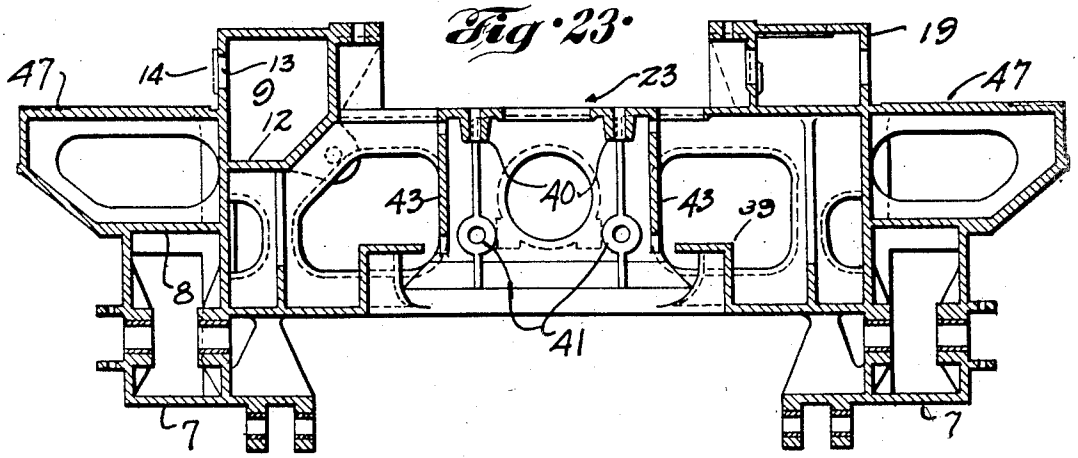
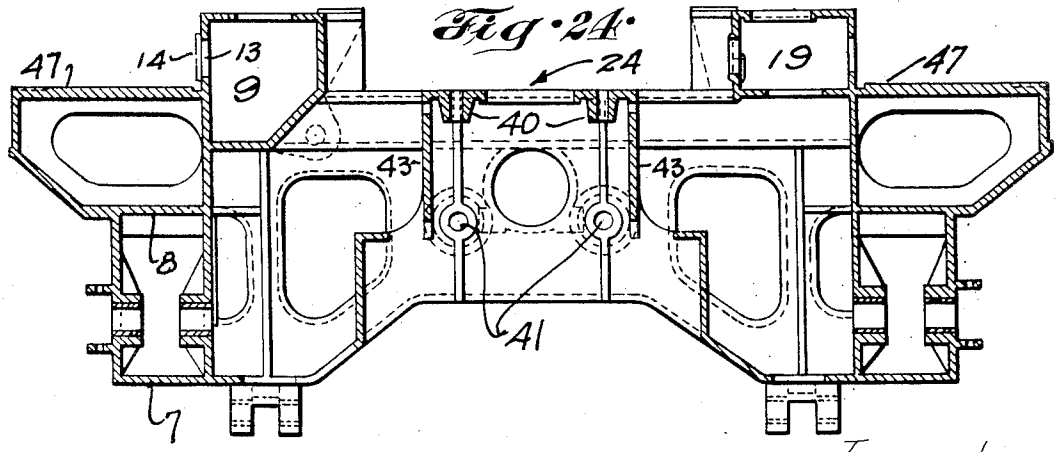


Fig. 24.



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Fig. 25.

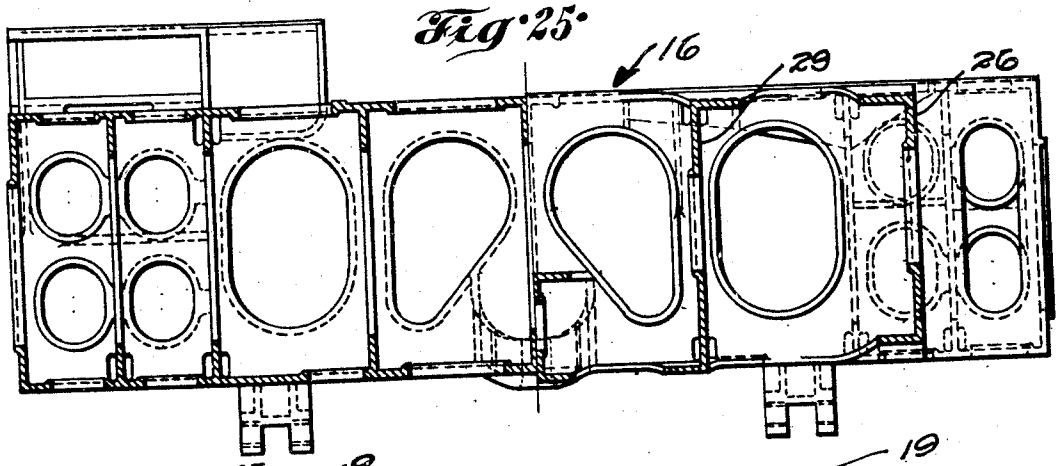


Fig. 26.

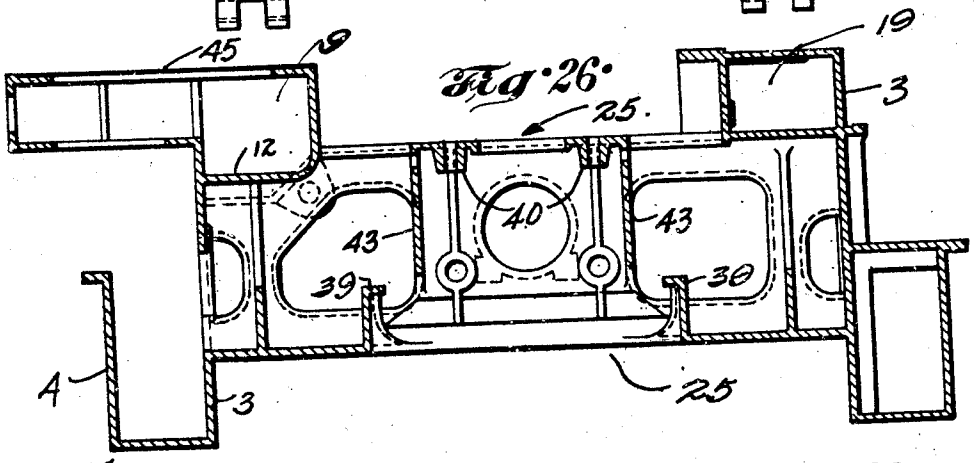


Fig. 27.

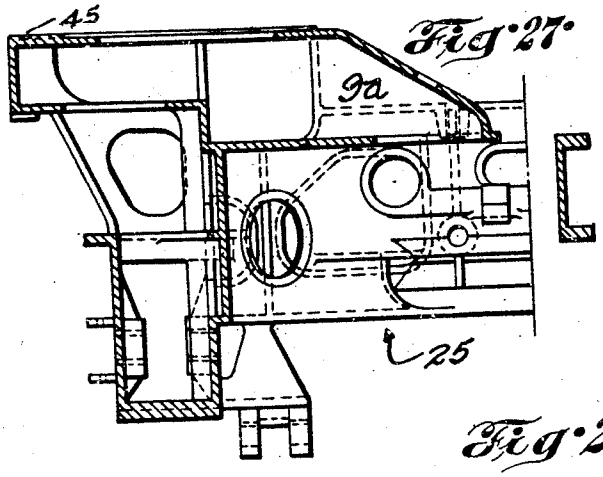


Fig. 28.

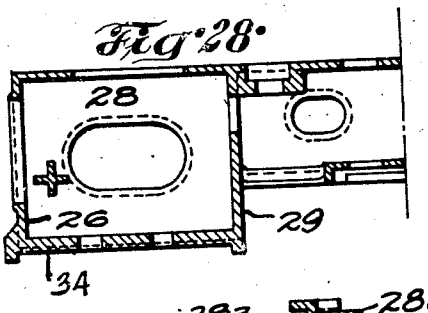


Fig. 29.

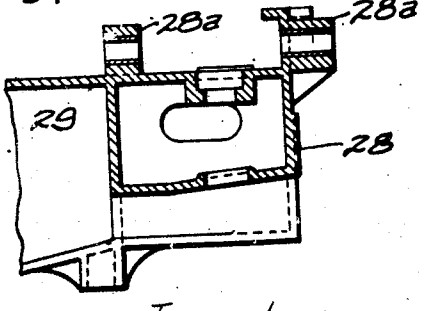
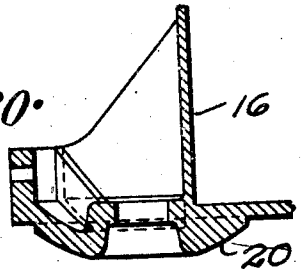


Fig. 30.



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Fig. 31.

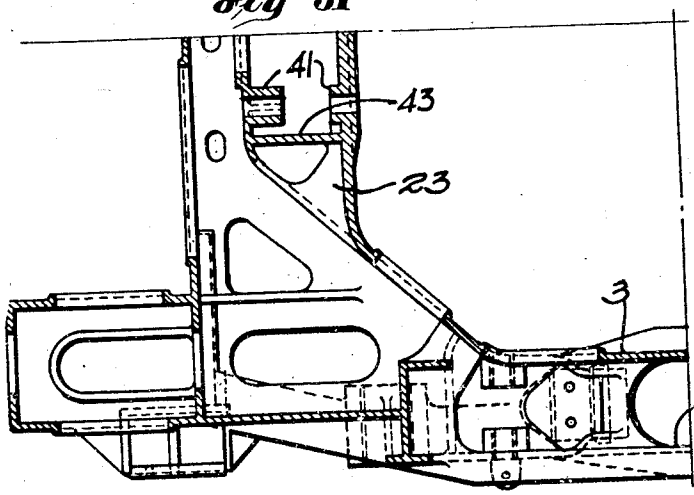
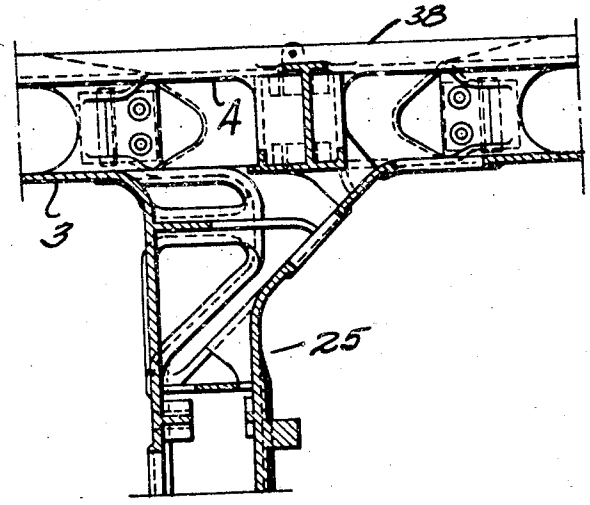


Fig. 32.



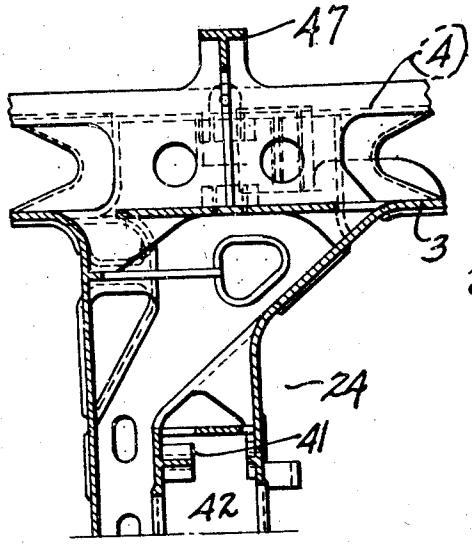


Fig. 33.

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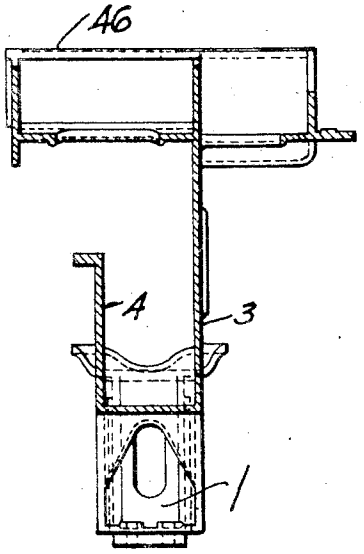
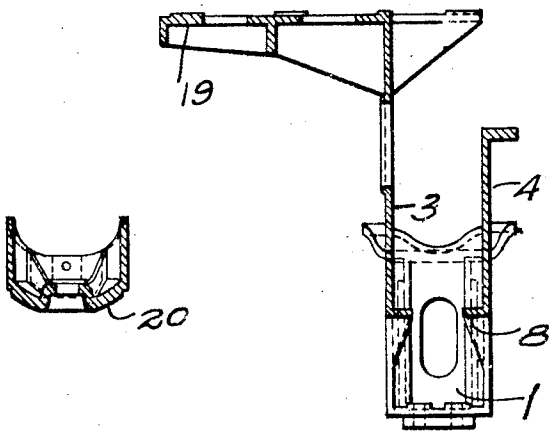


Fig. 34.



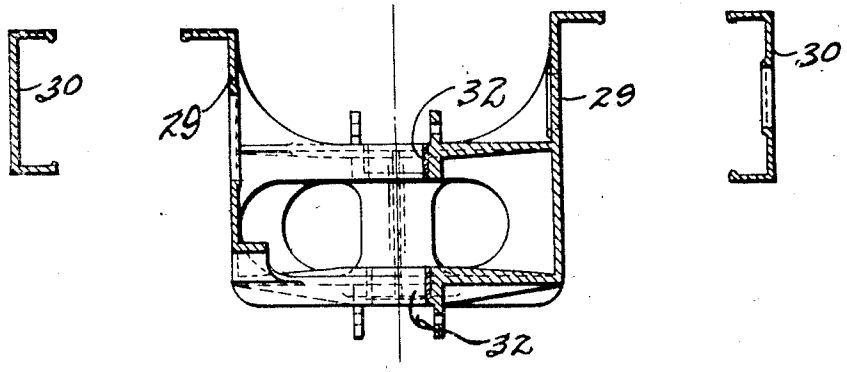
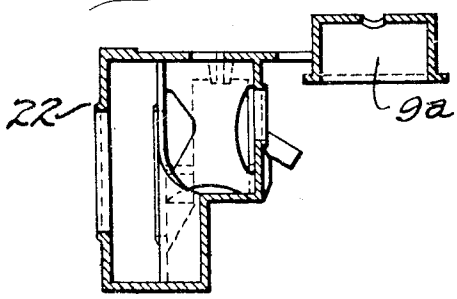


Fig. 35.

Fig. 36.



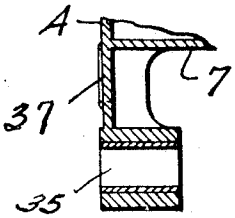


Fig. 37.

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Patented Nov. 24, 1931 1,833,094

UNITED STATES PATENT OFFICE

WILLIAM M. SHEEHAN, OF ST. LOUIS, MISSOURI, ASSIGNOR TO GENERAL STEEL CASTINGS CORPORATION, OF GRANITE CITY, ILLINOIS, A CORPORATION OF DELAWARE

LOCOMOTIVE FRAME

Application filed July 31, 1929. Serial No. 382,383.

My invention relates to railroad rolling stock and consists in a locomotive frame particularly adapted for an electric locomotive including motors connected to the driver axles of the locomotive, and more particularly to that type of an electric locomotive in which there are a plurality of driver axles journaled in a frame of the rigid wheel base type.

As is well understood in the art, the length of a rigid wheel base frame is limited due to track curvatures and the resulting disalinement of the successive wheels on one side of the frame when the vehicle is on the curved track. It is also well known in the art that the construction of a large electric locomotive including internal combustion engine, steam engine, or other engine structure, creates serious problems in connection with the transverse bracing of the sides of the frame because of the presence of the motors and their interference with transverse braces of the usual type which ordinarily extend down below the level of the tops of the pedestal openings in the frame. Such ordinary transom braces cannot be used without extending their wheel base to a length which would interfere with the proper negotiation of curves.

One of the main objects of my invention is to construct a locomotive frame having a rigid wheel base of minimum length mounted on a plurality of motor driven axles and to substantially brace laterally the pedestal forming side members of the frame and to embody in the lateral braces adequate supports for the ends of the motor housings not mounted on the axles.

Another object of my invention is to associate in such a rigid wheel base driving assembly a foundation for a power plant of sufficient depth to provide a degree of rigidity which will prevent distortion of the mechanical elements comprising the power plant.

It is an additional object of my invention to provide a frame having the characteristics mentioned with a minimum amount of material and labor. Preferably, I desire to form the frame of parts integrally associated with each other, thereby eliminating the disadvantages of riveted or bolted structures; this feature however is not essential to the broader aspects of my invention.

An additional object of my invention is to provide a frame having a main portion of relatively deep and heavy sections to form an adequate and rigid support for the engine and generator together with relatively light extensions for carrying the cab structure where it extends beyond the engine and generator and for carrying other equipment.

Another object of my invention is to utilize the engine and generator carrying sills as conduits for air currents and for piping, respectively, and to provide the air conduit sill with extensions for delivering the air to the motor housings independently of other frame elements or additional parts.

A frame of the type referred to is mounted upon driver axle boxes located outside of the wheel gauge (in order to provide room for the motors located between the wheels) and the sills for supporting the engine, generator, etc., should not be spaced nearly so far apart as the pedestal-forming portions of the frame. It is a further object of my invention to combine these two frame elements with each other so that each forms in effect a vertical extension of the other thereby increasing the rigidity of the frame.

It is also my desire to include transoms extending transversely of the frame and bracing the engine supporting sills and the side members substantially throughout the depth of the side members but without interfering with the motors, driver axles and other running gear. Preferably, these transoms will also serve to support one end of each motor housing.

Another object of my invention is to include in a frame of the type described portions of buffing devices for transmitting buffing thrusts to the main portion of the frame.

These and other detailed objects which will be referred to in the body of my specification are attained by the construction illustrated in the accompanying drawings in which;

Figure 1 is a top view of my novel frame;

Figure 2 is a side elevation of the same, the

wheels and axles being indicated by broken lines;

Figure 3 is a vertical section taken on the longitudinal center line 3—3 of Figure 1;

Figures 4 and 5 are end views of the right and left hand ends respectively of Figure 1;

Figures 6, 8, 12, 13, 14, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27, 28, 34, and 35 are transverse vertical sections taken on the corresponding section lines of Figure 1;

Figures 7, 9, 10, 11, 15, 16, 20, 29, 30 and 36 are longitudinal vertical sections taken on the corresponding section lines of Figure 1;

Figure 31 is a horizontal section taken on line 31—31 of Figure 2;

Figures 32 and 33 are horizontal sections taken on lines 32—32 and 33—33 of Figure 3;

Figure 37 is a vertical transverse section taken on line 37—37 of Figure 2.

The frame is mounted on the driver axles A by means of the usual journal boxes (not shown) which are received in the pedestal portions 1 of the side members 2 of the frame. These side members comprise an inner wall 3 and an outer wall 4 the same being connected at intervals by horizontal elements 5, 6, 7, and 8 (Figs. 13, 14, 19, 22, 23, and 24) forming either a U-shaped or a box shaped cross section substantially throughout the length of the side member.

The inner walls of the side members extend upwardly above the top of the outer walls 4 and form the outer walls of longitudinal sills 9 and 19 each having an inner wall 10 and having a top wall 11 provided with a pad to be machined for mounting the locomotive engine and generator (not shown). This sill also has a bottom wall 12 whereby a box shaped cross section is provided from end to end of the sill and on one side of the frame the sill 9 will be utilized as an air conduit for leading a stream of air from a suitable blower (not shown) to the axle driving motors (not shown). To facilitate molding and casting, the sill 9 is shown provided with a plurality of openings 13 and these openings will be closed by applying suitable plates such as 14 (see Figures 18, 23 and 24).

The opposite sill 19 may be utilized as a container for piping or similar equipment and it will not be necessary to close the openings therein if the sill is used for this purpose.

The sills 9 and 19 are located a substantial distance above the level of the side members 2 and are nearer to the center line of the frame throughout most of their length but near the front end (left hand end of Figure 1) these sills diverge as indicated at G to provide a wider space between them to clear the generator housing which is substantially wider than the internal combustion engine which will be mounted on the rear portion of the sills.

The opposite ends of the sills are provided with suitable pads 45 and 46 on which a water heater and an air blower may be mounted respectively. Openings between pads 46 permit the passage of air through the conduit in sill 9. The large opening surrounded by pad 45 will be closed by the bottom of the water heater mounted on the pad.

Main transverse transoms 15 and 16 extend across the frame connecting sills 9 and 19 with each other and transom 16 also connects with the ends of side members 2. The opposite end portions of side members 2 extend diagonally inward from the forward pedestals and merge with the outer walls of sills 9 and 19 at points adjacent to but spaced from transom 15.

Each transom 15 and 16 is of box shaped cross section from end to end and is deeper than the side members 2 and projects laterally from the frame beyond sills 9 and 19 and the side members 2. These projecting portions of the transoms provide suitable elements whereby the frame may be bodily lifted by means of crane slings or jacks. The transoms form braces for the side members and engine sills substantially throughout the depth of the side members and they are so shaped that they are adapted to absorb lateral and longitudinal forces applied to the frame.

Transom 15 mounts a center plate 17 adapted to engage a corresponding center plate on an engine truck the wheels of which are indicated at 18. Transom 16 mounts a similar element 20 (Fig. 20) comprising the radius bar fulcrums of the two wheel trailer truck the wheels of which are indicated at 21. Preferably these elements 17 and 20 are integral with the transoms.

Located between the main transoms 15 and 16 are intermediate transoms 22, 23, 24 and 25, each having spaced walls extending transversely of the frame and merging with sills 9 and 19 and side members 2. The forward wall of each transom is deeper than the rear wall and the ends of the deeper portions of the forward walls extend diagonally of the frame below the rear walls of the transoms and merge with the side members at points substantially below the top thereof.

This construction locates the intermediate portion of each transom at a point spaced from the adjacent axle to accommodate the motor housing mounted on that axle and also locates the end portions of the transom intermediate the driver wheels so that there is no interference with the flanges of the latter. The transoms comprise cross sections of U shape or box shape of substantial width and depth and they brace the side members at points adjacent to the level of the pedestal openings. On transoms 22 and 24 the diagonal end portions include box sections and in transom 24 the portions merging with the side members are wider than the intermediate

part of the transom, as best shown at 24ª (Fig. 3). Transom 24 has its intermediate portion recessed upwardly to provide better clearance conditions (Figs. 22 and 24).

Each transom 22, 23, 24 and 25 is adapted to mount between its front and rear walls a spring unit of the ordinary type for supporting a motor housing nose. The pads 40 will engage the upper bar of the unit and the apertured bosses 41 serve to receive removable pins for supporting the lower bar of the unit. Each transom has an opening 42 through which a hanger carried by the spring unit may extend downwardly to engage the motor noses.

Webs 43 extending transversely of the transom walls serve as stops to limit lateral movement of the spring units, and lugs 39 form safety brackets to prevent dropping of the motor in the event of failure of the support.

Extending inwardly from sill 9 at points spaced from the intermediate transoms are a series of branches 9ª adapted to lead air from the main conduit to the individual motors. Each branch is braced from the adjacent transom by an element 26 but the branch does not form a part of the transom. Each branch terminates in a downwardly facing outlet adapted to connect to a corresponding opening in the motor housing.

The walls 3, common to side members 2 and sills 9 and 19, extend beyond transoms 15 and 16 for a substantial distance as indicated at 26 and are connected at their ends by end sills 27 and 28. Draft sills 29 also connect the transoms with the end sills and carry cross members 30 each comprising upper and lower portions forming pockets 31 for the draw bars and having seats 32 for the draw bar pins.

The end sill 27 is provided with a radial buffer beam 33 adapted to receive buffing forces and transmit them through the draft sills to the main portion of the frame. End sill 28 forms housing or bearing elements 28ª for the usual stems (not shown) carrying a buffing plate. This end sill has lower faces 84 adapted to mount bearing plates for the ordinary rocker bearings (not shown).

Brake fulcrums 34 and 35 are provided at points spaced from the adjacent pedestals and are mounted on suitable bracket arms 36, extending from the pedestal legs longitudinally of the frame and on arms 37 extending downwardly from the side members 2 and merging with the adjacent transom.

Flanges 38 and brackets 47 projecting outwardly from the side members 2, and the main transoms 15 and 16 and the sills 9 and 19 and their longitudinal extensions 26, 29 and the end sills all co-operate to form a deck for mounting a cab (not shown) which encloses the power plant and operating compartments at the ends of the power plant.

The above described construction meets the essential requirement of a frame or engine bed in which deflection is reduced to such an extent that the desired alinement of engine parts and associated mechanisms is preserved. The sills supporting the engine merge with the side members mounted on the driver axles and each forms, in effect, an extension or reinforcement of the other, giving an unusually deep side girder for the frame between the main transoms.

The rigidity of the frame as described above is maintained or increased by the deep transom structures 22, 23, 24 and 25, each of which is united with the side members at its ends and includes parts extending diagonally of the side members in order to clear the motors and drivers, at the same time maintaining a desired sectional area throughout the connection to the side member.

This transom structure makes it possible to provide a shorter rigid wheel base frame for a given number of drivers than would be possible with an equally rigid frame having adequate transoms of ordinary construction which, as pointed out above, would require greater distances between the pedestals in order to clear the motors and driver wheels.

Many of the members have their cross sections changed substantially in shape and area and the hollow sections which I have used freely may be of different proportions or rounded instead of rectangular and other details of the construction may differ from that shown without varying the principles embodied in the frame. I have illustrated a one piece casting including all of the elements of the frame but many of the elements may be eliminated without affecting the general design and others may be secured to the frame body by rivets or bolts. I consider the welding of separately formed parts into an integral whole as completely within the spirit of my invention and contemplate the exclusive use of all modifications of the described structure coming within the scope of my claims.

I claim:

1. In a locomotive frame, a longitudinal member embodying pedestal jaws, and a sill offset vertically from said member but merging therewith and adapted to support a prime mover.

2. In a locomotive frame, spaced longitudinal members embodying pedestal jaws, spaced sills offset vertically from said members but merging therewith and adapted to support an engine, and a plurality of transverse braces engaging said members throughout a substantial portion of the depth of the latter and also engaging said sills.

3. In a locomotive frame, pedestal forming side members located outside of the wheel

gauge, spaced transoms approximating in depth the depth of said side members, and elements on said transoms for pivoting truck frames.

4. In a locomotive frame, pedestal forming side members of box shape cross section and located outside of the wheel gauge, spaced transoms of box shape cross section connecting said side members and approximating in depth the depth of said side members, and elements on said transoms for pivoting truck frames thereto.

5. In a locomotive frame, side members, spaced transoms corresponding in depth to the depth of the frame side members, elements on said transoms for pivoting truck frames, and longitudinal elements between said transoms and located substantially above the level of said transoms and said side members for mounting engine structure.

6. In a locomotive frame, longitudinal members located outside of the wheel gauge and provided with pedestal jaws and terminating at points spaced from the ends of the frame, longitudinal members located inside of the wheel gauge and having continuations extending beyond the ends of said first mentioned members, transoms connecting all of said members with each other, and a buffer beam connecting the ends of the continuations of said second mentioned members.

7. In a locomotive frame, spaced transoms, side members located between said transoms, pedestal jaws depending from said side members, and engine supporting sills extending between said transoms and located intermediate said side members and substantially above the level thereof.

8. In a locomotive frame, spaced transoms, side members located between said transoms, pedestal jaws depending from said side members, and engine supporting sills extending between said transoms and located within the vertical planes of said side members and forming substantially vertical continuations thereof.

9. In a locomotive frame, spaced transoms each comprising a box shape cross section, side members located between said transoms, pedestal legs depending from said side members, and engine supporting sills extending between said transoms and substantially above the level thereof.

10. In a locomotive frame, end sills, a longitudinal member extending from end sill to end sill, transverse transoms spaced from said end sills, a side member paralleling and spaced from said longitudinal member and merging at one end with one of said transoms, and driver axle pedestals on said member.

11. In a locomotive frame, end sills, a longitudinal member extending from end sill to end sill, transverse transoms spaced from said end sills, a side member paralleling and spaced from said longitudinal member and merging at one end with one of said transoms, and driver axle pedestals on said member, all of said parts being united in an integral structure.

12. In a locomotive frame, end sills, a longitudinal member extending from end sill to end sill, transverse transoms spaced from said end sills, a side member paralleling and spaced outwardly from said longitudinal member and merging at one end with one of said transoms and merging at its other end with said longitudinal member at a point adjacent to but spaced from the other of said transoms.

13. In a locomotive frame, end sills, a longitudinal member extending from end sill to end sill, transverse transoms spaced from said end sills, a side member paralleling and spaced outwardly from said longitudinal member and merging at one end with one of said transoms and merging at its other end with said longitudinal member at a point on the latter adjacent to but spaced from the other of said transoms, all of said parts comprising an integral structure.

14. In a locomotive frame, a longitudinal member of box shape cross section forming an air conduit, and pedestal jaws integral therewith.

15. In a locomotive frame, a side member, pedestal jaws integral therewith, extensions on said side members forming an air conduit extending above the level of said pedestal jaws and provided with openings for the exit of air currents to motors carried between opposite pedestals.

16. In an electric locomotive frame, side members located outside of the wheel gauge, pedestal jaws integral therewith, and a longitudinal member, having a hollow cross section forming an air conduit, also integral with said side member, and air outlet branches extending inwardly of the wheel gauge.

17. In an electric locomotive frame, a longitudinal side member located outside of the wheel gauge, a box shaped sill integral with said side member and in part offset from the same vertically, and a passageway for air formed in said sill with extensions leading transversely of the frame to motors mounted on the wheel axles.

18. In a locomotive frame, a longitudinal member adapted to be mounted on the locomotive axles, a longitudinal sill member nearer to the center line of the locomotive and located at a higher level and forming an engine support, each of said members having spaced side walls with the inner wall of the first mentioned member merging with the outer wall of the second mentioned member.

19. In a locomotive frame, spaced side members adapted to be mounted on the loco-

motive axles, spaced engine supporting sills located between said side members and above the level of the same, and a transverse member extending from side member to side member and beneath the engine supporting sills and joining the lower portions of the latter.

20. In an integral structure for a locomotive frame, spaced side members adapted to be mounted on the locomotive axles, spaced engine supporting sills of box shape cross section located between said side members and above the level of the same, and a transverse member of box shape cross section extending between said side members, the upper portions of said transverse member merging with the lower portions of said sills and the end portions of said transverse member merging with the inner walls of said side members.

21. In a locomotive frame, side members including axle box pedestals, longitudinal sills carried by said members and forming an engine support, one of said sills being of hollow cross section and forming an air conduit on one side of the frame and the other of said sills being of hollow cross section and forming a pipe receiving compartment on the other side of the frame.

22. In a locomotive frame, side members including pedestal structure for receiving axle boxes, spaced elements extending lengthwise of the frame beyond said members and forming an engine support throughout a portion of their length, longitudinal sills intermediate said elements and also extending lengthwise of the frame beyond said pedestals, and a radial buffer block extending across and integral with all of said sills.

23. In a frame for an electric locomotive, side members including driver axle box pedestal structure, sills intermediate said side members and including elements extending longitudinally of the frame beyond the sills between said intermediate sill elements, pedestal forming portions of said side members, end sills across said elements, draft sills between said intermediate sill elements, and pockets on said draft sills for receiving and securing draw bars, all of the described structure being formed in an integral entity.

24. In a locomotive frame, side members, pedestals for driver axle boxes depending from said members, and a transverse member connecting said side members adjacent to opposed pedestals and having its lower portion recessed upwardly to accommodate motor structure mounted on the driver axle.

25. In a locomotive frame, side members, axle box pedestals thereon, longitudinal sills located nearer to the center line of the frame and above the level of said side members and forming an engine support, and a transverse member connecting said side members below the top of the pedestal openings and extending upwardly above the level of said side members to unite with said sills and having its lower portion recessed upwardly to clear motor structure mounted on the driver axle.

26. In a locomotive frame, a side member, pedestal jaws thereon, a transom extending transversely of said member, framing elements forming an air conduit extending along said side member, and a branch on said conduit extending inwardly from said side member and spaced from said transom.

27. In a locomotive frame, a side member, pedestal jaws thereon, a transom extending transversely of said member, framing elements forming an air conduit extending along said side member, a branch on said conduit extending inwardly from said side member and spaced from said transom, and a brace between said transom and branch at a point spaced from said side member, all of the parts forming an integral structure.

28. In a locomotive frame, a side member, pedestals thereon for receiving axle boxes, a hollow longitudinal sill providing an air conduit along the side of said member, and elements on said sill forming a mounting for an air blower.

29. In a locomotive frame, a side member, pedestals thereon for receiving axle boxes, a longitudinal sill extending alongside of said slide member but spaced inwardly thereof but including elements projecting outwardly of said side member and adapted to mount a water heater.

30. In a locomotive frame, side members including pedestal jaws, the cross section of each of said members being deeper at the portion between successive pedestals than at the center of the pedestals, a transverse member merging with each of said side members at said intermediate portion and including end sections as deep as said intermediate portions of said side members and merging therewith, the bottom of said transverse member extending inwardly and upwardly from said end sections to clear motor structure mounted on the axle journaled in the adjacent pedestals.

31. In a locomotive frame, side members, pedestal jaws depending therefrom, and a transverse transom of hollow section connecting said side members, one side of said transom extending substantially transversely of the frame at a point substantially abreast of opposite pedestal jaws and the other side of said transom extending in part from intermediate the ends of the transom diagonally of the frame to connect with said side members at points nearer to the adjacent pedestals.

32. In a locomotive frame, side members having depending pedestal jaws, a transom having spaced vertical walls extending transversely of the frame, one of said walls being deeper than the other with the ends of its

deeper portion extending diagonally under the other wall and merging with said side member.

33. In a locomotive frame, side members having depending pedestal jaws, a transom having spaced vertical walls extending transversely of the frame, one of said walls being deeper than the other with the ends of the deeper portion extending diagonally under the other wall and gradually increasing in width and merging with said side member.

34. In a locomotive frame, side members having depending pedestal jaws, a transom having spaced vertical walls extending transversely of the frame, one of said walls being deeper than the other with the ends of the deeper portion extending diagonally under the other wall towards said side members, and elements on said transom end portions forming therewith box shaped structures merging with said side members.

35. In a locomotive frame, spaced longitudinal sills forming an engine support throughout a portion of their length, and having more widely spaced ends for mounting a generator, side members outside of said sills for mounting the frame on axle boxes, and cab supporting members projecting outwardly from said sills above said side members.

36. The combination in a frame for an internal combustion-electric generator locomotive, pedestals adapted to receive a series of axle journal boxes, elements above said pedestals forming a cab deck and including two transoms one of which is provided with a pad to which a truck center plate may be secured and also including two sills, said sills being elevated between said transoms and forming supports for the internal combustion engine and for the electric generator.

37. The combination in a frame for an internal combustion engine-electric generator locomotive, pedestals adapted to receive a series of axle journal boxes, elements above said pedestals forming a cab deck and including two transoms and two sills, said sills being elevated between said transoms and forming supports for the internal combustion engine and the electric generator, and extensions at each end of the deck beyond said transoms for supporting the ends of the cab.

38. The combination of an integral cab deck and frame structure for an internal combustion engine-electric generator locomotive, including pedestals arranged to receive a series of axle journal boxes, spaced transoms, and two parallel sills extending from one transom to the other, said sills being comparatively close together and forming the support for the internal combustion engine and the generator, end extensions beyond the transoms for supporting the ends of the cab, and brackets projecting from the deck structure proper for supporting the cab.

In testimony whereof I hereunto affix my signature this 26th day of July, 1929.

WILLIAM M. SHEEHAN.