No. 893,041. PATENTED JULY 14, 1908.

G. L. WALL & L. E. FEIGHTNER.

LOCOMOTIVE.

APPLICATION FILED JAN. 21, 1908.

3 SHEETS—SHEET 1.

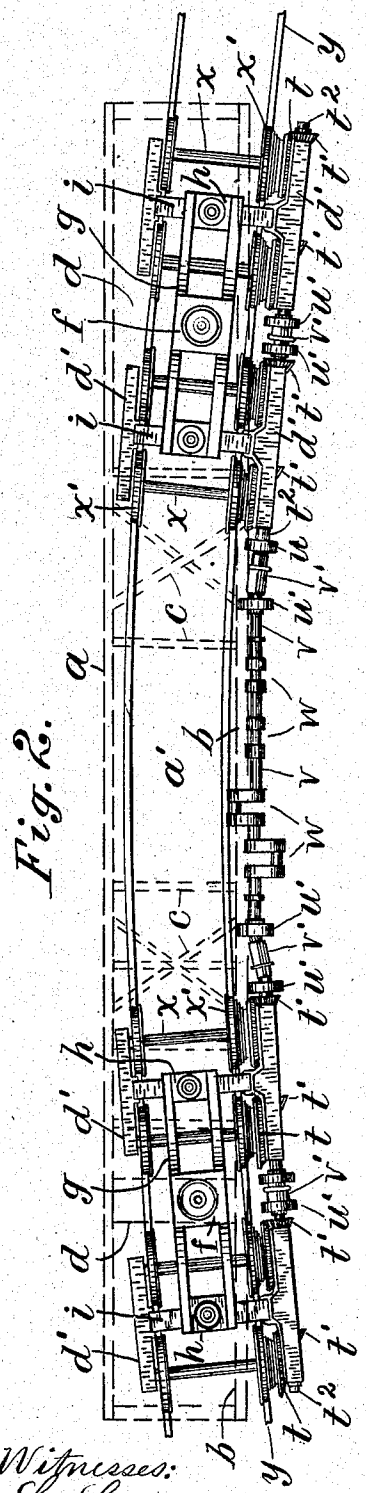

Fig. 2.

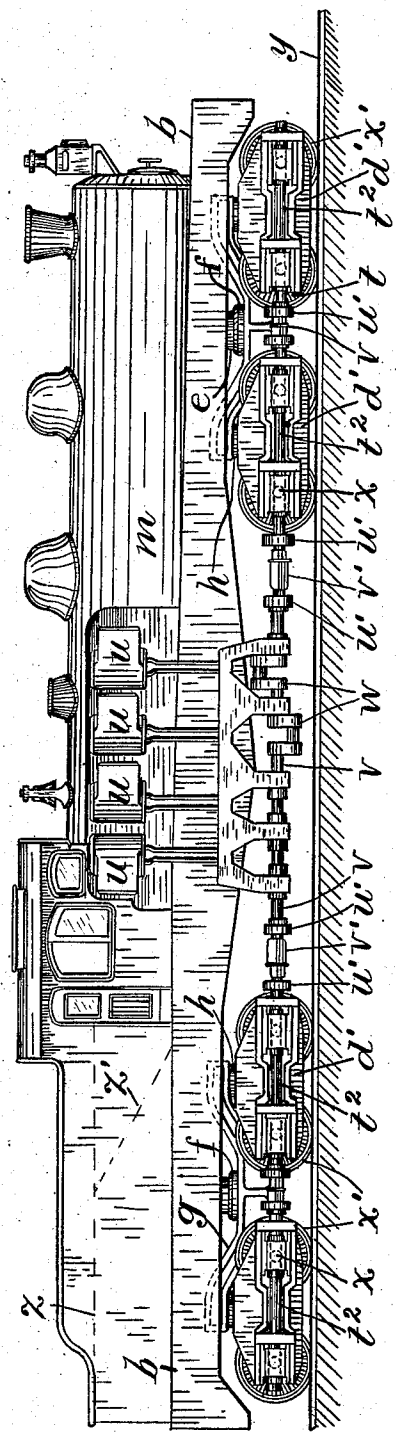

Fig. 1.

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L. Lee.
J. W. Greenbaum

Inventors: George L. Wall, per
Lewis E. Feightner per
Thomas S. Crane, atty.

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3 SHEETS—SHEET 2.

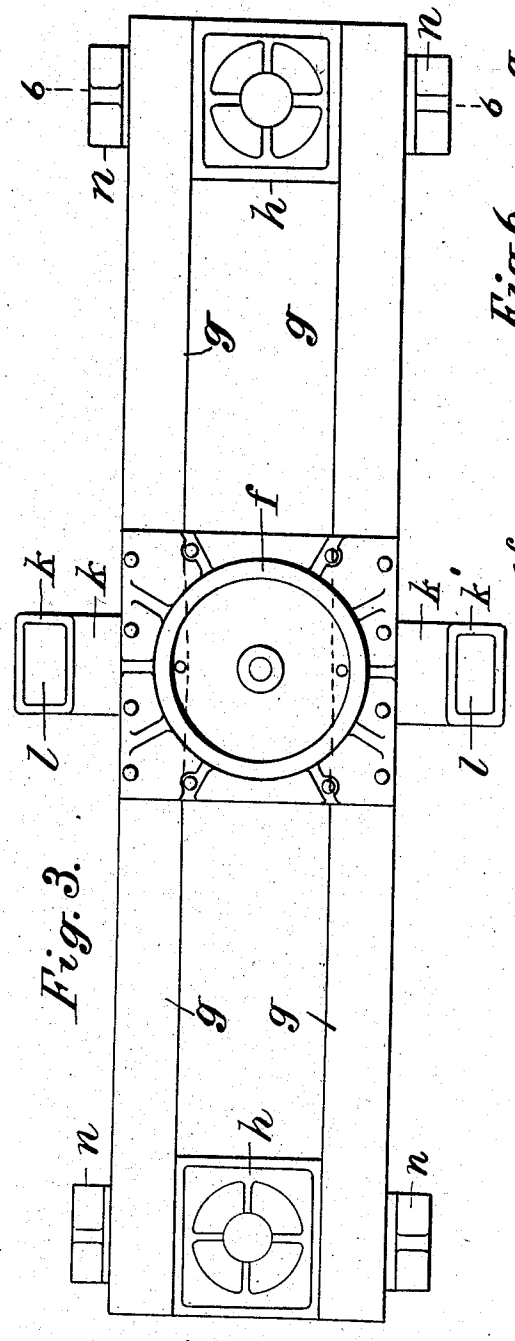

Fig. 3.

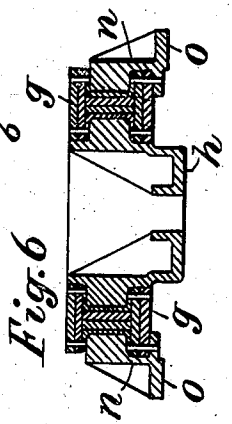

Fig. 6

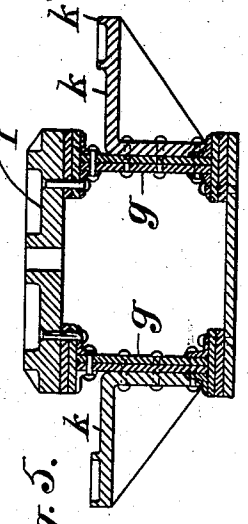

Fig. 5.

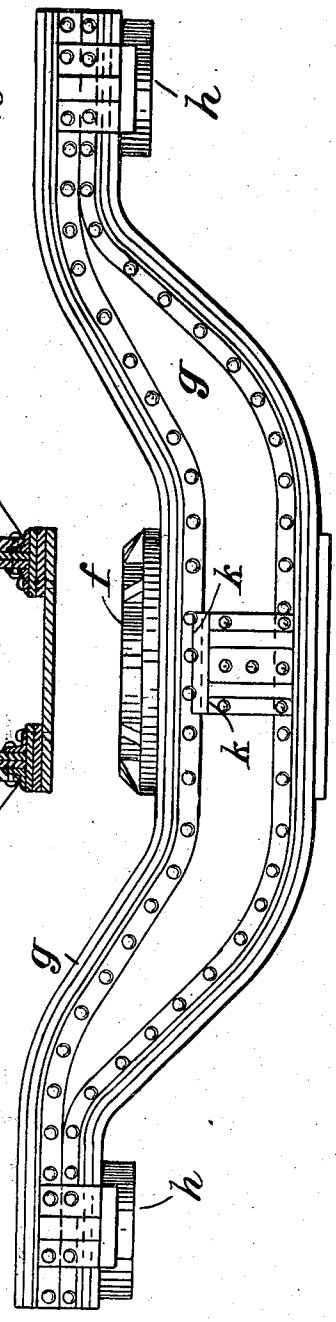

Fig. 4.

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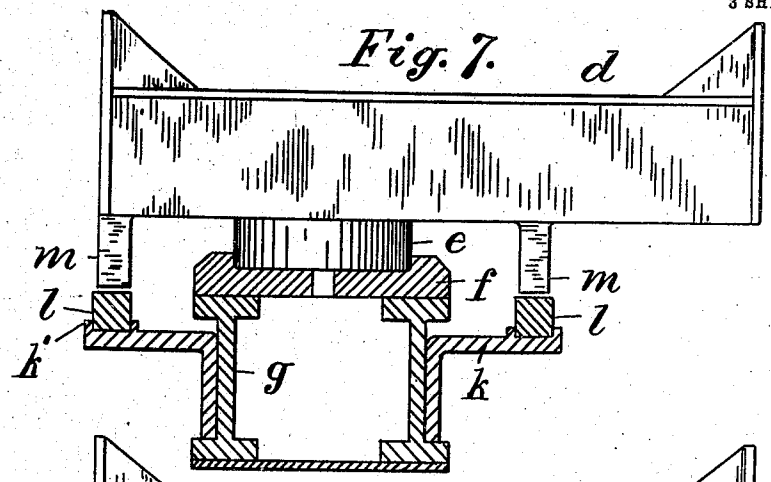
3 SHEETS—SHEET 3.

Fig. 7.



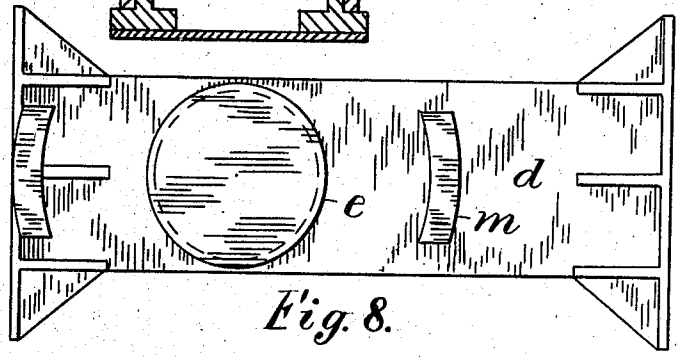
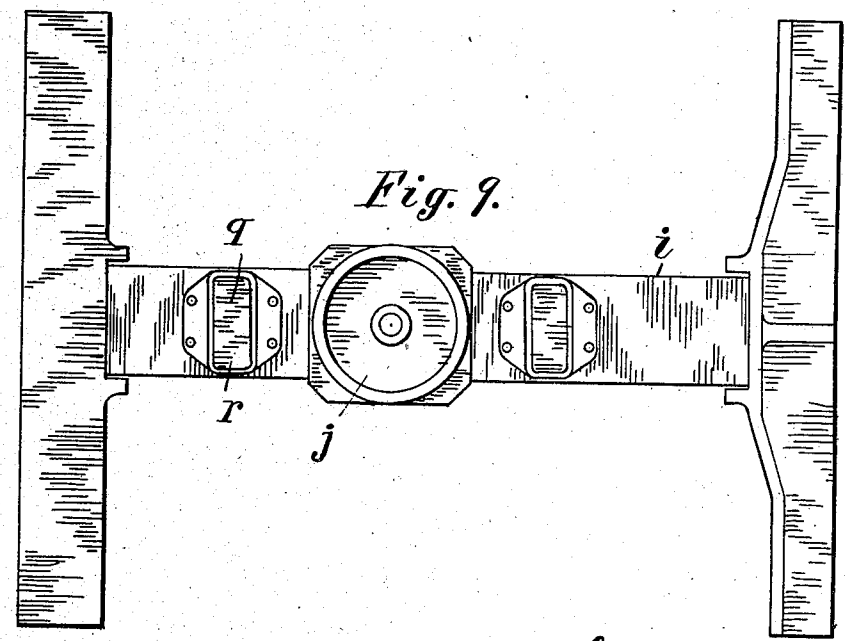


Fig. 8.

Fig. 9.



Witnesses:
L. Lee.
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UNITED STATES PATENT OFFICE.

GEORGE L. WALL AND LEWIS E. FEIGHTNER, OF LIMA, OHIO, ASSIGNORS TO LIMA LOCOMOTIVE AND MACHINE COMPANY, OF LIMA, OHIO, A CORPORATION OF OHIO.

LOCOMOTIVE.

No. 893,041. Specification of Letters Patent. Patented July 14, 1908.

Application filed January 21, 1908. Serial No. 412,012.

To all whom it may concern:

Be it known that we, GEORGE L. WALL, residing at 1103 West High street, Lima, county of Allen, and State of Ohio, and LEWIS E. FEIGHTNER, residing at 715 South Broadway, Lima, county of Allen, and State of Ohio, both citizens of the United States, have invented certain new and useful Improvements in Locomotives, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The object of this invention is to furnish a means of wholly supporting a locomotive frame upon more than two pivoted trucks, so as to distribute the weight upon a large number of journals, and thus permit a locomotive of great weight to be sustained wholly upon truck-wheels which can follow a curved track independently.

In the present invention, swing-bolsters are pivoted beneath the two ends of the locomotive frame, and the ends of both swing-bolsters are supported upon separate trucks. By this invention, four pivoted trucks can be used, two under each end of the locomotive frame, the center of the swing-bolsters at each end of the locomotive being pivoted beneath a body-bolster connecting the side-frames of the locomotive. Only two swing-bolsters are required, and the whole locomotive is thus supported upon two center-plates; which leaves all the trucks free to turn in any degree required by the curvature of the track, and enables each of the truck-wheels to follow the track independently. The flanges of the wheels may therefore be fitted properly to the rails, and may operate most effectively in guiding the locomotive, which is of especial importance in a structure having a long wheel-base.

It is readily seen in the drawing, that the truck-bolsters are divergent from one another, as is necessary in turning curves; which is effected by a free connection with the ends of the swing-bolster.

The body-bolster is provided with a center-plate to rest upon the swing-bolster; and each swing-bolster has center-plates under its opposite ends to rest upon the truck-bolsters; and all of the trucks are thus enabled to turn independently, and their wheels are enabled to follow the track-rails in turning curves. A locomotive having the frame thus supported may be provided with any suitable motor; and any number of the truck-wheels be rotated by such motor to act as driving-wheels; but a construction in which all of the weight rests upon truck-wheels is especially adapted for use in a so-called Shay locomotive, in which vertical engines at the side of the boiler firebox are used to propel a horizontal crank-shaft, and such crank-shaft connected by universal joints and slip-couplings with all the wheels in the different trucks. All of the truck-wheels may thus operate as drivers, and all of the driving-wheels be furnished with flanges to hold them in place on the rails.

The trucks are shown herein provided with two axles and four wheels each, thus supporting the locomotive upon sixteen wheels; but more axles and wheels may be used in each truck, if desired.

In the annexed drawing, Figure 1 is a side elevation of a locomotive provided with the improvements; Fig. 2 is a plan of the four trucks with the swing-bolsters resting thereon, and the crank-shaft with its connections to the truck-wheels. The locomotive frames are also indicated by dotted lines. Fig. 3 is a plan of the swing-bolster; Fig. 4 a side view of the same; Fig. 5 a vertical section of the bolster through the central pivot-plate; Fig. 6 a vertical section of the bolster on line 6—6 in Fig. 3, through one of the end center-plates; Fig. 7 is a side view of the body-bolster with cross section of the swing-bolster beneath the same; Fig. 8 shows the under side of the body-bolster; and Fig. 9 is a plan of the truck-bolster and end frame.

a designates the left hand locomotive frame, and *b* the right hand frame connected by cross-ties *c* and by the body-bolsters *d* which have center-plates *e* to rest upon the pivot-plates *f* of the swing-bolsters. The swing-bolsters are shown in Figs. 3 to 6 inclusive, made with two parallel side girders *g* between the ends of which center-plates *h* are also secured to engage the pivot-plates upon the truck-bolsters *i*.

The swing-bolster is shown at the middle with a pivot-plate *f* having its circular face presented upwardly to support the body-bolster *d* by its center-plate *e*, and the swing-bolster is furnished at the opposite sides of such pivot-plate with bearing-plates or brackets *k* having sockets formed upon the

upper side to receive bearing-blocks *l* which contact with segmental seats *m* upon the under side of the body-bolster.

The bearing-blocks furnish a means of using harder metal for the wearing face and to compensate for wear as the blocks may be readily renewed when worn, and the sockets are formed simply as a shallow recess with a marginal flange *k'* to hold the bearing-blocks in place. The ends of the swing-bolster at the opposite sides of the end center-plates *h* are also furnished with brackets *n* having bearing-plates *o* with their faces presented downwardly to rest upon bearing-blocks *q* seated in sockets *r* upon the top of the truck-bolsters *i* at the opposite sides of its pivot-plate. It will be noticed that the pivot-plate *f* and brackets *k* at the center of the swing-bolster face upwardly, while the center-plates *h* and the faces *o* upon its adjacent brackets project in a reverse direction.

The details of the truck construction are omitted in the drawing, as they form no part of the present invention, but they are each shown carrying two axles *s*, and the wheel at one end of each axle provided with a bevel-gear *t*. The firebox of the steam boiler *m* swings between the frames, at the middle of their length, and four engine cylinders *u* are shown upon the side of the firebox in Fig. 1, with a crank-shaft *v*, having four cranks *w* journaled in bearings *w'* which are supported upon the locomotive frame *b*.

The truck-wheels are all shown flanged to fit the track-rails *y* of Figs. 1 and 2, and each of the trucks is shown constructed, as is common in Shay locomotives, with bearings carrying a driving-shaft *x* having pinions *t'* meshing with the bevel-gears *t* upon the wheels of such truck. The ends of these driving-shafts and the opposite ends of the crank-shaft *v* are shown provided with universal joints *u'* which are connected by slip-couplings *v'*, thus connecting the crank-shafts with all of the axles in the four trucks, and at the same time permitting each truck to assume an independent position upon the track-rails *y* which are shown in Fig. 1.

The locomotive frames are shown in Fig. 1 provided with a water-tank *z* and a coal-bunker *z'* at the rear of the firebox, and as the entire frame is carried by the swing-bolsters upon which the body-bolsters *d* are pivoted, the whole weight is carried by the pivot-trucks, and all of the wheels which carry such weight may be utilized as driving-wheels by connecting them with the motive power, as shown in the drawing.

The center-plates *e* upon the body-bolsters *d* are shown in Fig. 1 set much nearer to the frame *b* than the frame *a*, as the frame *b* carries the engine, whose weight is balanced by thus arranging the center-plates *d*.

The essential feature of the invention is the supporting of the locomotive frames with the motor upon swing-bolsters pivoted under its opposite ends, each swing-bolster also having center-plates under its opposite ends and trucks supporting such end center-plates with wheels journaled in said trucks, and a part at least of said wheels having connections with a motor to drive the locomotive.

The construction is especially adapted, as stated above, for use in a Shay locomotive, in which all the supporting wheels are utilized as driving-wheels by a flexible gear connection with a motor-shaft, thus permitting all the wheels to be flanged and all the trucks to turn independently in passing over curves. It is not, however, essential to the present invention that all of the supporting wheels should be connected with the motor, as a part of the wheels may be used as trailing or leading wheels, if desired.

The supporting of the entire weight upon swing-bolsters and pivoted trucks is equally applicable to a locomotive employing an electric motor, a gas motor, or any other motor agent.

Having thus set forth the nature of the invention what is claimed herein is:

1. In a locomotive, the combination, with side-frames having cross-ties adapted to carry a suitable motor, of body-bolsters connecting the side-frames near opposite ends and provided each with a center-plate, a swing-bolster pivoted under each of such center-plates, each swing-bolster having center-plates also under its opposite ends, wheeled trucks supporting such end center-plates and free to turn thereon in passing curves, and a motor with connections to at least a part of said wheels.

2. In a locomotive, the combination, with two frames carrying a locomotive boiler, of a body-bolster carrying a center-plate near the forward end of the boiler, a swing-bolster pivoted under such center-plate with center-plates also under its opposite ends, wheeled trucks supporting such end center-plates and free to turn thereon in passing curves, steam cylinders with pistons having connections to said driving-wheels.

3. In a locomotive, the combination, with side frames having crossties, of a horizontal tubular boiler supported upon one of such frames, a water-tank and coal-bunker supported upon the opposite end of the frames, body-bolsters connecting the side frames near opposite ends and provided each with a center-plate, a swing-bolster pivoted under each of said center-plates, each bolster having center-plates also under its opposite ends, wheeled trucks pivoted to such end center-plates and free to turn thereon when passing curves, and upright cylinders with pistons having connection to all of the wheels in the wheeled trucks.

4. In a locomotive, the combination, with a frame having a horizontal tubular boiler,

and upright engines having pistons connected to a common crank-shaft, of body-bolsters extended across the frame near opposite ends, swing-bolsters pivoted thereon and each having four-wheeled trucks pivoted under its opposite ends whereby the whole weight is supported upon sixteen wheels, four gear-shafts separately journaled upon the four trucks and geared to the said wheels, and universal joints and couplings connecting all of said gear-shafts together and to the crank-shaft.

5. In a locomotive, the combination, with two girder-frames, of cross-ties connecting the same, body-bolsters also connecting the same near opposite ends of the frames and provided each with a center-plate, a horizontal tubular boiler supported upon one end of the frames, a water-tank and coal-bunker supported upon the other end, swing-bolsters pivoted to the two body-bolsters, trucks pivoted under the ends of the swing-bolsters with driving-wheels journaled therein, and steam cylinders having pistons with connections to the said driving-wheels.

6. In a locomotive, the combination, with two plate-girder side-frames, and cross-ties connecting the same except near the middle, of body-bolsters also connecting the frames near opposite ends and provided each with a center-plate, a horizontal tubular boiler supported upon the frames with firebox between the frames at the middle of their length, swing-bolsters pivoted to the two body-bolsters, trucks pivoted under the ends of the swing-bolsters with driving-wheels journaled therein, four gear-shafts journaled separately upon the four trucks and geared to the driving-wheels, a horizontal crank-shaft at the side of the firebox, upright engines having cylinders attached to the firebox and pistons connected to the said crank-shaft, and universal joints and couplings connecting the several gear-shafts together and to the crank-shaft.

7. In a locomotive, the combination, with right and left hand frames, of cross-ties connecting the same, body-bolsters also connecting the same near opposite ends of the frames and provided each with a center-plate nearer to the right hand frame, a horizontal tubular boiler supported upon one end of the frames, with the firebox near the middle of the frame, a crank-shaft supported outside the right hand frame at the side of the firebox, upright engines having cylinders attached to the firebox and pistons connected to the said crank-shaft, swing-bolsters pivoted to the two body-bolsters, trucks pivoted under the ends of the swing-bolsters with driving-wheels journaled therein, four gear-shafts journaled separately upon the four trucks and geared to the driving-wheels, and universal joints and couplings connecting the several gear-shafts together and to the crank-shaft.

8. In a locomotive, the combination, with two side-frames, of body-bolsters extended between the side-frames near opposite ends and provided each upon its under side with a center-plate *e* and with bearing-seats at opposite sides of the same, a swing-bolster having pivot-plate fitted to such center-plate and brackets at the sides of the pivot-plate with bearing-blocks *l* facing upwardly to bear upon the seats on the body-bolster, and the swing-bolster having the end center-plates *h* and side brackets with seats *o* facing downwardly, and a truck having bolster with pivot-plate under each of said end center-plates, the truck-bolster having sockets with bearing-blocks to fit the seats *o*, the construction operating to sustain the whole load upon pivoted trucks and to resist the lateral rocking of the load upon the trucks.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

GEORGE L. WALL.
LEWIS E. FEIGHTNER.

Witnesses:
THOMAS NESMITH, JR.,
H. C. HAMMACK.