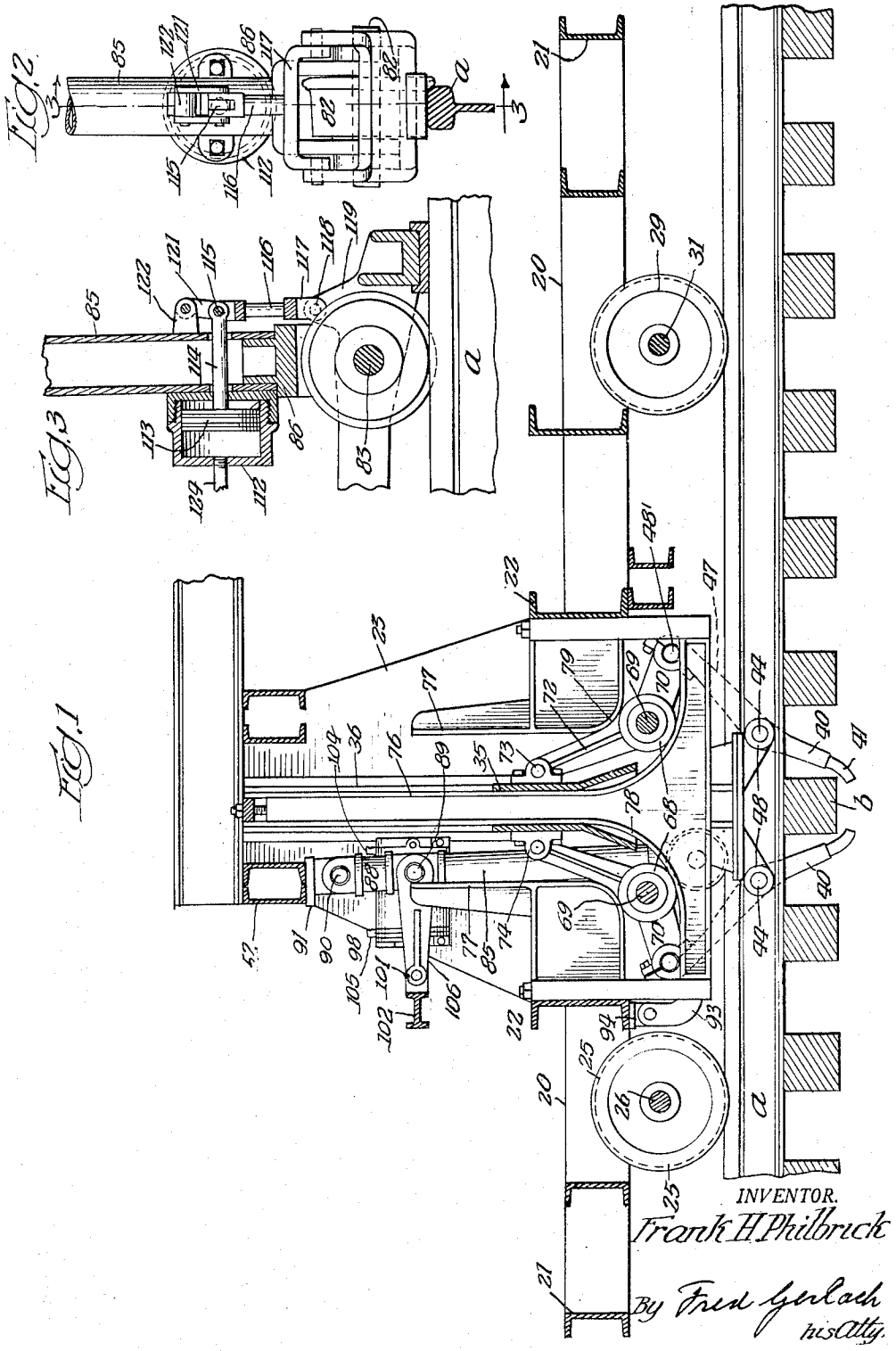
Dec. 14, 1954 F. H. PHILBRICK 2,696,792

MACHINE FOR TAMPING RAILWAY BALLAST

Filed March 24, 1950 4 Sheets-Sheet 1



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MACHINE FOR TAMPING RAILWAY BALLAST

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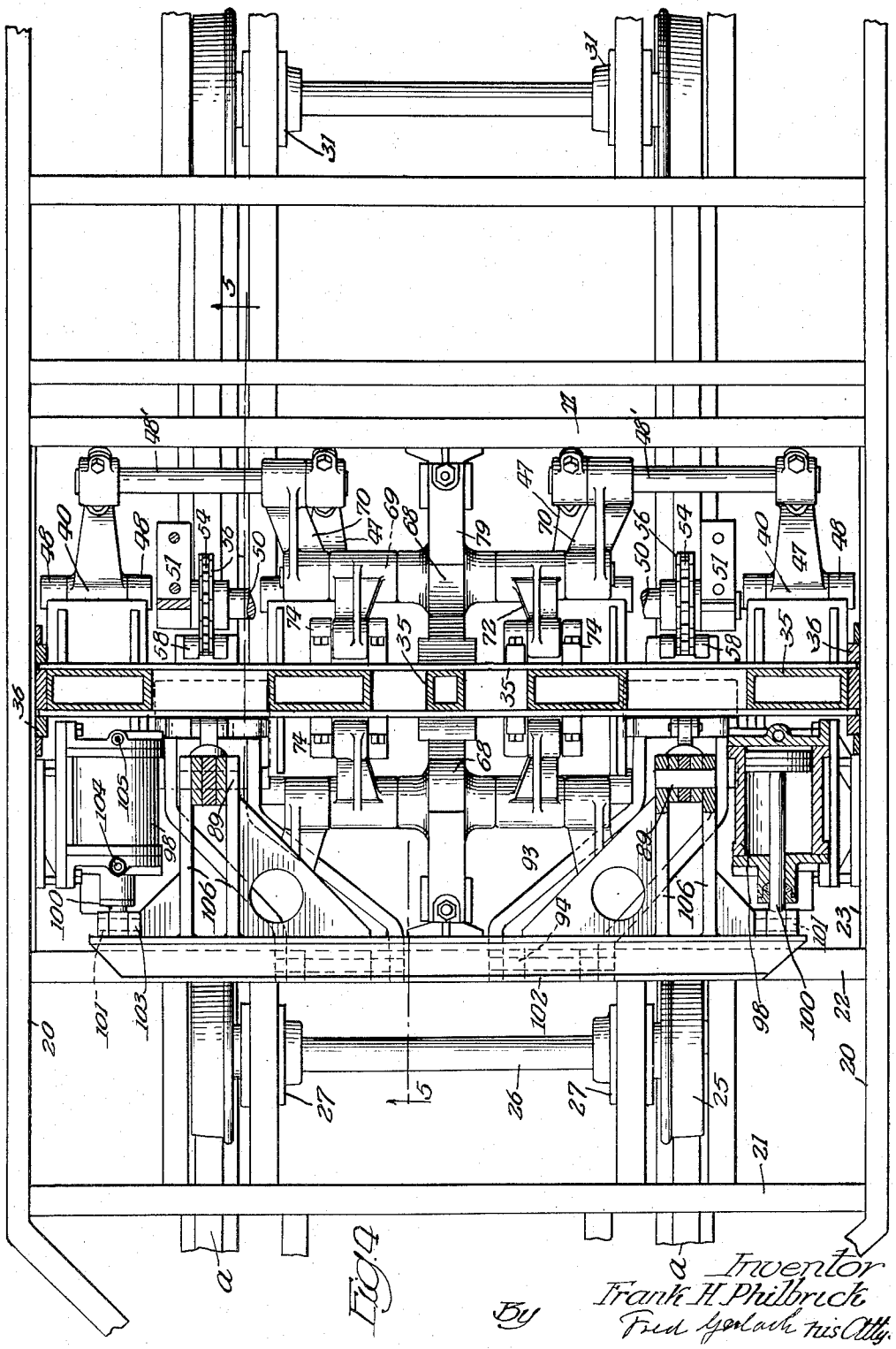


Fig 4

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MACHINE FOR TAMPING RAILWAY BALLAST

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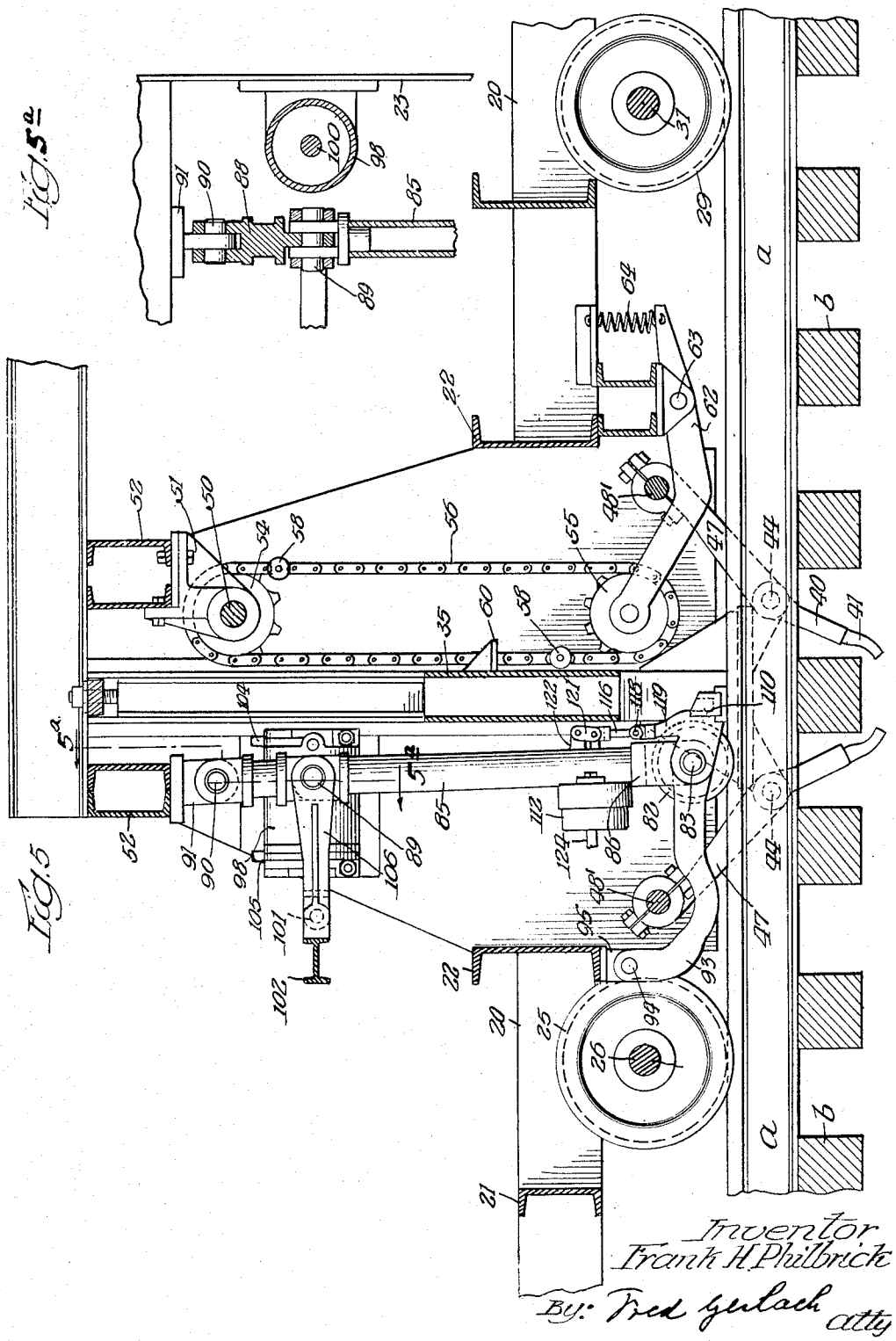


Fig. 5a

Fig. 5

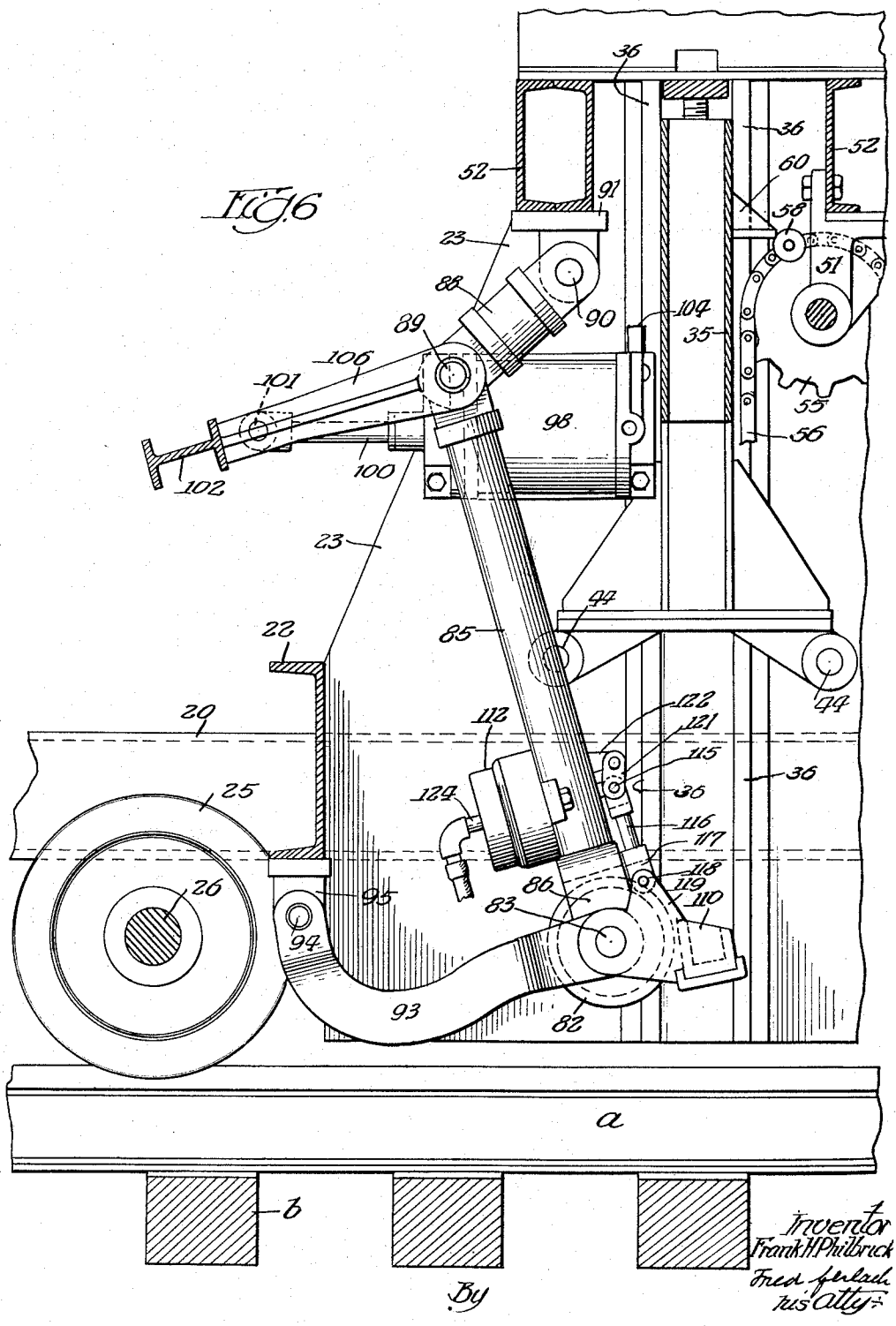
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MACHINE FOR TAMPING RAILWAY BALLAST

Filed March 24, 1950 4 Sheets-Sheet 4

FIG. 6



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MACHINE FOR TAMPING RAILWAY BALLAST

Frank H. Philbrick, Evanston, Ill.

Application March 24, 1950, Serial No. 151,660

16 Claims. (Cl. 104—12)

The invention relates to machines for tamping railway ballast.

Machines for tamping or moving ballast between and under the ties of a railway track are usually mounted on a truck or car provided with wheels adapted to travel along the track with one pair of wheels in advance of said mechanism and another pair of wheels positioned to travel behind said mechanism. During the tamping operation the front wheels of the truck are disposed above the rails and ties where the ballast has not been tamped. The tamping, particularly when performed by tampers on a drop-head, produces vibrations in the front end of the machine which is supported by the portion of the railroad track which is not firmly supported by ballast which has been tamped.

One object of the invention is to equip the machine with auxiliary means for supporting it intermediate the front and rear wheels to minimize said vibrations in the front end of the truck.

Another object of the invention is to provide auxiliary supporting struts for this purpose which are efficient in operation and may be readily controlled to render them operative during the tamping, and inoperative when the truck is being transported along the track.

Another object of the invention is to provide braking means adapted to engage the rails of the track for retaining the truck in its assigned position while the struts or auxiliary supporting devices are in use.

Another object of the invention is to provide auxiliary supporting devices for said purpose which are simple in construction and efficient in operation.

Other objects of the invention will appear from the detailed description.

The invention consists in the several novel features hereinafter described and more particularly defined by claims at the conclusion hereof.

In the drawings:

Fig. 1 is a vertical longitudinal section of a ballast tamping machine embodying the invention;

Fig. 2 is a rear view of the lower end of one of the struts and the brake thereon;

Fig. 3 is a section taken on line 3—3 of Fig. 2;

Fig. 4 is a plan view, parts being shown in section;

Fig. 5 is a section illustrating the strut in its operative position;

Figure 5ª is a section taken on line 5ª—5ª of Fig. 5;

Fig. 6 is a section similar to Fig. 5, illustrating one of the supporting struts in its raised or inoperative position, parts being omitted.

The invention is exemplified in a tamping machine which is mounted on a truck or car which comprises a suitable frame which includes longitudinal side beams **20**, end beams **21**, intermediate cross-beams **22** and side plates **23**, all rigidly secured together to form a supporting structure. The truck frame is supported on a pair of front wheels **25** on an axle **26** which is journalled in bearings **27** on the truck frame and a pair of rear wheels **29** on an axle **30** which is supported in bearings **31** secured to the said frame. The truck is adapted to travel on rails *a* of a railway track for movement along the track to successively position the tampers for operation between the ties. The truck is usually equipped with a power plant with an internal combustion engine and suitable gearing, which is usually disposed on the rear portion of the truck frame, for propelling the truck along the track and for operating the tamping devices, as well understood in the art.

The machine includes a series of tampers for packing ballast at opposite sides of a tie under the rails. These tampers are carried by a drop-head, generally designated **35**, to which lifting strokes are imparted for imparting hammer strokes to the tampers. Head **35** is mounted to slide vertically in guides **36** which are fixedly supported on the side-plates **23** of the truck frame. A gang of tampers is carried at each side of the drop-head **35**. Each tamper comprises a head **40** and a series of teeth **41** for engaging the ballast and packing it between and under the tie. Each head **40** is pivotally connecetd to the drop-head **35** by a shaft **44** which is supported in bearings **48** for pivotal movement of the tampers longitudinally of the railway track. The tampers in the gang at one side of the head **35** are disposed in opposed relation to those at the other side of said head for drop strokes at the opposite sides of a railway tie *b*. Each shaft **44** functions as a fulcrum for a tamper and connects the tamper to the head **35** for bodily strokes therewith and for pivotal movement on the axis of said shaft. The angular movements of the tampers of the gangs move the teeth on the opposed tampers toward and from each other for packing the ballast between and under the tie during successive drop strokes of head **35**. Each tamper head **40** is provided with an integral arm **47** for controlling the pivotal movement of the tampers relatively to the drop-head **35**. The arms **47** of each pair of tampers at one side of the longitudinal center of the track are connected by a shaft **48'** so that each shaft **48** is adapted to pivotally shift a pair of tampers, one of which operates on ballast inwardly of the rails and the other on ballast on the outer side of the rails.

The drop-head **35** is liftable by power derived from the motor on the truck frame through mechanism which lifts said drop-head and then releases it for a drop hammer stroke. This mechanism comprises a transverse shaft **50** which is selectively driven from the motor by any suitable gearing (not shown) and journalled in brackets **51** on cross-beams **52** of the truck frame; a pair of sprocket wheels **54** which are fixed to shaft **50**; a pair of idler sprockets **55**, and sprocket chains **56** between vertically aligned sprockets **54** and **55**. Intermittent lifting strokes are imparted to the drop-head **35** by rollers **58** which are carried by chains **56** and are adapted to intermittently engage abutment plates **60** on drop-head **35**. Each idler sprocket **55** is journalled on a lever **62** which is fulcrumed at **63** on the truck frame and is urged by a spring **64** to retain an idler sprocket for retaining a chain **56** taut. The transversely aligned rollers **58** during their upward travel will intermittently engage abutments **60** and lift drop-head **35** until said rollers pass off said abutment at the end of an upstroke and then release the head **35** for a hammer stroke to the tamping elements carried thereby.

The mechanism for shifting shafts **48** for controlling the pivotal movement of the tampers comprises a track structure and coacting devices of the type exemplified in Patent No. 2,482,123. Rollers **68** at the transverse center of drop-head **35** are mounted on shafts **69** at the opposite sides of said head **35** and links **70** operatively connect the ends of roller shafts **69** and the shafts **48'** of the gangs of tampers, respectively. Links **72** are pivotally connected to each roller shaft **69** and to pins **73** mounted in lugs **74** which are fixed to the sides of the drop-head **35**, respectively, for imparting vertical movement to shafts **69** and rollers **68**.

The track structure is stationarily supported on the track frame in any suitable manner and includes an inner rail **76** and an outer rail **77** for each roller **68** and lower cam or offset portions **78** and **79** for shifting links **70** to control the pivotal movement of the tampers. During each lifting and drop stroke of the drop-head **35** the tampers will move rectilinearly during the upper portions of their stroke and angularly during the lower portions of said strokes to swing the tampers to pack the ballast between and under a tie.

The impact of the tampers against the ballast resulting from the drop hammer strokes imparted to the drop-head **35** produces vibrations which are transmitted to the truck frame and operating parts. During the tamping operations the front wheels **25** of the truck are usually posi-

tioned over the track rails *a* where the ballast has not been tamped and the rails and ties are not firmly supported so that the front end of the truck will be responsive to said vibrations. To more firmly support the truck and minimize said vibrations, the invention provides struts as auxiliary supports intermediate the front and rear truck wheels for transferring the load on the front end of the truck to a point adjacent the portions of the rails and the ties which are adequately supported on the tamped ballast. These auxiliary supports comprise struts and rollers **82** on the lower ends of the struts, which are vertically movable to engage the track rails *a*, respectively, and are adapted to firmly support the truck frame during the tamping operation and are liftable to permit the truck wheels to travel along the track. These rollers are located where, when in their track engaging and lowered positions they will transfer the load from the front truck wheels **25** to the rails *a* adjacent the tamped portion of the track. Each roller **82** is mounted on a shaft **83** which is supported in the lower end of a strut. Each strut includes a lower tubular link member **85** provided with a fork **86** at its lower end which straddles a wheel **82** and carries its shaft **83**; an upper link member **88** which is pivotally connected by a pin **89** to the upper end of link member **85** and by a pin **90** to a lug **91** which is fixedly secured on beam **52** of the truck frame. Arms **93** are pivotally connected to the roller shafts **83** and to pivot pins **94** which are mounted in lugs **95** which are secured to the truck frame for controlling the movement of the roller longitudinally of the track. Each connected pair of upper and lower link members constitute a toggle linkage between a roller **82** and one side of the truck frame. The rollers **82** are adapted to be lowered into engagement with the track rails *a* by the movement of the connecting pin **89** between link-members **85** and **88**, into position to force the strut links **88** and **85** substantially into dead-center relation between the axes of roller shafts **83** and pins **90**, which are connected to the truck frame, and to lift said rollers off the rails *a* when pin **89** is reversely shifted into the position illustrated in Fig. 6.

Pneumatic devices are provided for shifting the linkages to render the struts operative and inoperative. A pair of cylinders **98** are fixedly mounted on the opposite sides of the truck frame and a piston **99** on a stem **100** is mounted in each of the said cylinders. The outer end of each piston stem **100** is pivotally connected at **101** and a cross-beam **102** connects the lugs **103** in which the pins **101** are connected. Arms **106** are fixedly secured to beam **102** and pivotally connected to the pivot pins **89** between the toggle links. Each cylinder **98** is provided with pipe connections **104** and **105** for delivering compressed air from a suitable supply, such as a reservoir on the truck, into either of its ends, for the two-way operation of its piston **99**. Assuming the strut linkage to be in its inoperative position shown in Fig. 6, rollers **82** will be lifted off the track rails, and pistons **99** will be disposed inwardly. When air is admitted to the outer ends of cylinders **98** pistons **99** will operate stems **100** to shift beam **102** and arms **106** to operate the pivot pins **89** into substantially dead-center position, as illustrated in Fig. 1. The members of the toggle linkage will then be aligned and will function as rigid struts between the truck frame and rollers **82** on the track rails. The load of the front end of the truck will then be transferred to the points on the track rails engaged by rollers **82** which are in close proximity to the portions of the rails which overlie the tamped portion of the track so that the machine will be supported with minimized vibration resulting from the tamping operations because struts will support the front portion of the truck and the rear wheels will be supported on tamped portion of the track, so that the vibrations in the track rails beneath the front truck wheels will be reduced.

During the drop strokes of head **35**, the tampers act percussively on the ballast and rollers **68** are impacted against the curved portions of the track-structure for controlling the pivotal movements of the tampers. These impacts are severe particularly while the tampers are operating near or under the bottom level of the ties. The stresses and vibrations from these impacts if transmitted through the front portion of the frame of the machine and the front wheels **25** to the portions of the rails on the ties adjacent the cribs without tamped ballast, may displace or loosen the rails at the front of the machine. In order to minimize the stresses and vibrations transmitted to the portions of the rails over the untamped cribs and ties under the frame in advance of the tampers, the struts are designed to firmly support the frame as closely as possible to cross-head and tampers immediately in advance of the tamped cribs under the rear of the frame. In this manner, the struts while operative relieve the portions of the rails at the front end of the machine of stresses and vibrations, or minimize the transmission of vibrations produced by the tamping operation, to said portions of the rails.

If desired, the rollers **82** may be retained in their lowered operative position while the truck is being advanced to bring the tampers into position for successively tamping the ties. When the machine is to be transported along the track from its place of storage to the place where the work is to be performed, air will be admitted to the outer end of cylinders **98** to cause pistons **99** to shift beam **102**, links **106** and the toggle linkage into the position illustrated in Fig. 6, so that the rollers **82** will clear the rails.

During the tamping operations it is desirable to retain the truck against longitudinal movement along the rails and for this purpose braking devices are provided which are carried by the struts and engage the track rails adjacent the rollers **82**. Each of these devices comprises a brake shoe **110** which is bifurcated and pivotally supported on a roller shaft **83** and a pneumatically operable device for shifting the shoe. An air cylinder **112** is fixedly secured to the link-member **85** and is provided with a slidable piston **113** on a stem **114**. The outer end of the stem **114** is pivotally connected at **115** to operate a toggle linkage which comprises a link **116** with a forked lower end **117** which is pivoted at **118** to lugs **119** on the brake shoe **110**, and a link **121** between pivot **115** and a lug **122** fixed on link **85**. When air is admitted to the outer end of cylinder **112** piston **113** will operate links **121** and **116** to press the brake shoe **110** against the top face of the head of the rails *a*. When air is exhausted from the cylinder the pressure of the shoe **110** will be released. A pipe **124** is connected to cylinder **102** and to a suitably controlled source of compressed air.

When rollers **82** are lowered and engaging the track rails *a* as illustrated in Fig. 1, the operator will cause air to be delivered into cylinders **112** to operate pistons **113**, and through toggle links **121** and **116** to exert a pressure on the brake shoes **110** for retaining the truck against movement along the track. To permit the truck to be moved after one tie has been tamped into position for tamping the succeeding tie air will be exhausted from cylinders **112** to permit the brake shoes **110** to slide along the track rails. When the machine is to be transported to or from the place of work, the brake shoes **110** will be lifted by the struts to clear the track rails.

The invention exemplifies a tamping machine provided with struts composed of toggle-linkages for auxiliarly supporting the machine between the truck wheels and adjacent the portion of the track where the ballast has been tamped during the tamping operation. The invention also exemplifies simple and efficient braking devices for the truck which are associated with the auxiliary supporting devices for retaining the machine in its spotted position during the tamping operations.

The invention is not to be understood as restricted to the details set forth since these may be modified within the scope of the appended claims without departing from the spirit and scope of the invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A machine of the character described comprising: a truck including a supporting frame and front and rear carrying wheels adapted to travel on the rails of a railway track, a drop-head mounted longitudinally between the front and rear wheels for percussive strokes in the frame; tampers movable vertically with and pivotally on the head; means on the frame for controlling the movement of the tampers relatively to the head; auxiliary supports adjacent the drop-head, rearwardly of the front wheels, and extending between the frame and the track-rails, for supporting the front portion of the truck while the truck is also supported by the rear wheels and thereby reducing the stresses between the front wheels and the rails produced by the percussive operation of the tampers; and means for shifting the auxiliary supports off the rails for supporting the frame entirely by the front and rear wheels.

2. A machine of the character described comprising:

a truck including a supporting frame and front and rear carrying wheels adapted to travel on the rails of a railway track, a drop-head mounted longitudinally between the front and rear wheels for percussive strokes in the frame; tampers movable vertically with and pivotally on the head; means on the frame for controlling the movement of the tampers relatively to the head; struts adjacent the drop-head, rearwardly of the front wheels, and extending between the frame and the track-rails, for supporting the front portion of the truck while the truck is also supported by the rear wheels and thereby reducing the stresses between the front wheels and the rails produced by the percussive operation of the tampers; and means for operating the struts to disengage them from the rails for supporting the frame entirely by the front and rear wheels.

3. A machine of the character described comprising: a truck including a supporting frame and front and rear carrying wheels adapted to travel on the rails of a railway track, a drop-head mounted longitudinally between the front and rear wheels for percussive strokes in the frame; tampers movable vertically with and pivotally on the head; means on the frame for controlling the movement of the tampers relatively to the head; struts including toggle linkages adjacent the drop-head, rearwardly of the front wheels, and extending between the upper portions of the frame and the track-rails, for supporting the front portion of the truck while the truck is also supported by the rear wheels and thereby reducing the stresses between the front wheels and the rails produced by the percussive operation of the tampers; and means for raising the struts and supporting the frame entirely by the front and rear wheels.

4. A machine of the character described comprising: a truck including a supporting frame and front and rear carrying wheels adapted to travel on the rails of a railway track, a drop-head mounted longitudinally between the front and rear wheels for percussive strokes in the frame; tampers movable vertically with and pivotally on the head; means on the frame for controlling the movement of the tampers relatively to the head; auxiliary supports adjacent the drop-head, rearwardly of the front wheels, and extending between the frame and the track-rails, and including pairs of toggle links, one of each pair being pivoted to the upper portion of the frame, and arms between the lower end of the other toggle link and the frame, and a roller at the lower end of said other link for supporting the front portion of the truck while the truck is also supported by the rear wheels and thereby reducing the stresses between the front wheels and the rails produced by the percussive operation of the tampers; and pneumatic means for operating the toggle links to render them inoperative and supporting the frame entirely by the front and rear wheels.

5. A machine of the character described comprising: a truck including a supporting frame and front and rear carrying wheels adapted to travel on the rails of a railway track, a drop-head mounted longitudinally between the front and rear wheels for percussive strokes in the frame; tampers movable vertically with and pivotally on the head; means on the frame for controlling the movement of the tampers relatively to the head; auxiliary supports adjacent the drop-head, including toggle linkages rearwardly of the front wheels, and extending between the upper part of the frame and the track-rails, and links between the lower ends of the linkages and the lower portion of the frame for supporting the front portion of the truck while the truck is also supported by the rear wheels and thereby reducing the stresses between the front wheels and the rails produced by the percussive operation of the tampers; and means for collapsing the linkages for supporting the frame entirely by the front and rear wheels.

6. A machine of the character described comprising: a truck including a supporting frame and front and rear carrying wheels adapted to travel on the rails of a railway track, a drophead mounted longitudinally between the front and rear wheels for percussive strokes in the frame; tampers movable vertically with and pivotally on the head; means on the frame for controlling the movement of the tampers relatively to the head; auxiliary supports adjacent the drop-head, rearwardly of the front wheels, and extending between the frame and the track-rails, including toggle linkages and rollers on the lower end of the linkages and engageable with the track rails for supporting the front portion of the truck while the truck is also supported by the rear wheels and thereby reducing the stresses between the front wheels and the rails produced by the percussive operation of the tampers; and means for operating the linkages to raise the rollers off the rails.

7. A machine of the character described comprising: a truck including a supporting frame and front and rear carrying wheels adapted to travel on the rails of a railway track, a drophead mounted longitudinally between the front and rear wheels for percussive strokes in the frame; tampers mounted on the head; auxiliary supports adjacent the drop-head, rearwardly of the front wheels, and extending between the frame and the track-rails, for supporting the front portion of the truck while the truck is also supported by the rear wheels and thereby reducing the stresses between the front wheels and the rails produced by the operation of the head and tampers; means for raising auxiliary supports off the rails, brakes carried by the lower ends of the auxiliary supports and engageable with the rails, and means for applying said brakes to the rails and releasing them therefrom.

8. A machine of the character described comprising: a truck including a supporting frame and front and rear carrying wheels adapted to travel on the rails of a railway track, a drophead mounted longitudinally between the front and rear wheels for percussive strokes in the frame; tampers mounted on the head; auxiliary supports adjacent the drop-head, rearwardly of the front wheels, and extending between the frame and the track-rails, for supporting the front portion of the truck while the truck is also supported by the rear wheels and thereby reducing the stresses between the front wheels and the rails produced by the operation of the tampers; means for raising auxiliary supports off the rails, brakes carried by the lower ends of the auxiliary supports and engageable with the rails, and pneumatic means carried by said supports for operating said brakes.

9. A machine of the character described comprising: a truck including a supporting frame and front and rear carrying wheels adapted to travel on the rails of a railway track, a drop-head mounted longitudinally between the front and rear wheels for percussive strokes in the frame; tampers mounted on the head; auxiliary supports including struts adjacent the drop-head, rearwardly of the front wheels, and extending between the frame and the track-rails, for supporting the front portion of the truck while the truck is also supported by the rear wheels and thereby reducing the stresses between the front wheels and the rails produced by the operation of the head and tampers; means for raising the struts away from the rails, brakes carried by the lower ends of the struts and engageable with the rails, and pneumatic means carried by said struts for applying said brakes to the rails and releasing them therefrom.

10. A machine of the character described comprising: a truck including a supporting frame and front and rear carrying wheels adapted to travel on the rails of a railway track, a drop-head mounted longitudinally between the front and rear wheels for percussive strokes in the frame; tampers mounted on the head; auxiliary supports adjacent the drop-head, rearwardly of the front wheels, and extending between the frame and the track-rails, including toggle linkages and rollers engageable with the rails and journalled on the lower ends of the linkages for supporting the front portion of the truck while the truck is also supported by the rear wheels and thereby reducing the stresses between the front wheels and the rails produced by the operation of the head and tampers; means for raising auxiliary supports off the rails, brakes pivotally mounted on the lower ends of the linkages and engageable with the rails, and means carried by said linkages for pivotally shifting said rollers and applying the brakes to the rails and releasing them therefrom.

11. In a machine of the character described, the combination with a portable truck provided with a supporting frame and front and rear wheels adapted to travel on the rails of a railway track, a drop head mounted for vertical strokes in the frame between the front and rear wheels, and provided with elements for moving ballast between the ties under the rails, of auxiliary supports including devices for engaging the track rails adjacent the path of travel of the head and structures between the frame and said devices for supporting the frame to relieve the weight on the front wheels while the rear wheels support the frame, and means for shift-

ing said structures to relieve the stresses on the front wheels and to raise them off the rails and engage them with the rails while the rear wheels remain engaged with the rails.

12. In a machine of the character described, the combination with a portable truck provided with a supporting frame and front and rear wheels adapted to travel on the rails of a railway track, a drop head mounted for vertical strokes in the frame between the front and rear wheels, and provided with elements for moving ballast between the ties under the rails, of auxiliary supports including devices for engaging the track rails adjacent the path of travel of the head and structures including struts between the frame and said devices for supporting the frame to relieve the weight on the front wheels while the rear wheels support the frame, and means for shifting said structures to relieve the stresses on the front wheels and to raise them off the rails and engage them with the rails while the rear wheels remain engaged with the rails.

13. In a machine of the character described, the combination with a portable truck provided with a supporting frame and front and rear wheels adapted to travel on the rails of a railway track, a drop head mounted for vertical strokes in the frame between the front and rear wheels, and provided with elements for moving ballast between the ties under the rails, of auxiliary supports including devices for engaging the track rails adjacent the path of travel of the head and structures including struts between the frame and said devices and arms between the struts and the frame for supporting the frame to relieve the weight on the front wheels while rear wheels support the frame, and means for shifting said structure to relieve the stresses on the front wheels and to raise them off the rails, and to engage the rails while the rear wheels remain engaged with the rails.

14. In a machine of the character described, the combination with a portable truck provided with a supporting frame and front and rear wheels adapted to travel on the rails of a railway track, a drop head mounted for vertical strokes in the frame between the front and rear wheels, and provided with elements for moving ballast between the ties under the rails, of auxiliary supports including devices for engaging the track rails adjacent the path of travel of the head and structures between the frame and said devices for supporting the frame to relieve the weight on the front wheels while the rear wheels support the frame, and fluid pressure operable means for shifting said structures to relieve the stresses on the front wheels and to raise them off the rails, while the rear wheels remain engaged with the rails.

15. In a machine of the character described, the combination with a portable truck provided with a supporting frame and front and rear wheels adapted to travel on the rails of a railway track, a drop head mounted for vertical strokes in the frame between the front and rear wheels, and provided with elements for moving ballast between the ties under the rails, of auxiliary supports including devices for engaging the track rails adjacent the path of travel of the head and structures including toggle linkages between the frame and said devices for supporting the frame to relieve the weight on the front wheels while the rear wheels support the frame, and means for shifting said members to render them operative and to raise them off the rails.

16. In a railway ballast tamping machine, the combination with a portable truck provided with a supporting frame mounted on front and rear wheels adapted to travel on the rails of a railway track for successive tamping of ballast beneath ties, multiple tamping bars mounted at each side of the truck and intermediate the wheels thereof for straddling a tie in the vicinity of the rail supporting portion of said tie, said tamping bars being capable in operation of vertical movement as well as horizontal movement toward and away from the tie so as to tamp the ballast supporting the tie, of retractable auxiliary supports on said truck for engaging the track rails during the tamping operation in the immediate vicinity of the tamping bars so as to relieve the weight on the wheels of the truck which are supported on the forward untamped portion of the track.

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