HELIXTRAM Investigation
Evan L. Jacobsen
231 S. Lombard Ave.
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Dear Railroader:

The enclosed HELIXTRAM pamphlet invites your attention and interest in a completely new and intriguing railroad, born from my enthusiasm for trains of all kinds.

This pamphlet outlines the potential uses of the HELIXTRAM, other transportation modes similar to it, and includes 38 drawings which illustrate its entire structure, from the general to the specific.

I am hoping that you and some of your customers will be interested in purchasing additional copies of the booklet. The cost to you of printing and mailing is $1.00. I will be extremely happy to send you as many copies as you can sell (please make check for prepayment payable to Evan Jacobsen). It is my belief that the more that people come to know and understand the HELIXTRAM, the closer we will come to safe mass transportation.

Both the potential users and builders of the HELIXTRAM are being contacted. Without the support of people like you and your customers, who can look at my plan with knowledge and railroad wisdom, I know it will be hard to "make my case" to industrial engineering offices. I'm anxious to hear both your reaction and that of the people you work with and sell to. I very much appreciate and will acknowledge your public service in helping pass the HELIXTRAM along.

Very sincerely yours,

Evan Jacobsen

Contained herein is a body of information that might have been FRONT PAGE NEWS had it first been shown during the recent "GAS CRISIS", and even though our country is recovering now somewhat from its TERMINAL ILLNESS (if it is to remain in its OIL DEPENDENT STATE),

HELIX-TRAM

, a small rail conveyance TO REPLACE AUTOMOBILES, of which this is the first public showing, SHOULD BE DECLARED A "NATIONAL INTEREST", if the other is to be the "NATIONAL ENERGY CRISIS". READ IT AND SEE WHY, though only engineers can render said verdict, studying the feasibility for thousands, if not hundreds of thousands of dollars. I IMPLORE YOU to help explore this POSSIBLE SOLUTION to our nation's most desperate challenge, by helping in any way you see fit. Here is the SIMPLIFIED PATENT of a COMPLEX APPARATUS TO REPLACE CARS, to know of, to forward, and to donate to. Thank you.

Write HELIXTRAM INVESTIGATION, 231 S. Lombard, Oak Park, Illinois 60302.

HELIXTRAM

Table of Contents: Page

ON AUTOMATIC TRAMS -- THE ALTERNATIVE TO THE AUTOMOBILE

An "Automatic Tram" for the delivery of parcels is often suggested as future convenience; receiving goods by merely pressing a few buttons and having the wanted thing "pushed out of a slot in the wall". When tracks connect all homes, stores, and factories, and even large cumbersome packages are sent between them on automatic tram cars, this expectation will have come to pass.

Today men expend massive resources on the several modes in use by us to bring home the goods we have bought, the basis of which transport is the common automobile and continuation of its service is the United States' largest industry. It is difficult to declare what percentage of automobile use falls into the category of "package transport" between stores, homes and even factories; but a high percentage of car miles is given to just that one necessity; and the fact that the driver is along is secondary and a negative aspect, as is the massive carriage bulk, energy consumption, and danger inherent in such vehicles' use.

The shortcomings of the automobile are well known, and have become a considerable worry to most of us. To what degree an "automatic tram" for local package delivery could lift the automobile's burdens is only theory; but development of an efficient "automatic tram" looms as a societal necessity, rather above an expectation.

Automatic tram railway offering immediate delivery of almost any commodity to any home, assures that sender and sendee would not have invested in "driving time", and the package probably received sooner than a man could normally drive out and retrieve it. To take things a bit further, a man involved in commercial enterprise may operate even heavy equipment in his home, the equipment delivered and returned on the automatic tram, as are the materials and the products on which he works. When transportation of bulk objects are automatic on a home delivery level, many objects will move to the man rather than requiring the man move (often daily) to them, and industry and commerce carried forth from the home would therefore flourish.

"Automobile (people) transport" and "tram access" imply two different modes of production and buyers' habit, so the first efficient "Automatic Tram" conveyance will give many people all over the world cause for thought, because the implications of this are so far-reaching; doubly so, because such a device's structure would not be difficult to integrate with existent urban design.

The automation to control rail cars in transit has long been sought; but like a man driving on ice, steel wheels "slip" easily on steel rails; the inability to calculate stopping distances because the wheels may slide, the inability to start without wheel slippage, and the wheels' not offering enough traction to surmount any but the slightest incline, make conventional rail conveyance almost the antithesis of what an automatic tram is required to be.

Conventional rails are used to carry immense weight for long distances on the nearly straight and level, but the versatile tram is to carry light or heavy loads, usually short distances, in even hilly terrain. While the conventional freight cars jar and churn (due to their high center of gravity), and are started, stopped, and sorted with concussive jolts, the tram must transport household goods and equipment of an often fragile nature.

The lines of cars in a train are continuously divided, routing each into still another line, always routed in great lines from town to town; but for trams there are hundreds of thousands, millions, of different routings between house to house; there is no similarity in the required service. While conventional electrified tracks can be divided, elevated or fenced off, because they are dangerous, a "neighborhood" tram must be completely enclosed to protect people from "electrocution" or from being "run down" by a tram car. In short, a miniaturized conventional rail technology would not lend itself to a tram, aside from the integral "steering" guidance offered.

Automation for conventional rail vehicles has been tried many times, and unsuccessfully so. The Chicago Transit Authority attempted to automate one of its conventional "ELs" with a control system to start it smoothly, and to stop it at designated stations on a three-mile track set aside for the experiment. This project required only functional automatic throttle and brake control, and after two years of modification and testing, results weren't promising and the project was scrapped.

In 1969 the Federal Urban Mass Transit Authority funded the construction of a 2.2 mile long automated rail car system, called the "People Mover," on a West Virginia University campus, and after spending $57 million on its 5 test cars and 3 stations, it was determined that it would cost $50 million more to complete, and the project was scrapped. This original 90 car-6 station planned automation called for a $13 million total construction budget.

Though the "rolling efficiencies" of the steel wheel on steel rails has no equal, even experimental automobiles which can follow a metal strip along or under a road's pavement were exhaustively tested to see if a conventional super-highway could be automated, but "merging" vehicles, speed control, braking, and auto breakdown on "the track" ruled out such a cause. Ample automatic control of a rolling vehicle has been a confounding problem.

The possibility of automating wheeled vehicles aside, experiments in routing large pneumatic capsules sucked through a tube were also unsuccessful. There is one breakthrough, however, in moving vehicle automated control, to start, power, and stop frictionless "air float cars", in a level concrete trough guideway. "Air blower" motors are utilized to hold the car at a constant height above the guideway, and inboard magnets set up fields in metallic strips of the guideway to push the car along.

Plans are in the works to build a 14 mile, $80 million "air float" automated "el" in Nancy, France, during the next four years. The same system is being considered for Denver, Colorado, where a short demonstration model is on display. The Dallas-Fort Worth Airport has one of these in operation, reportedly plagued with breakdown. Experimentation goes on; vehicle automation is a vital and worthwhile cause.

Challenging to automaticity though they may be, the controlled starting, speed, and stopping of mass transport cars range below "traffic control" of a feasible household goods delivery tram; many size and weight cars going in all directions between a multitude of separate stores and homes, on a maze of tracks and switch work -- all this completely automatic. In the event of its perfection, the accomplished automation of 25 passenger "magnetic air floats" lavishly deployed for inner-city shoppers or airport travelers, along a length of level trough, still may not be relative to a much needed tram utility, many thousands of small automatic cars routed independently between homes and stores across as many tracks as there are streets in a conventional city.

To the Commissioner of Patents:

Your petitioner, Evan L. Jacobsen, a citizen of the United States and a resident of Oak Park, State of Illinois, whose post office address is 231 S. Lombard Ave., Oak Park, Illinois 60302, prays that letters patent may be granted to him for his improvement of and in Helixtram Technology set forth in the following specification.

THE HELIXTRAM

Abstract of the Disclosure:

A rail vehicular evolved because of default by other methods to be arranged as a small and fully automatic carrier of "inter-city" transport.

A fully automatic rail vehicular to take the place of automobiles, trucks, and mailmen, engaged in household goods' delivery; as such, an improved household goods transporter.

A viable carrier of persons short distances from their homes to mass-transit outlets or other areas nearby; as such, an improved method of mass transport terminal access.

Description of Drawings:

PART I - BASIC HELIXTRAM COMPONENTS

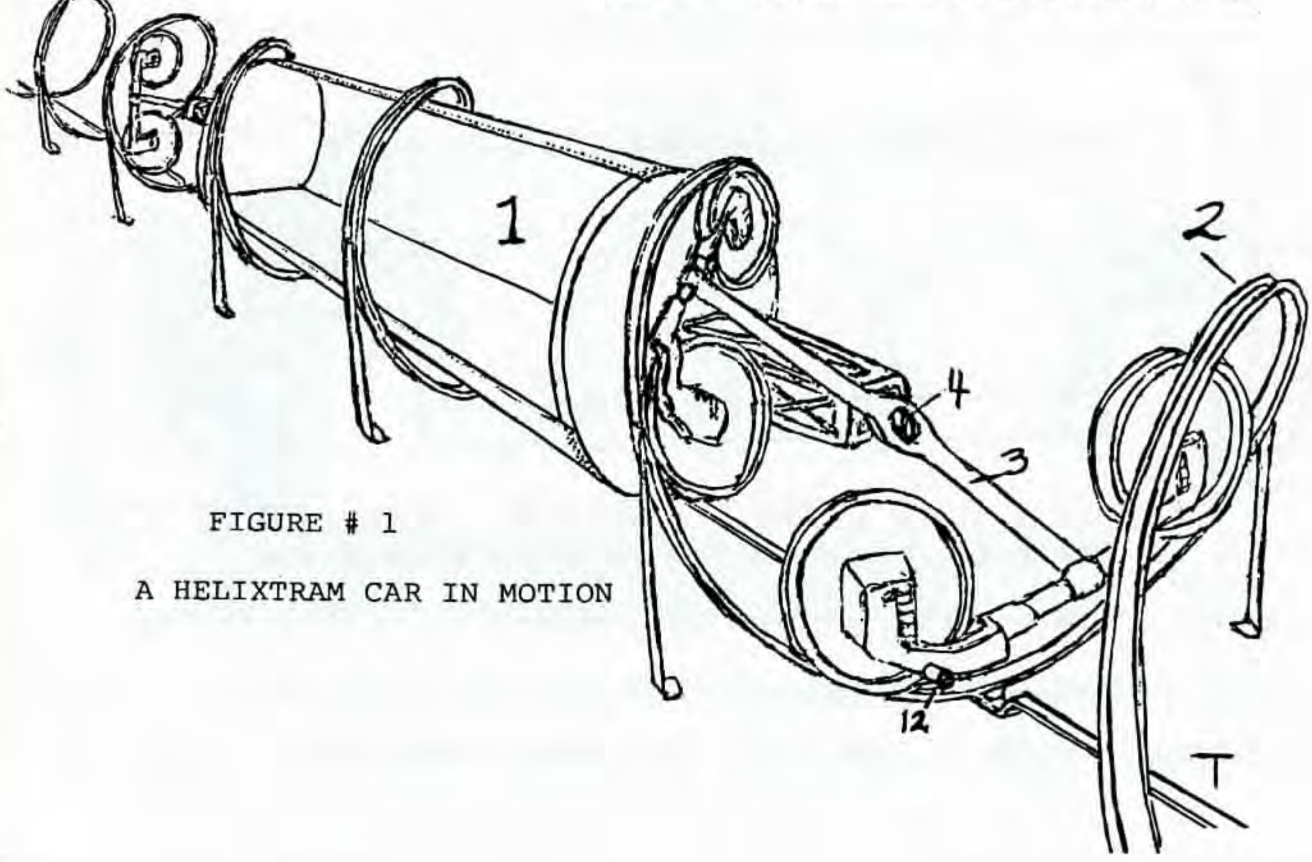


FIGURE # 1

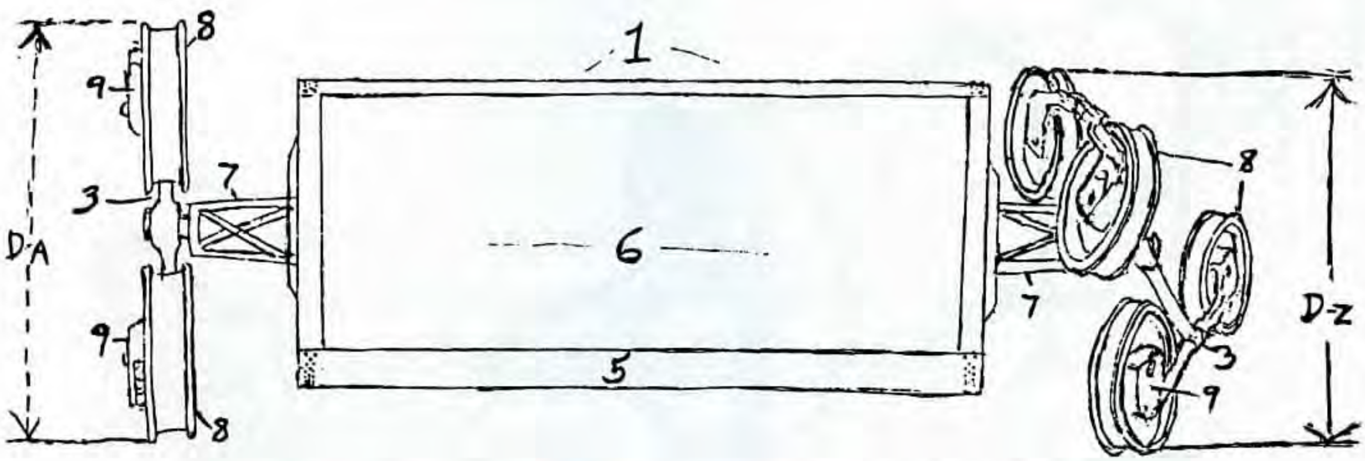
A HELIXTRAM CAR IN MOTION

A rail vehicle (1) is riding within a "helical" track (2). The helical shape is that of a coil spring, or the "thread" of a bolt and is often mistakenly called a "spiral."

In operation, the self-powered wheel carriage (3) at either end of the car (1) are rotating semi-sidewards, carrying and propelling the car forward along the helical track (2).

Roller bearings (4) allow the wheel carriage's (3) circular movement rotation without affecting any tendency to roll the car body (1) over to its side, or remain less than upright, though a third-rail (T) "straightens" this, its runner allowing the car (1) some leeway to sway.

FIGURE # 2 - A HELIX CAR

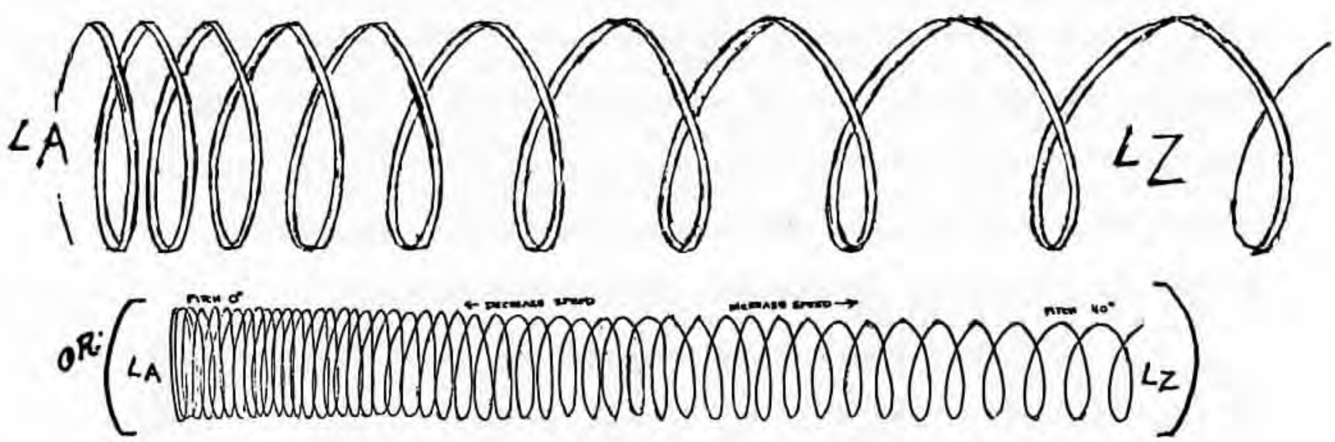


The car (1) carries removable containers (not shown) of many sorts, limited to perhaps 500 pounds per car load, locked in place upon its flat bed (5). The helical diameter (D-A&Z) of the track (not shown) would most likely be 3 or 3-1/2 feet, allowing the load space (6) in the car to be about 6-1/2 feet long, and about 2-1/2 feet in diameter, room enough for a very large man to ride.

At both ends of the cylindrical body (1) of the car are "beams" (7) at the end of which are attached wheel carriages (3). Each of the 8 wheels (8) on the wheel carriages (3) is approximately 15 inches in diameter, and each is powered by an electric motor (9) compactly mounted on the wheel's axle. These motors (9) need only develop one horse power, or less, each. If each motor and wheel turns at 1750 RPM, then the wheels will roll at 30 MPH on the track, and the car itself will then move up to approximately 10 MPH.

The wheel carriage (3) shape is shown in two different positions in adjustment to follow different forward pitch angles of the track, angles A through Z of the next figure (Figure # 3).

FIGURE # 3 - TRACK TO START AND SLOW VEHICLES



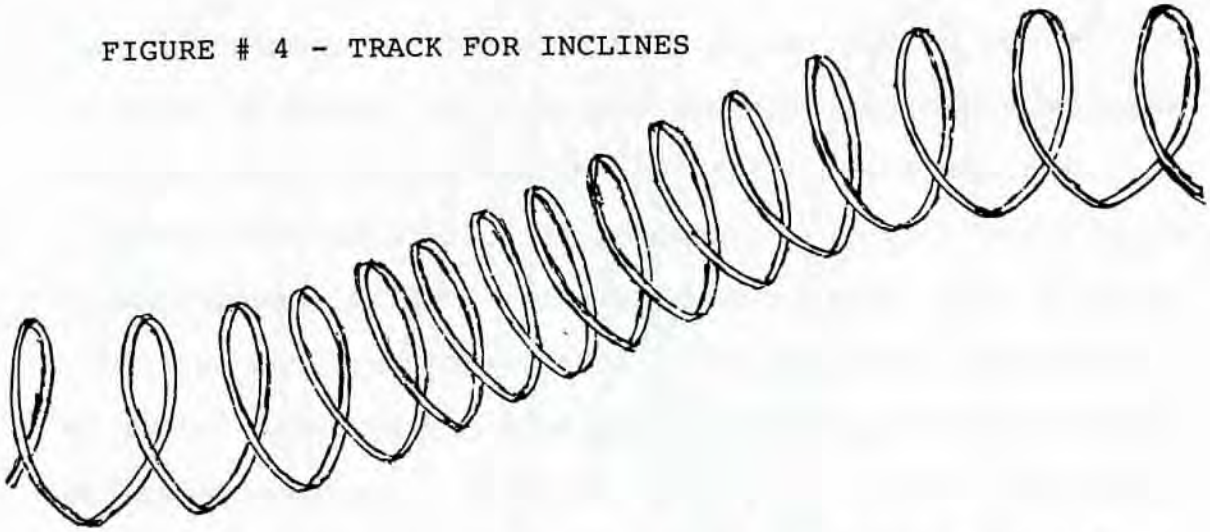
The unique "gear box" capability of the track on which the vehicle is started (accelerated), where the forward angle/pitch of the track gradually increases from near zero (∠A) through to full pitch (∠Z), augments transmissional perfection as the car is brought from a near standstill, to its full speed, the motors overcoming the load's inertia with a full range of gearing, as infinitum ratios, without shifting. The illustration (Figure # 3) distorts, for the graduation of the track's pitch from ∠A to ∠Z must occur more slowly, subtly, not suddenly.

Starting leverages in the lowest (∠A) pitch inclinations of the track, increases the car motors applied pull and increases wheel traction proportionately, thus the motors develop "positive" force without the conventional tractive limitation during starting, wheel slippage, or use of "sand."

Because the gearing relationship of the track allows the car motors to develop torque at a high constant speed, whether the car is just starting (∠A) or moving at full speed (∠Z), at no time does starting add unusual strain to a constant power development of the motor. The constant speed motors which power Helixtram cars are thus lighter and more efficient running in proportion to conventional tractive motors, which are required to develop torque at a variety of speeds, from 0 R.P.M. up.

If a car enters this section of track (Figure # 3) at full speed, moving from ∠Z to ∠A, it will gradually slow to near standstill without a lurch, without need or use of brakes.

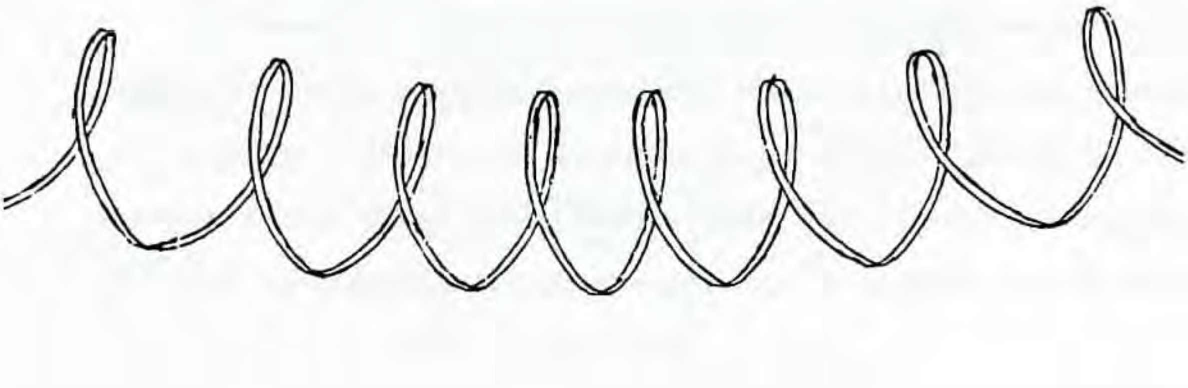
FIGURE # 4 - TRACK FOR INCLINES



Further considering the "perfect transmissional" aspects offered by gradually increased or decreased track pitch, in certain areas of the track, shows that through using a lower forward pitch of the track on hills, the helix car can climb even the severest incline (20 or 30 percent) without conventional difficulties like lack of power, lack of traction, and the presence of an "on-duty" operator.

Though without brakes, the same car can go down the hill on such a track without any dangerous increase in speed, ascent and descent completely and automatically controlled by the track's pitch degree of its forward angle.

FIGURE # 5 - TRACK FOR CURVES (Shown in the top view)



In curves, helix cars cannot "jump the rail" from centrifugal force, although they must be slowed by decreasing the track's pitch into the curve, proportionate to that curve's centrifugal resistance (it takes more power to go around a curve than to go straight.) (While conventionally a derailment might result in a "run-away" car, an encircling Helixtram track cannot release a car to cause injury or extraneous damage, thus such a vehicle is optimumly safe to ride in, or to be near to.)

As the car moves through the curve, the body of the car is free to "bank" of its own will, besides what pressures are expected here by a third rail (T - Fig. #1) to assure the car body will not roll over to its side. The self-adjusting "bank" initiates the load's weight, leaning it into the curve like a boat, unlike the tendency of a conventional rail car or automobile which leans on a curve in such a way as to spill its load against the wall of the car.

Friction against the wheel flanges does not occur going through a helix track curve, unlike that of the conventional rails in curves.

FIGURE # 6 a & b - THE IDLER

The last aspect of using the helix railway variable "track pitch", is the forumlation of "idlers" to remove any forward pitch from the track in spots where the car is to be brought to a complete standstill. If for instance, the car has been slowed by a track pitch degression to ∠A (Figure # 3), the wheel carriages will still be

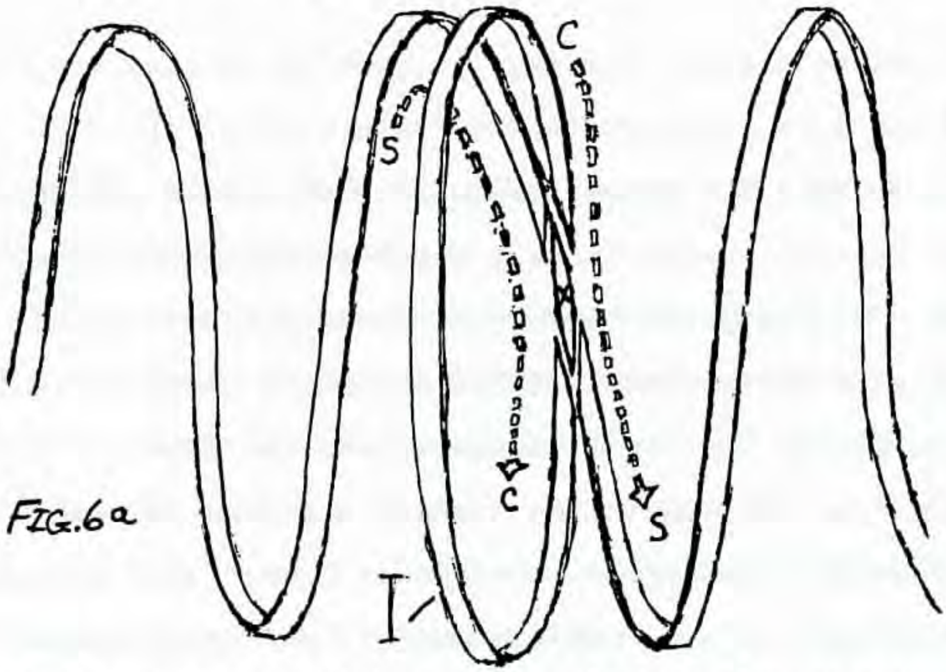


FIG.6a

spinning at a very high speed, and the only way you can stop the car's slow forward motion is to eliminate the forward pitch of the track, turning it into circles (I) on which the wheel carriages can continue spinning without moving the car forward.

Pairs of "idlers" (I) (only one is shown) switch the car's wheel carriages from a screwing (s) to a circular (c) motion to stop a car, and from circle (c) to screw (s) when the car is to move forward. Idlers also allow the cars to pass through un-idled(s to s) or of course, can hold a car idling (c to c) interminably.

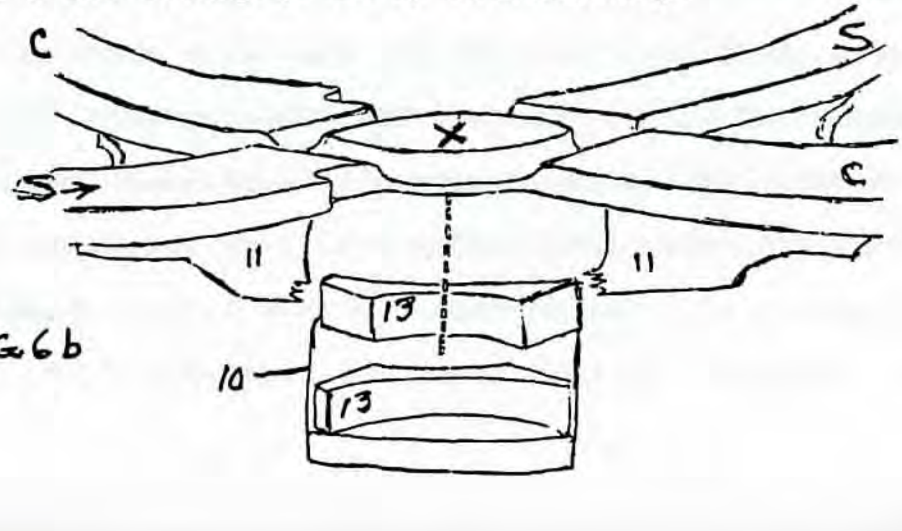


FIG.6b

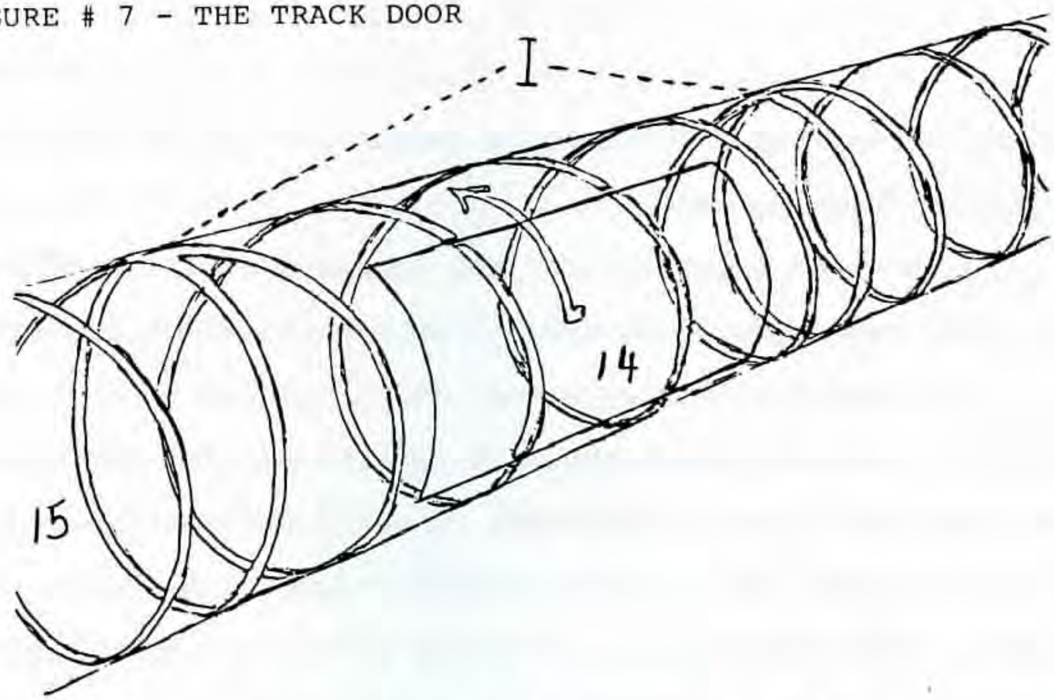
Idling a wheel carriage is done by raising and lowering the idle crossing's (X) "point plate" (10 - Figure 6b), drawn far below its housing (11) that guides its short "throw", approximately wheel flange depth (maybe 1/2 inch). Such a short "throw" is necessary to contend with a split-second interval where the point plate is raised, switching the wheel carriage onto the idle circle (s to c) and as the 4th (of each wheel carriage) wheel enters into the idle circle, the "point plate" (10) must be lowered instantly before the 1st wheel. An impact roller (12 - Figure # 1) on the wheel carriage lowers the point plate by tripping a lever (not shown), thus not only at the exact instant, but also with the force necessary to do so. This particular "point plate" (10) design must be raised again, between the 4th and 1st wheel in order to un-idle (c to s), using the same impact roller (12 - Figure # 1) to lever to make an opposite throw.

Though the angles of the crossing in Figure 6 a & b are tremendously exaggerated, the point plate (10) guides both flanges of each wheel in or out of the idle track circle, extending the shock of doing this to two "idler shock" (13) surfaces going into idle (s to c) and two other shock surfaces going out of idle (c to s). The idler crossing (X) should be mounted at the top of the circle of track, which reduces shock, but the illustration has it on the side, its blow-up (Figure # 6 b) upside-down, to show it more clearly. The idlers, necessary at both front and rear wheel carriages, determines one "standard length" of all Helixtram cars from "beam to beam".

Besides fully halting the car, idlers (I) enable the wheel carriages to be brought to speed without resistance, in a purely circular motion (c to c), and then when the idler is switched to screw (c to s) position, the spinning wheel carriage can initiate tremendous forward momentum to overcome the car's standing inertia. The helix vehicle is unique in its facility to create or, by keeping the wheels and wheel carriages moving at full speed, to retain forward momentum, regardless of whether the vehicle is moving forward. This all suggests above conventional efficiency in starting and stopping, and no stalling; but what is also important, its vehicle will accelerate formidably from standstill to traffic speed, making such cars easily injected into traffic flows.

One might assume the idler loop (I) would initiate a "brick wall" stop, or inversely, a horrendous jolt to start the Helixtram vehicle, but such is not the case. Rather, the car's wheels will flow smoothly in (S to C) or out (C to S) of the idle track circle (I), stopping that container gradually as each wheel in sequence is "turned-in or -out" in one smooth progression, moving this from or to still.

FIGURE # 7 - THE TRACK DOOR



The idler (I) is used in places where the car is to leave a container it is carrying or pick up a container for delivery elsewhere, and the facility through which the container is inserted or ejected is called a "track door" (14.)

Supplied with standard containers, the customer places something in one and places it on an "insert rack",* the container to be removed from the rack automatically by a Helixtram vehicle which will halt on that home or store's idlers (I) momentarily, the track door (14) open (↰), the rack insert with the container on the car, the track door to then close, and the car to move on to or towards the container's destination, insertion accomplished without manual application or operator attention. When the container's destination is reached, idlers will again hold the car, a

* Insertion or ejection of envelopes, packages or large containers, requires a too-specialized apparatus to involve us here.

track door opens, and mechanism will eject the container automatically, the track door will close, idlers snap, and the car will be away within seconds.

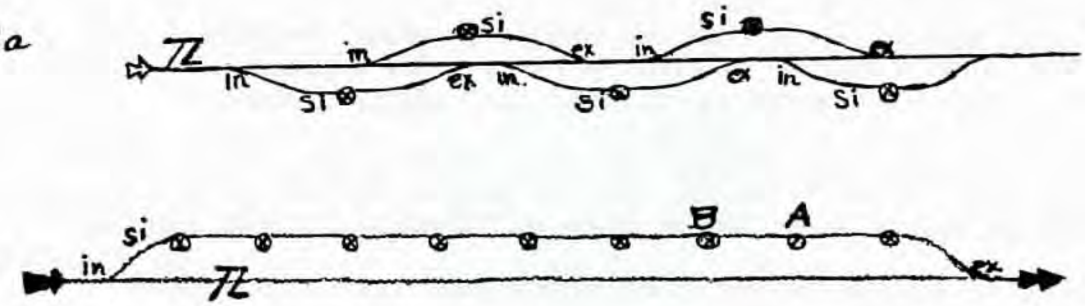
The track door (14) is a section of the station tube (15) wall and track which is moved (↰) to the side and then rotated over the stable portion of the station tube (15) to give open access to the container of the vehicle being idled.

The track's forward pitch by the track door is much less, many more loops much closer together, than its illustration (Figure # 7) shows.

FIGURE # 8 a & b - THE SIDING

Fig#8a

Fig#8b

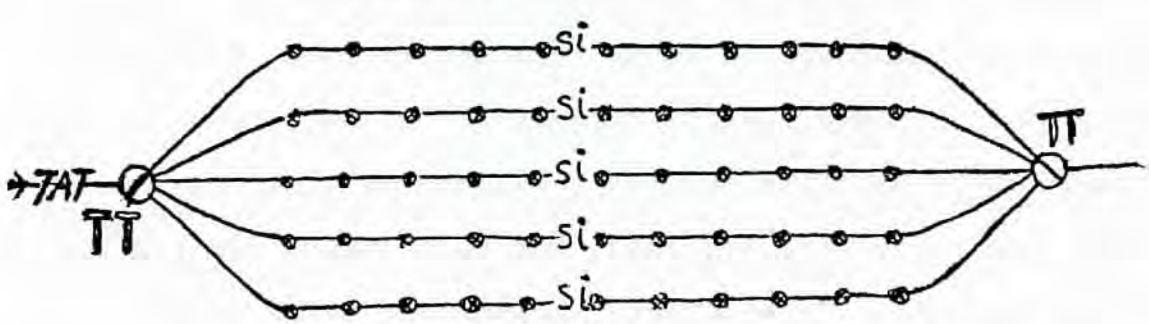


A major conventional limitation to automatic delivery to any home is the number of sidings and allied switchwork necessary en route from and to many, many destinations. Conventionally (Figure # 8 a), each home (x) (or store) would probably require a lengthy by-pass, ergo intake switch (in), siding (si), and exit switch (ex), off a trunkline (TL). In contrast, because the helix track (Figure # 8 b) halts and starts its cars with an extraordinary ease, it may serve many (perhaps several dozen) homes (x) on each siding (si).

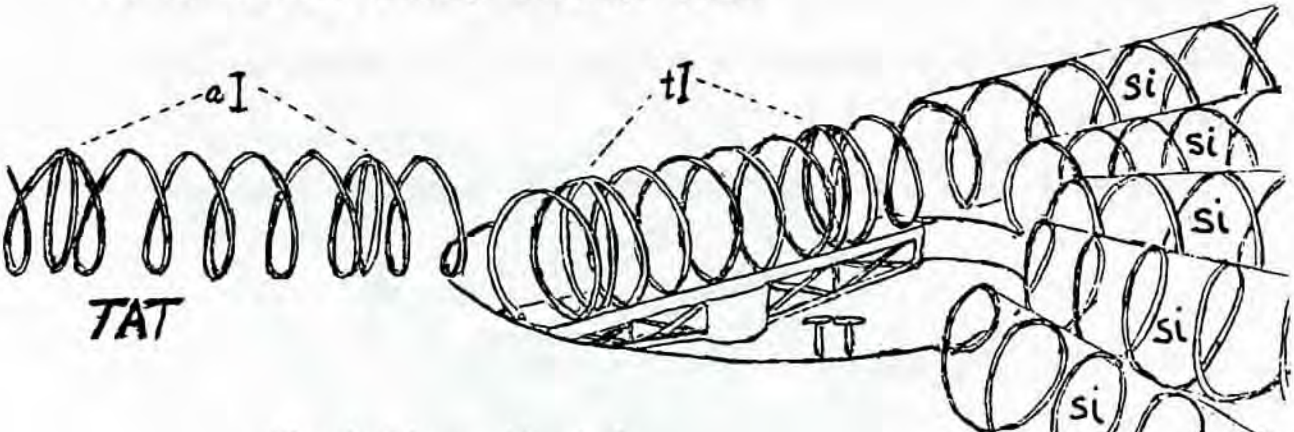
For instance, if a Helixtram (Figure # 8 b) car loading or unloading at point A, momentarily blocks the siding, collision with an oncoming car can be avoided by idling the second car at point B until both cars can move forward. Conventionally it is difficult to adjust for moving car's tendency to bunch behind a car that is stopped, but idlers operating in sequence as B did to A, avoid "tail ending" collision.

A ramification of the Helixtram's multi-station siding is that a car passing through it will move only at approximately 1 or 2 m.p.h. for the length of that siding, this limiting the effective multi-station siding's length to several blocks in a row, of houses. Most feasible, in town, this situation is quieter and simpler than a short station tube bypass at each home which would allow vehicles to go past homes without slowing, using nearly identical equipment to that described later in Figure # 10, for bypassing, or in rural areas.

FIGURE # 9 - THE TURNTABLE



Access to the multi-station sidings (si) is made available by the Helixtram "turntable" (TT). Figure # 9 first shows a tentative "track plan" using turntables (TT) to route cars through sidings (si).

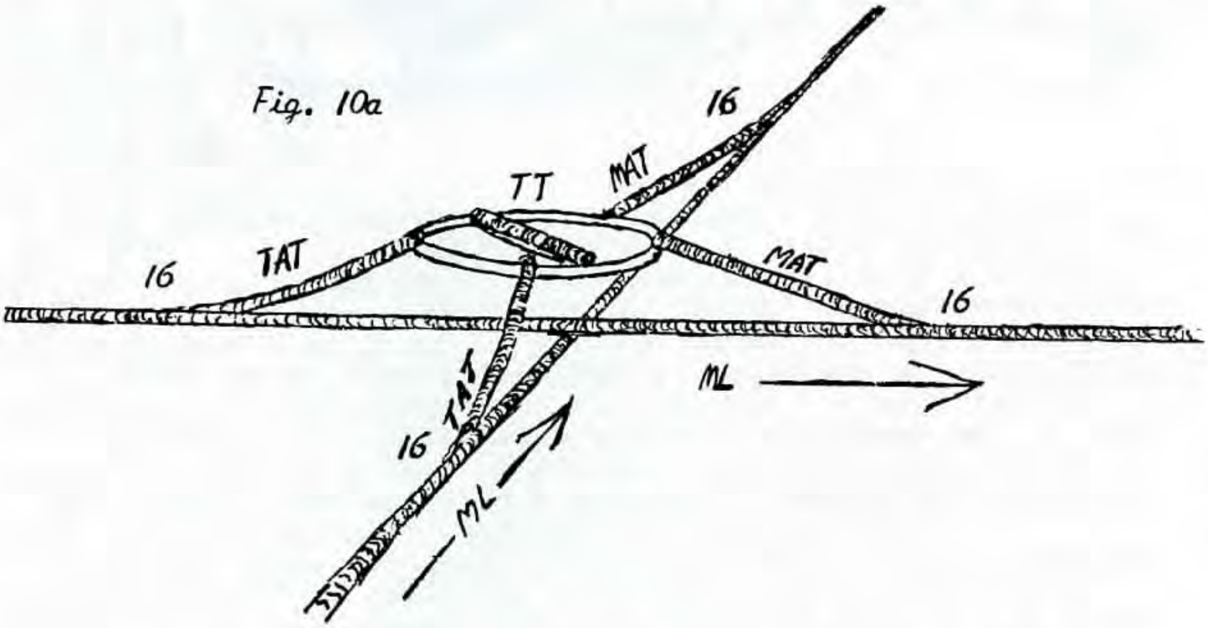


The helix rail style of "turntable" works in conjunction with the aforementioned "idler" (Figure # 6) mechanisms. In operation, a vehicle is held in an idler (aI) on the turntable's access track (TAT), and when the turntable has turned to receive a car from that track, the car moves onto it and into the turntable's idler (tI) and idles as the turntable turns to the siding (si) of the car's destination.

Because each car is idled briefly on the turntable, its destination can be more easily read than can conventional automaticity reading moving cars. A car is easily automatically weighed on the turntable in determining transported weight for customer billing. Turntables deduce roadworthiness of each vehicle, observed there more easily on the "centralized" turntable idler (tI).

The turntable allows the greatest amount of directions in route choices, in the least possible amount of room. Turntables reduce travelling distances, curves, switchpoint at speed derailment and wear, eliminate need for car motor reversals, and allow placement of its system indoors, free from weather's corrosion, ice, tampering and accidents.

FIGURE # 10 a & b - THE TURNTABLE BY-PASS AND SWITCH



The "turntable by-pass" (Figure # 10a) allows mainline (ML) traffic to stop only at those turntables (TT) which specifically redirect it. The turntable by-pass utilizes 4 switches (16) that direct traffic that is moving at cruising speed. The turntable by-pass tracks may pass beneath the turntable structure, thus the cars entering on the turntable access track (TAT) slow moving up an incline, and are started on a mainline access track (MAT) going down one.

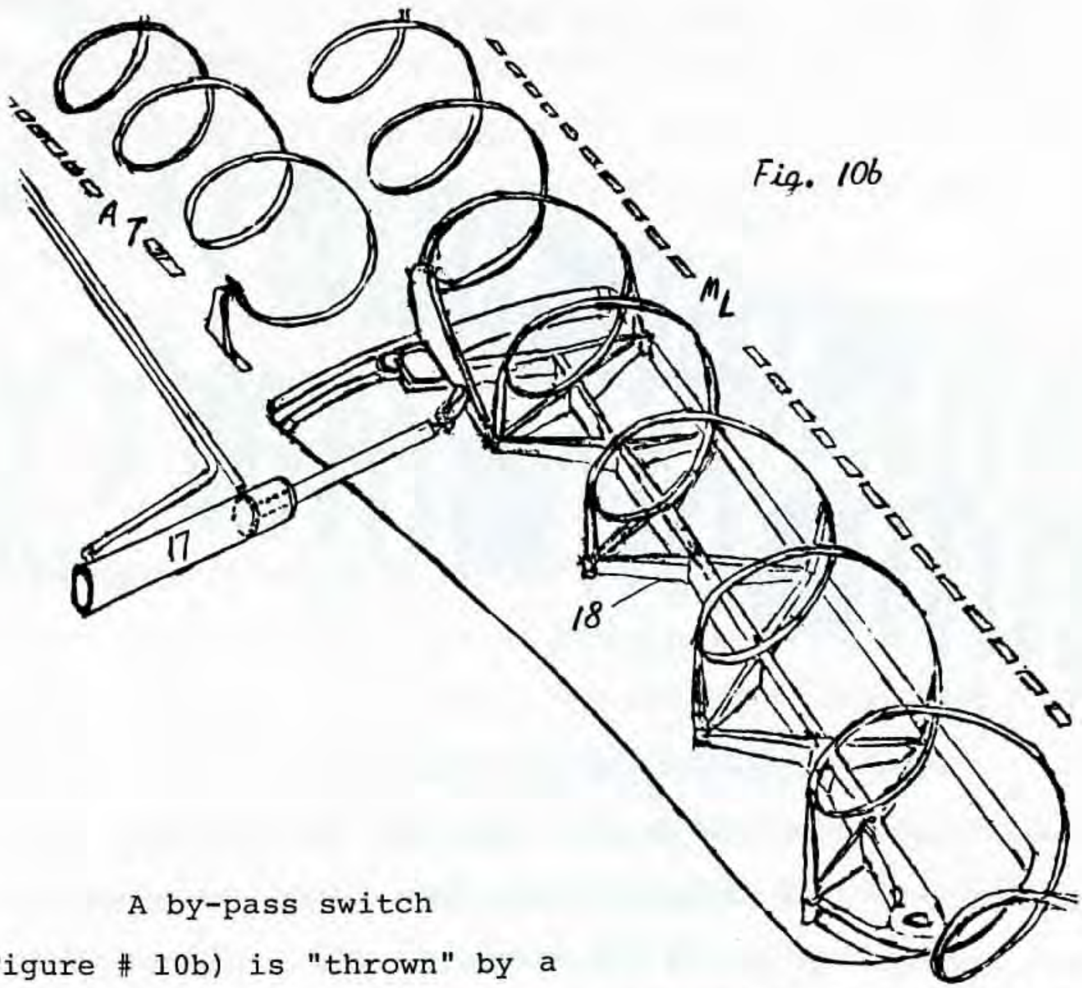
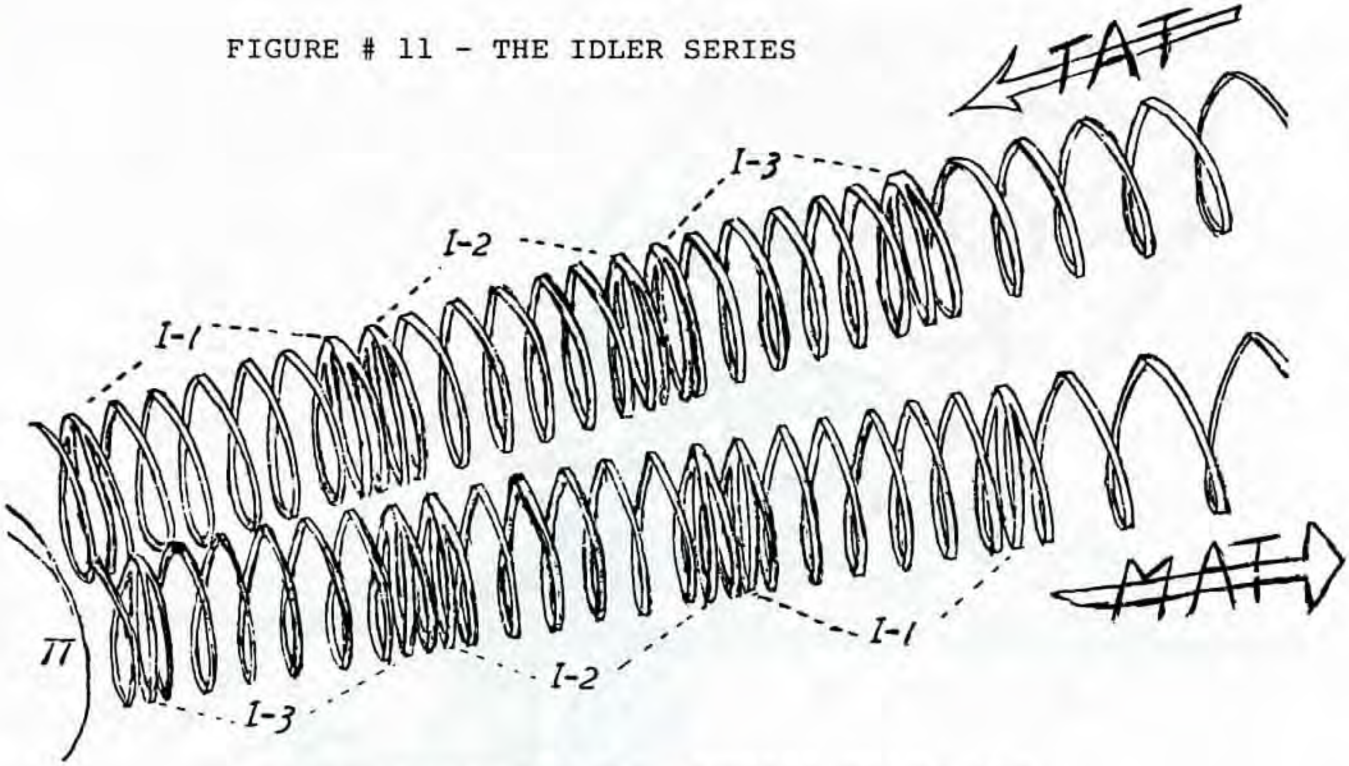


Fig. 10b

A by-pass switch (Figure # 10b) is "thrown" by a pneumatic piston (17), opening or shutting the switch its extensive distance as quickly as is appropriate. The four by-pass switches (16) at any turntable are operated from a single compressor/pressure tank at that turntable.

The by-pass switch is only slightly complicated by requiring the hinging segment (18) of track, that part which actually switches, to hinge into a smooth curvature for connecting the main-line (ML) to the access track (AT). At either position the mounting that holds the hinging track (18), locks rigidly in place to stabilize it, though this mechanism is not drawn.

FIGURE # 11 - THE IDLER SERIES



Cars coming off the mainline and up the access track (TAT) may have to wait for the turntable (TT), and in case a line starts to form, many cars can be held there through the use of the "idler series". The idler series consists of several pairs of idlers working in sequence, holding a car in the first one (I1), a following car in the second (I2), and so on. When the car in the first idler (I1) is taken onto the turntable, the later cars held in the second (I2) and third (I3) idlers in the series each move forward one, leaving room behind for a subsequent car.

Idler series of great length are unnecessary to sustain the heaviest traffic, because the filling of the last idler (I3) in the series would automatically signal the turntable for immediate attention to that TAT track, to assure any incoming car a space. If all the idlers in the series remained full, the turntable by-pass switch will automatically disallow entrance of further traffic, which would shortly return up the other TAT track of the same turntable.

The traffic going from the turntable to the mainline from the turntable is idled on the mainline access track (MAT) because cars moving on the mainline are "spaced" apart. The front idler (I1) on the MAT track releases a car so that all mainline traffic will continue spaced at a certain interval. If mainline traffic is heavy, the MAT track's idler series will hold several cars, injecting them into mainline traffic where "empty" intervals exist.

The cars control their own motor R.P.M./speed, so all will cruise at the same speed whether they are fully loaded or empty. The spacing of the mainline traffic is, nonetheless, correctible by the automatic "interval timer/counter" of the turntable which not only tells the MAT track idler (I1) when to let a car go and when TAT track's by-pass switch should take one out, but will also react to a slow or a fast car in the mainline traffic, that it might be taken out at that turntable, its reastat automatically adjusted there, so that the car will "keep its distance" when reinserted onto the mainline.

If through some mechanical failure a car or two caught-up with another car* on the mainline, before the

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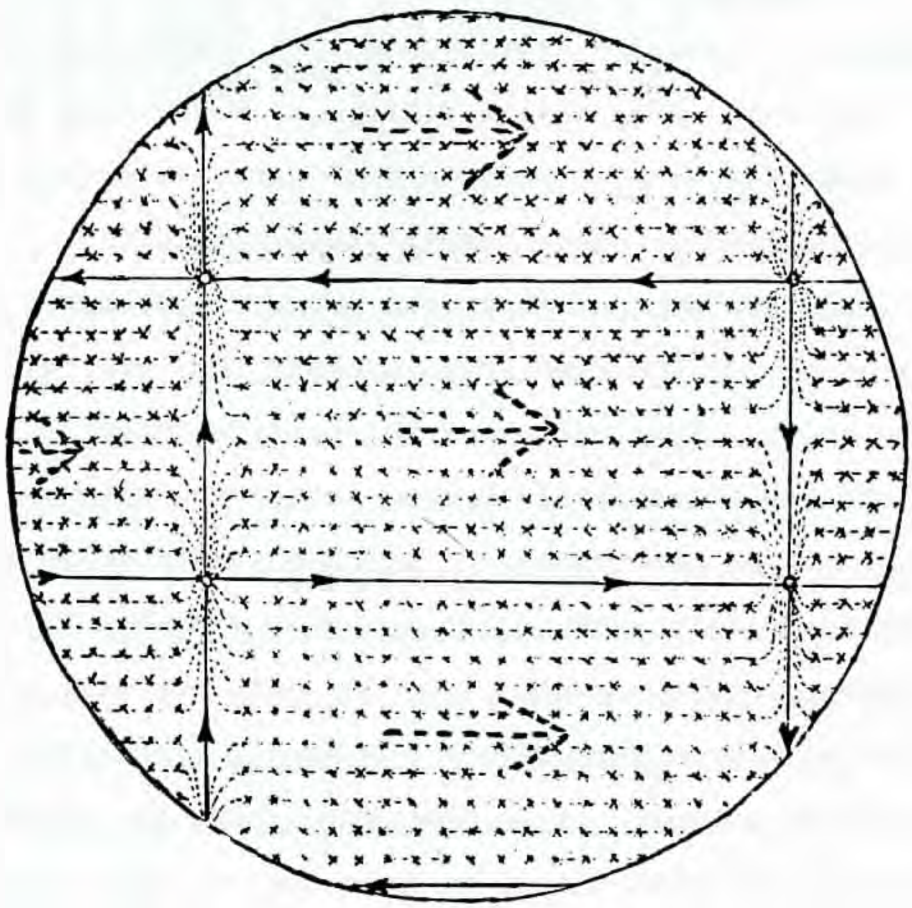
*Suitable "bumpers" for Helixtram cars are easily devised.

slow or the fast one had a chance to be corrected, then this "bunching" of cars rolling along together could be divided by running it through a special TAT track idler series function, which would idle the last car in the bunch on idler 3, the second on idler 2, and so on, so from there each car can be run off separately through the turntable.

FIGURE # 12 - THE SYSTEM



This microcosm of a city's trackplan consists of mainline (——) and siding (····) track, turntables, idler series, turntable by-passes, track doors and idlers in homes (x); these parts completing the Helixtram's basic trackwork. The actual automation by computeral circuit, opening and closing electric switches at the right time in conjunction with a car's route, integrating it with all the other movement, is plausible, given these track components, and a knowledge of the art of computer organization.

Only turntables that can move up and down between tiers could service the number of sidings drawn into each in Figure # 12.

PART II - THE TRACK DESIGN

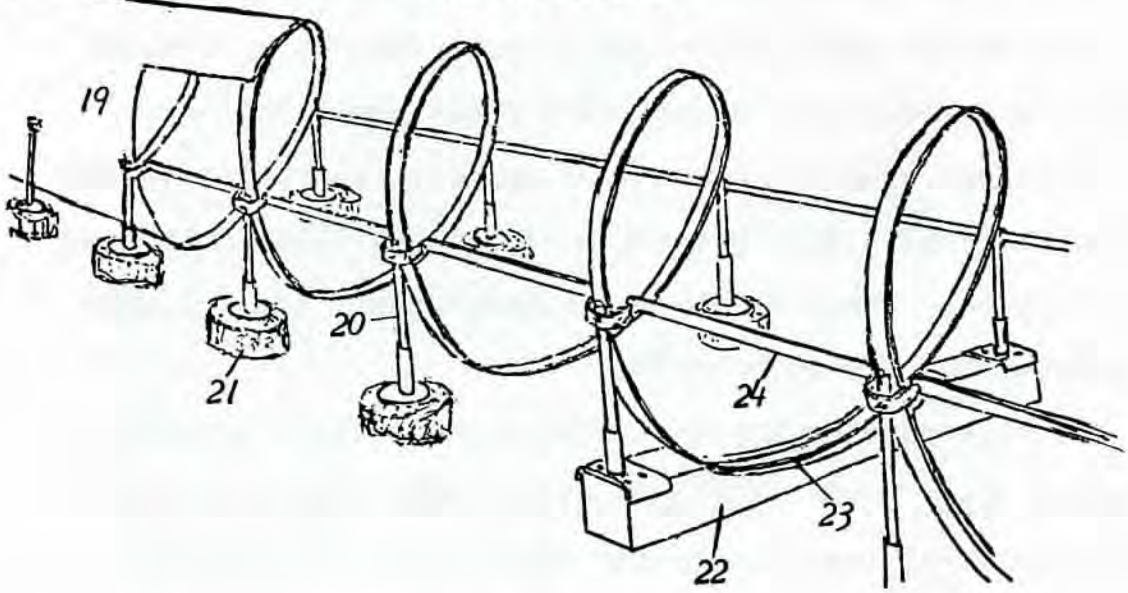
Car speeds being equal, the wheels roll three times as far and as fast over helical track than on a straight rail, distributing the vehicle's shock and weight over three times as great an area of support, in traveling the same distance. This principle of rolling is unknown, and one may only guess at its efficiency; there are too many factors that are to be considered.

Structurally, the arching steel helix is uncollapsible and unexpandible to significant proportion, and the wheel carriage inside the track offers a four-point truss which adds significantly to the strength of its encirclement. Intriguing to watch, such as the wheel carriage's movement offers gyroscopic and centrifugal force fields, which will further balance stress and stabilize the track.

The major cause of conventional rail wear and replacement is damage at rail joints, that "clickity-clack" each wheel makes rolling over smashes where the rails join .

Welding the conventional rail ends together is only partially successful, because as changing temperature causes the track to expand or contract, assuring even wider rail joint gaps at rail end, or track "buckling" in warmer seasons. The helix track's expansion and contraction, on the other hand, offers no functional problem whatever, and all rail joints can be welded, extending track life far beyond the conventionals.

FIGURE # 13 - THE TRACK COVERING, SUPPORT STRUCTURE, AND THIRD RAIL



Helix railway track is most easily covered (19), acting as the structure of the covering's support. Covering the vehicles from rain, vandalism, or being stopped by snow, as well as protecting the local inhabitants and their animals from being maimed or killed, even electrocuted just by touching upon its rail, also eliminating most of such a vehicle's noise, is necessary. Presumably, protective track covering would limit the size of load which could be transported on a conventional tram, thus helical track encirclement is shown to allow as sizable a load. If buried, Helix track can formulate the support of a tunnel, or on the surface can simply hold a "wrapping" (19) of chicken wire and tar paper; conventional track cannot be so easily covered.

Helix track can be mounted along the side of a hill or cliff-side, the track fastened from bottom, sides or top with nearly equal ease, without damaging the ecology by grading or blasting a level path. Elevating the track on tall poles in certain areas, or suspending it from wires to form bridges, helix track requires a minimum of holding structure.

The length of the poles (20) which hold up the helix track can be adjusted to level and straighten its track in contrast to conventional "gravel packing" roadbed maintenance. The adjustable length poles (20) may rest on simple "treated tree slabs" (21), although a "cross tie" (22), holding the lower portion of track on a buffer plate (23), may be a promising method.

The tram's "third rail" (24) from which the car picks up electricity, gives the track horizontal stability intrinsically, and will also act as a guide for spacing the track when laid. The horizontal track support opposite the third rail might be of wood, or even unnecessary if using "cross ties" (22), the third rail then at the track's top instead of as drawn (figure 13). The best complete track support systems for various terrains, vehicle weights, and traffic could only be known after trial and experimentation.

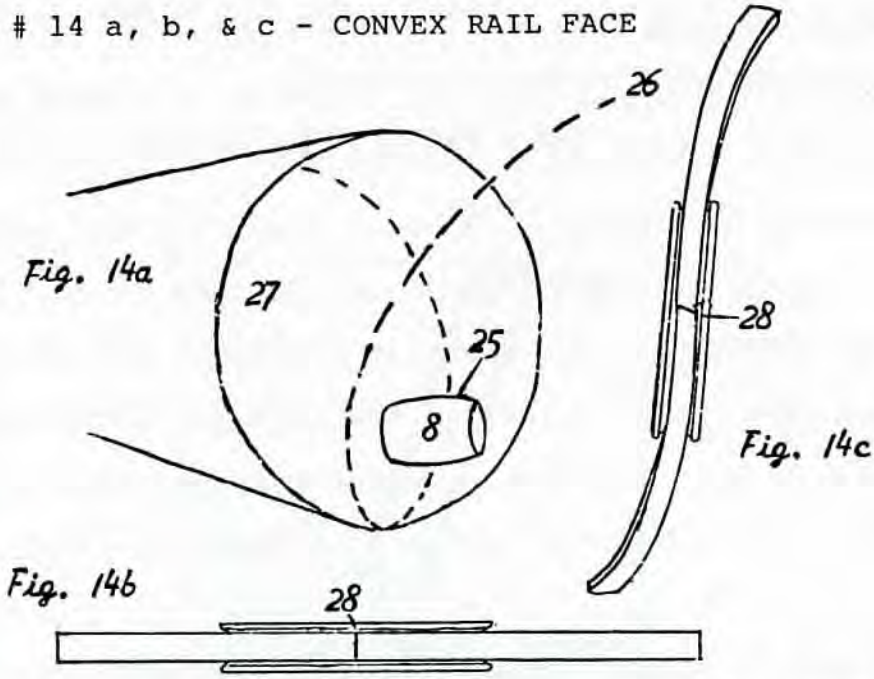
TRACK PITCH AND DIAMETER VARIATION

Each length of Helixtram track must be made in accordance with where in the trackwork system it is to be laid. Figures # 3, 4, and 5 show "pitch adjustment" sections of track for starts, stops, hills, and curves; track sections which must be formed with the pitch variance built-in.

Further analysis shows that these "pitch adjustment" sections of track would not be literally helical, because as Figure # 2 shows, the wheel carriage reduces in diameter (DA to DZ) as the track increases in pitch, thus the track in idle position may be 3-1/2 feet (DA) but as the pitch increases, the diameter will correspondingly decrease to approximately 3 feet (DZ) for full speed on the straight and level.

Building-in variation (DA to DZ) in the helical diameter may involve still further calculation because the diameter of the coils of the rail could be formed slightly oversized (and under-pitched), and "stretched" into place on its supports, creating a dynamic tension that could increase rigidity and stability within the rail.

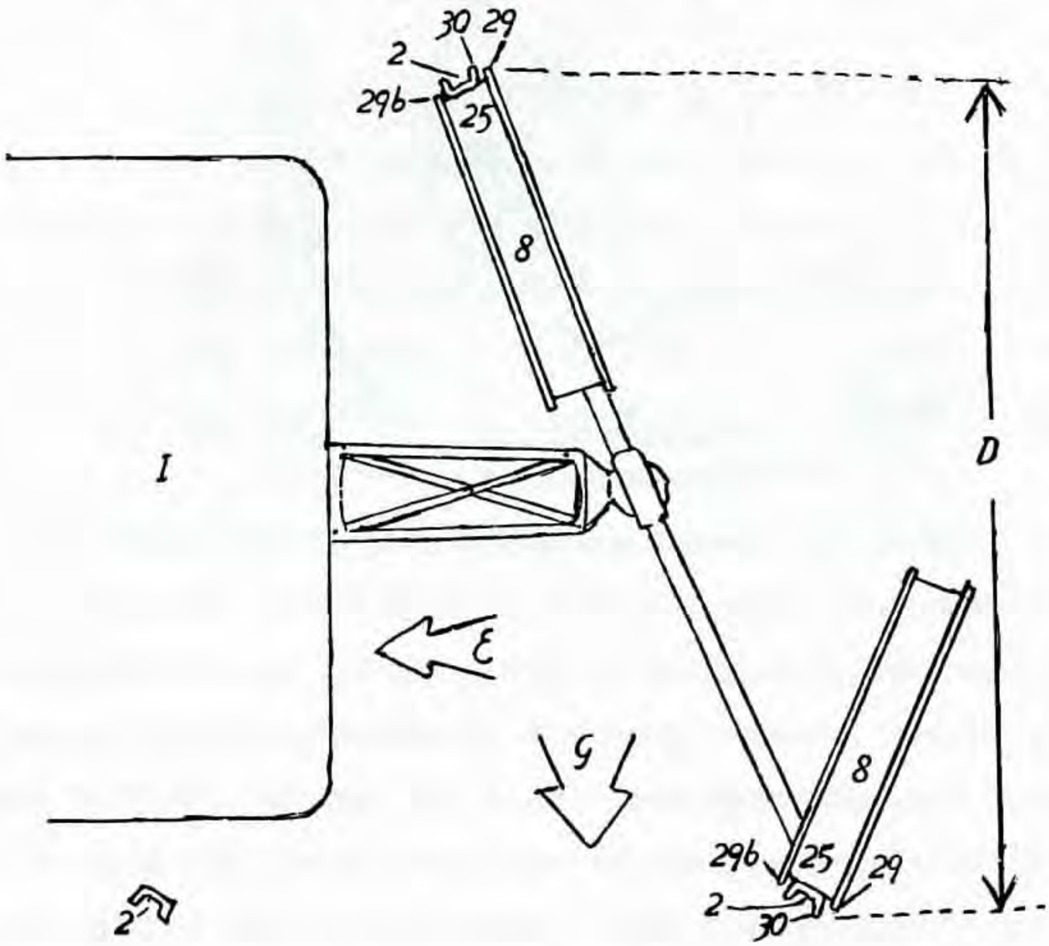
FIGURE # 14 a, b, & c - CONVEX RAIL FACE



Where in obvious appearance the track's pitch and diameter varies, there is also a proportionate variance in the "track face" (rolling surface), in the degrees that it is to be made convex. Figure # 14 expresses the situation tremendously exaggeratedly, and in the inverse, showing how the tire (25) of a wheel (8) would not "seat" fully on a helical track surface (26), represented by the inside of a tube (27), unless the wheel's tire (25) was convex, or inversely, unless a helical track face is convex, which it is thus to be made. The more forward the angle of the track's pitch, the more convex the track face must be, in order that the wheel tire surface will always "seat" on it, throughout the variance in the track's pitch.

Interestingly, helical rail-to-wheel contact, or "seating" (28) is not in the conventional attitude (Figure # 14b), but rather is to some slight degree "S-shaped" (28 Figure # 14c), without other functional ramification or as an inert cause or friction.

FIGURE # 15 - TRACK FACE BEVEL / for Wheel Tilt



Perhaps the most crucial innovative technology of the Helixtram is ANTI-FLANGE WEAR function, consisting of a "track face bevel", and its corresponding action, "wheel tilting", as drawn purposely adjusting to lean the wheel (8) rolling surfaces "into the pull" (E). In this figure the car (1) is accelerating from left to right on the track (2): it is a "cut-away view" from its side.

As the car accelerates, or moves up a hill, the wheel flanges (29) do not come in contact with the sides of the rail (30) lest the resultant friction wear off the flange; rather, the track (2) bevels and wheels (8) tilt into a position to pull the full of the car's inertial resistance (E) directly on the wheel tires (25) instead of against the flange (29). As long as the track's diameter (D) will not expand under the inertia's pressure (E), to make it do so, it is impossible for the flanges (29) to touch the rail side (30), track beveled and wheels tilted proportionate to inertial resistance, just as is the track's pitch almost regularly.

When the car is moving at full speed on level track, the track bevel-wheel tilt remains, to some slight degree, relative to the amount of inertia and air resistance overcome. Where the car is braking, the tracks bevel and wheels tilt at the opposite angle, to maintain braking force on the tire (25) rather than flange (29b).

Other than to encounter bent-up uneven track, flanges (29 & 29b) are only necessary where there is no inertial resistance (E), where there is no track bevel and the wheels are straight up, as in "idle" and momentarily in transition from cruising into braking.

In order to keep rolling friction at a minimum, the tires (25) of the wheels (8) are also slightly beveled, approximately as drawn, to equalize, for the most part, a tendency of a wheel rolling on beveled track to suffer rolling misalignment. The tire (25) bevel to track bevel principle: a cone aligned to roll in a straight line on the inner surface of a larger cone, representing the most constant angle of the track's bevel.

SHOCK ABSORPTION

As gravitational force (G - Figure # 15) applies against the track, the "offset" suspension of the Helixtram car will innately absorb "road shock" in many places on the rail. For instance, a shock against a lower wheel at the track's bottom is extended pushing up and back or forward on the wheels at the track's top; the shock absorbed in rail flex and wheel "side slip" , but does not result in the bouncing of the car.

HOW THE TRACK IS MADE

Incorporating variances in pitch, diameter, convexness, and bevel in the rail is done by extruding almost molten, still pliant steel channel onto a revolving "mold". The mold is a long cylinder-shaped thing, in which a helical slot conforming to the "track variance" specifications had been painstakingly made. It is made like a mold is made, perhaps first in wax, reversed in cement or plaster, then cast in iron permanently. There must be a mold that makes rail to suit each differing trackwork situation, perhaps a hundred or so in all, to make the track for the versatile Helixtram.

The extruded channel is pulled into the mold's slot, and takes on its varying curvatures, and then aligned "side pole" (Figures # 13-20) attachments are welded on, and then the new rail only remains to be tempered. By stretching the rail's diameter slightly it is lifted out and to the side of the slot, and then can be revolved off the mold.

It is possible that sections of track made for curves will be formed on a cylindrical mold that is slightly out of round, in order that they are round when they are mounted, pulled into a curve.

PART III - THE WHEEL CARRIAGE DESIGN

The wheel carriages (Figure 1 - #3) change shape (Figure 2 - #3) in conjunction with the changing pitch (Figure # 3)(∠ A through ∠ Z) of the track in such a way that its wheels always remain precisely aligned to it. Figures # 16 through 20 explain how.

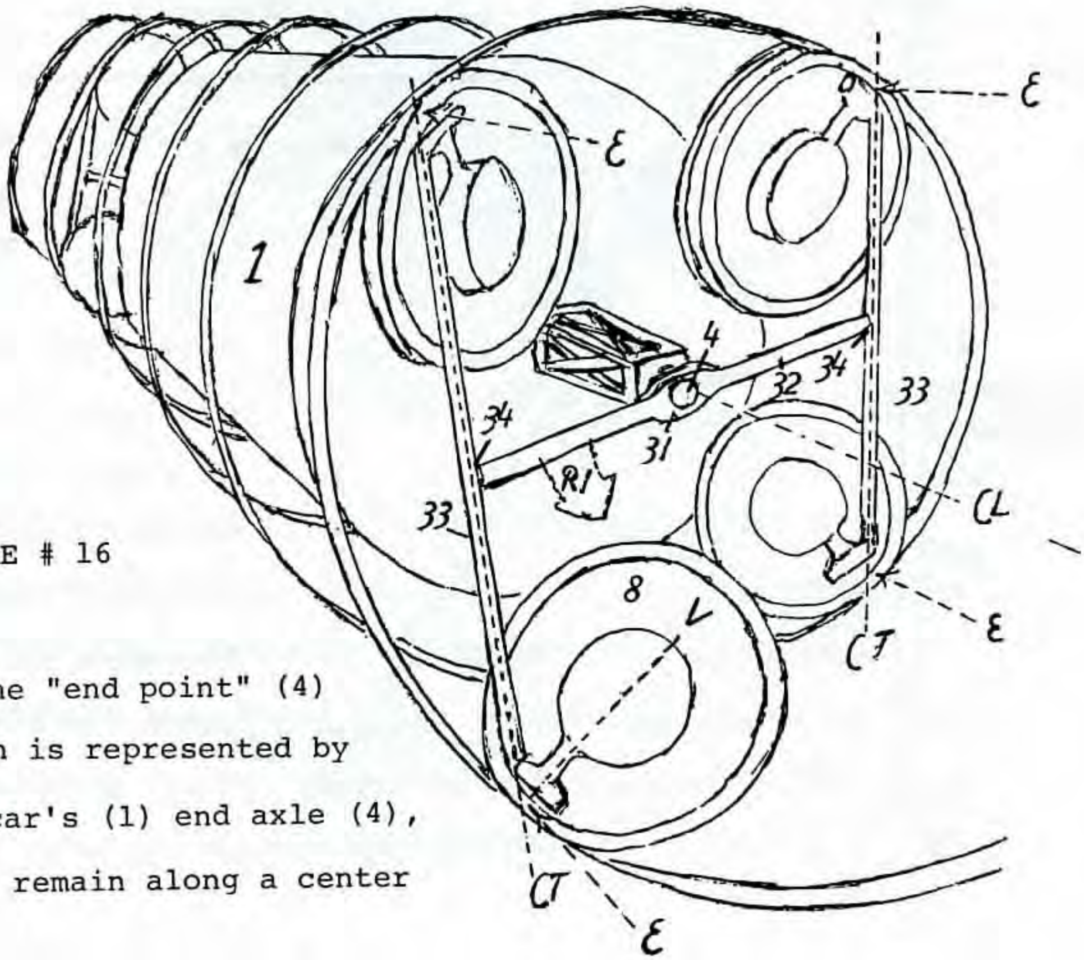


FIGURE # 16

The "end point" (4) which is represented by the car's (1) end axle (4), must remain along a center line (CL) inside the encircling track (2).

The end axle (4) is held at the center (31) of the "inner bar" (32) during the rotation (R1) of the wheel carriage. "Outer bars" (33) are attached (34) at either ends of the inner bar (32).

The length of the inner bar (32) is construed as ending where it intersects tangents (CT) drawn between "wheel-rail" contact points. When the outer bars (33) are laid along that tangent (CT), inertia (E) extended through the inner bar (32) and outer bars (33) will then not interfere with the wheel's (8) upward equalibrium (V), nor create unusual wheel bearing stress as the mechanical wheel "tilting" procedure (Figure # 15) inacts.

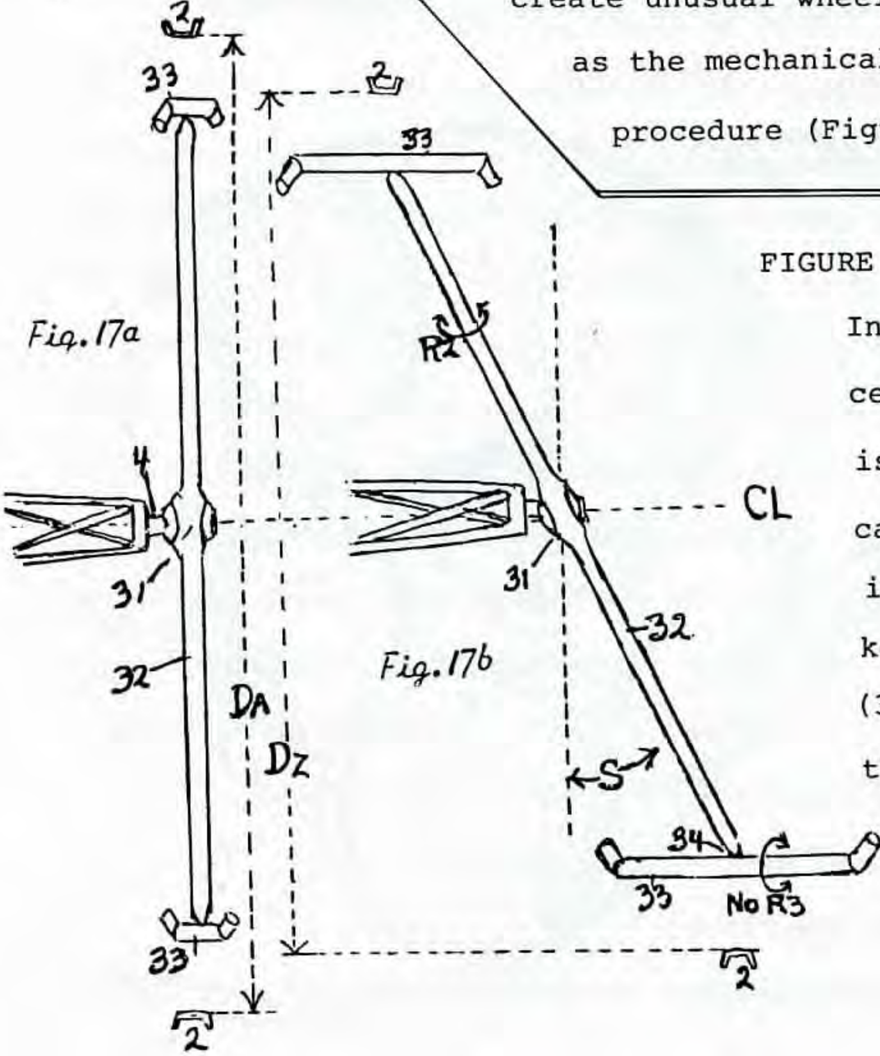
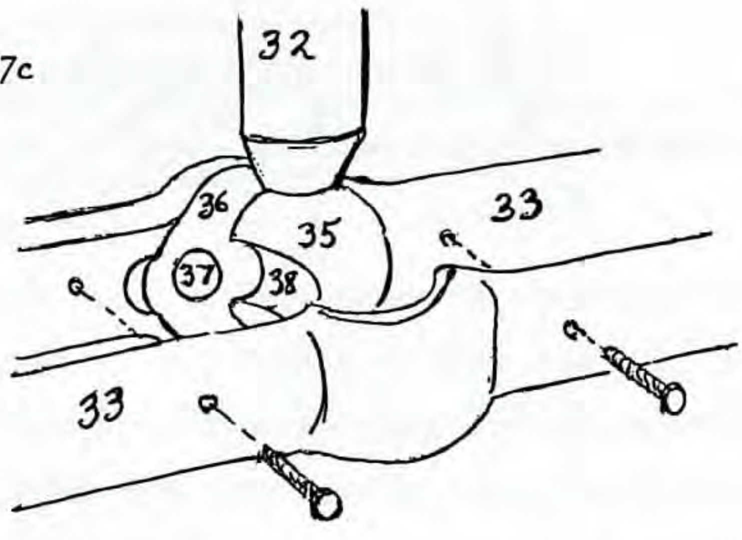


FIGURE # 17 a, b, & c
In the inner bar's center (31), where is attached the car's end axle (4), is a ball 'n socket universal joint (31) which allows the inner bar (32) freedom to slant (S)

forward-rearward variably from straight up (Figure # 17a) to a maximum of 25° (Figure # 17b), plus a certain slight rotatibility (R2) which occurs there in curves.

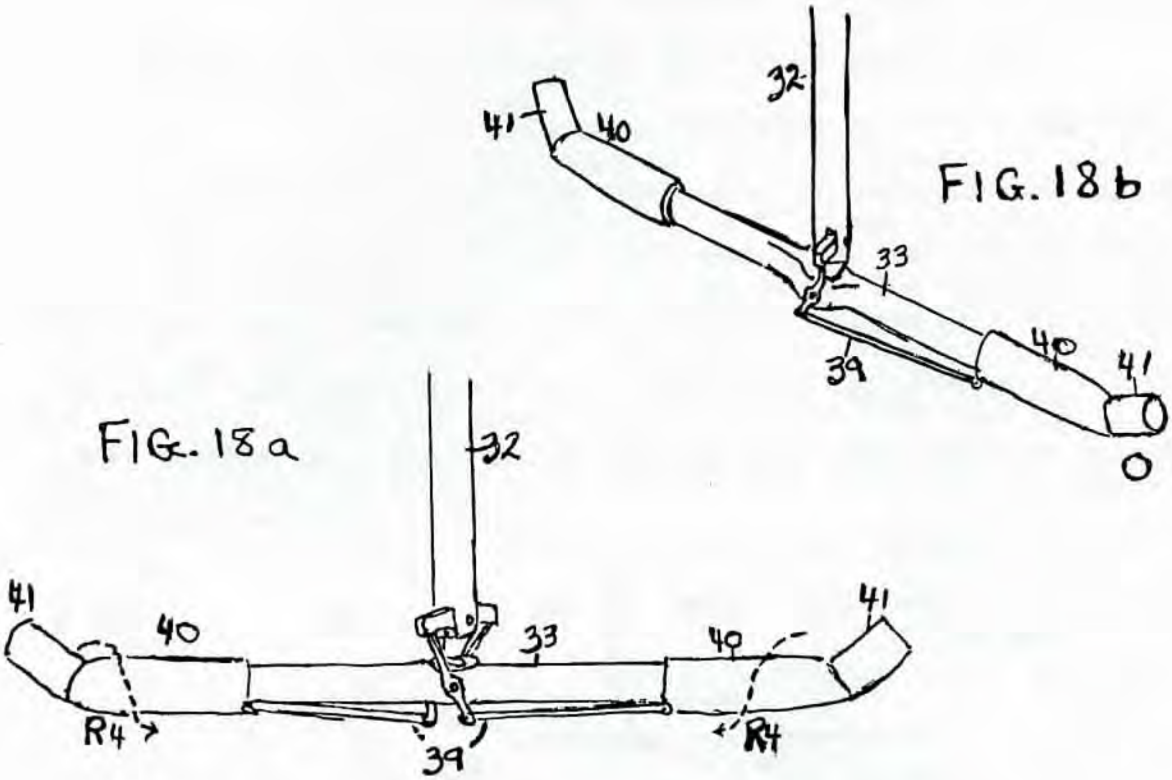
The outer bars (33) mounted at both ends of the inner bar (32) are attached by a ball 'n socket joint (34) because as the wheel carriage follows varying track pitch, the outer bar (33) and the inner bar (32) swivel at odd angles to each other. However, that joint (34) is a "guided" ball 'n socket, thus a multi-angular twisting apparatus that does not let the outer bars (33) rotate (R3).

Fig. 17c



To eliminate that rotation (R3 - Figure # 17b), the inner bar (32) and outer bars (33) are attached (Figure # 17c) through a ball (35) 'n socket (36) which has a "ball (37) 'n slot (38)" guide inside it, so that its unit swivels in an exactly predetermined movement, and it is not free to make any movement beyond that.

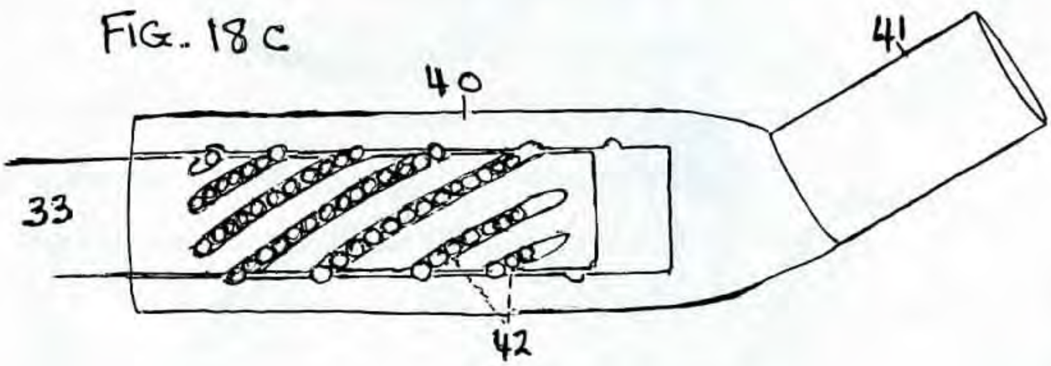
FIGURE # 18 a, b, & c



The track (2) diameter (DA) is 3-1/2 feet in Figure # 17a, and decreases to 3 feet (DZ) in Figure # 17b, in correspondence to the slant (S) of the inner bar (32). As that occurs, the length of the outer bars (33) must decrease approximately 3 inches each in order that their ends sustain the 4-point equalibrium, like the corners of a square, inside the track. In Figure # 18 a & b, a linkage (39) detracts outer bar (33) end sleeves (40) by the leverage enacted as the position of the inner and outer bars (32 and 33) shift during the helix track's pitch differential (Figure # 18a to Figure # 18b).

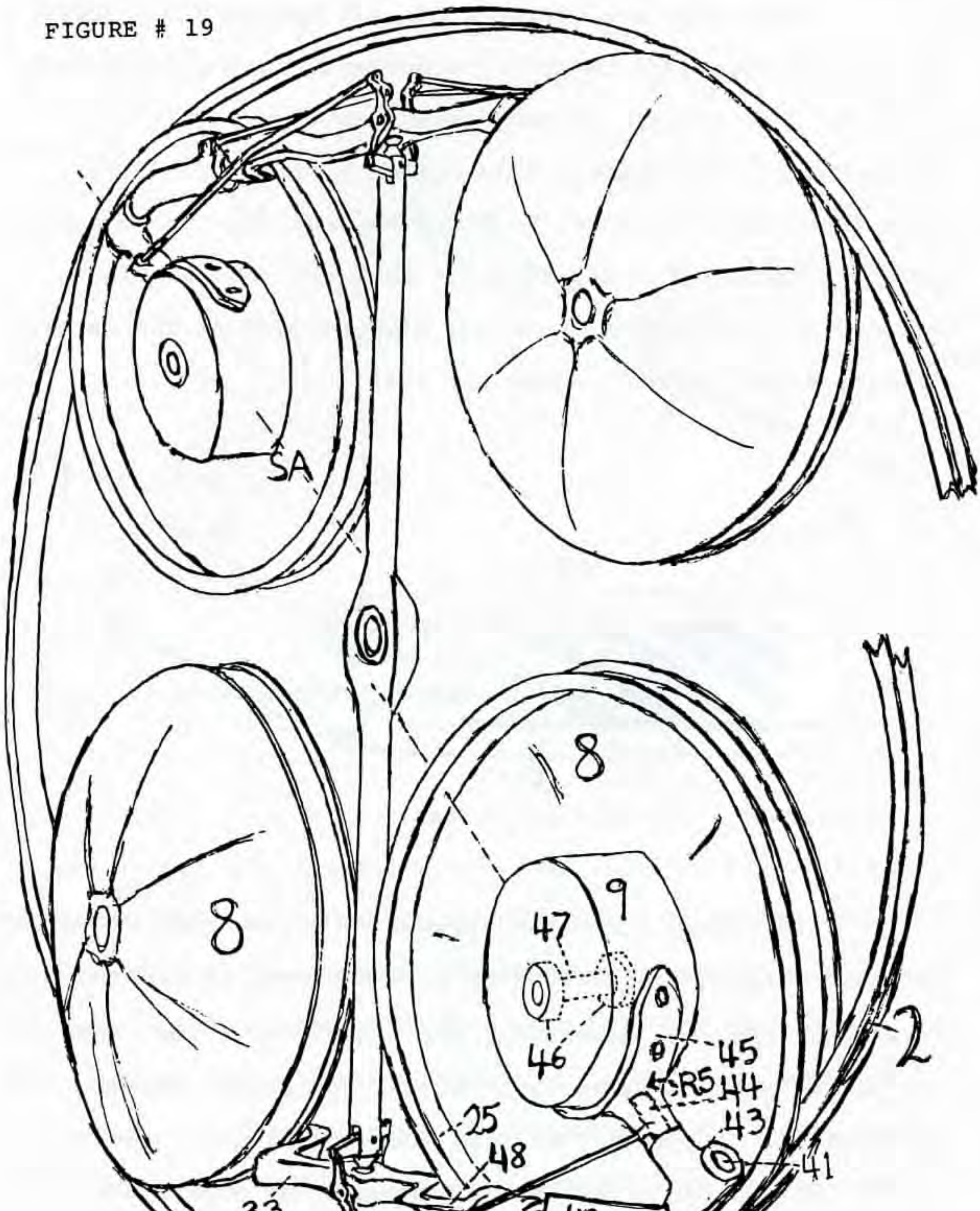
The outer bar sleeves (40) are not only detracted, but must rotate (R4) in strict accordance to the detraction movement. At the end of each outer bar sleeve (40) is a 45° upturned cylinder which is called a "tilt axle" (41), held in correct position, balanced 4-point and "track paralleled (explained in detail later on)", by rotational detraction (R4) of the outer bar sleeves (40) on the stable (Figure # 17b - No R3) outer bar (33).

FIG. 18 C



In Figure # 18b the sleeves (40) are fully detracted and have rotated (R4) accordingly, and though both have rotated in the same direction, the "lead" (O) sleeve has rotated slightly more to have had its end remain "track paralleled". Figure # 18c shows that the sleeves (40) rotate (R4) on the outer bar (33) because of slots (42) resembling "rifling" on the bar and inside the sleeve, with ball bearings (42) in them, guides as well as rolls that movement (R4), as its linkage (39) enacts.

FIGURE # 19

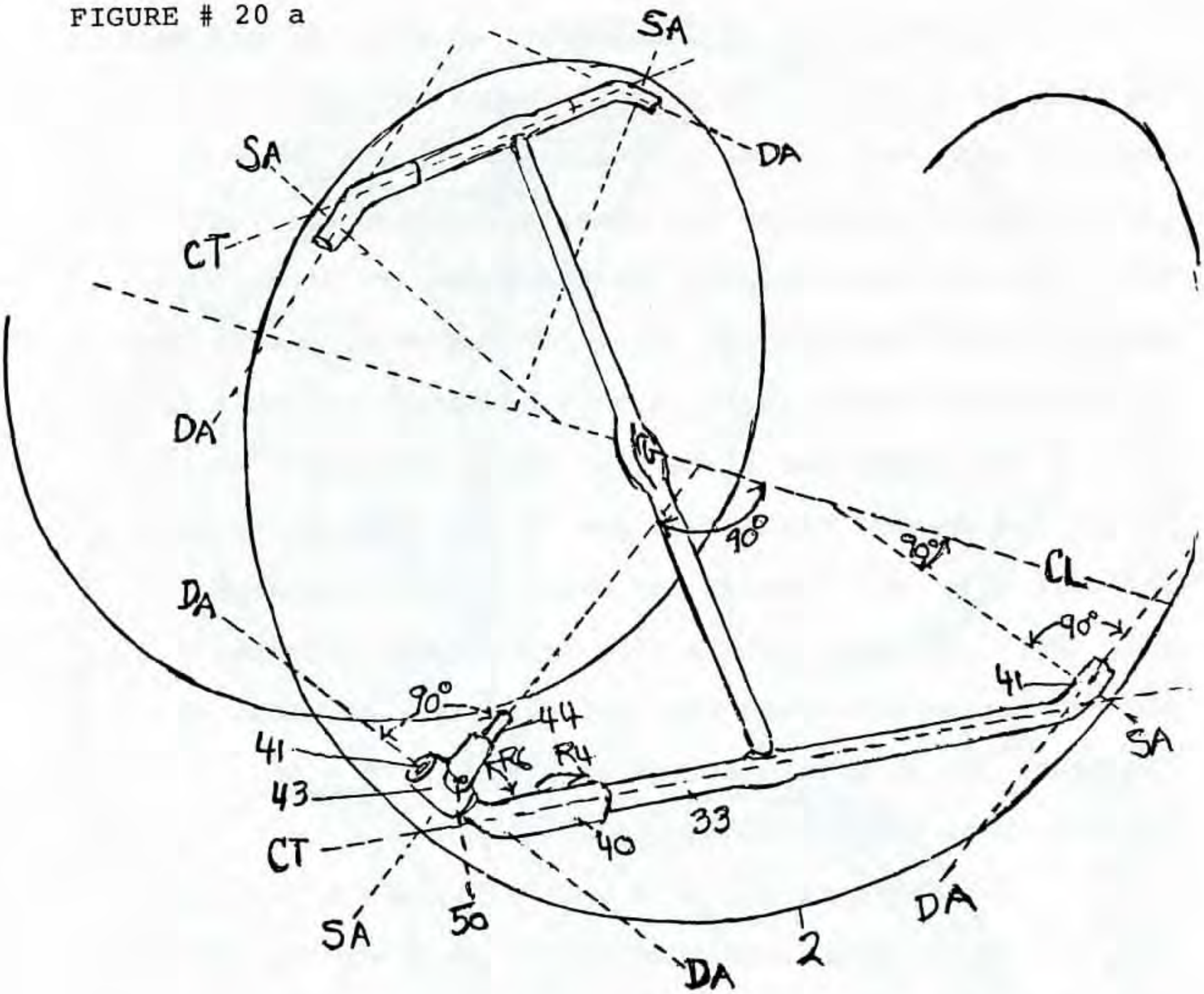


The wheel (8) is "moon disc" shaped, off-set to the side of its tire (25) several inches, in order that the tilt axle (41), motor bar (43-45), and the motor (9) can fit direct center on the wheel's standing axis (SA). There is no rolling support for the wheel (8) other than special motor (9) bearings (46), for the wheel's axle (47) is the motor's shaft (47), in this directest possible drive.

The outer bar piece (33) has a "dog leg" (48) around the wheels' tires (25) put in, in order to locate the tilt axle (41) "inside the wheel" on its standing axis (SA). The tilt axle's (41) female part (43) has a thinned bottom to locate the tilt axle (41) as close to the track (2) as possible (review Figure # 16 - on optimum wheel balance tangent (CT).

Fitting over the tilt axle (41) is a two-piece motor bar (43-45) which is comprised of the tilt axle's (41) female part (43) on one end (disregard "tilting" until further on), an in-built wheel turning pivot hinge (44) in the motor bar's middle, and a mount (45) on which the motor assembly (9) is bolted on the other end. As the wheel carriage opens or closes, the pivot (44) in the motor bar (43-45) rotates (R5) the motor mount (45), its motor and wheel (8 & 9) only several degrees (R5) by a linkage (49) attached as drawn to the existent "sleeve (40) detractor" linkage (39).

FIGURE # 20 a



The basic angles of the wheel's (as yet untilted) upright alignment to the track are shown in these figures.

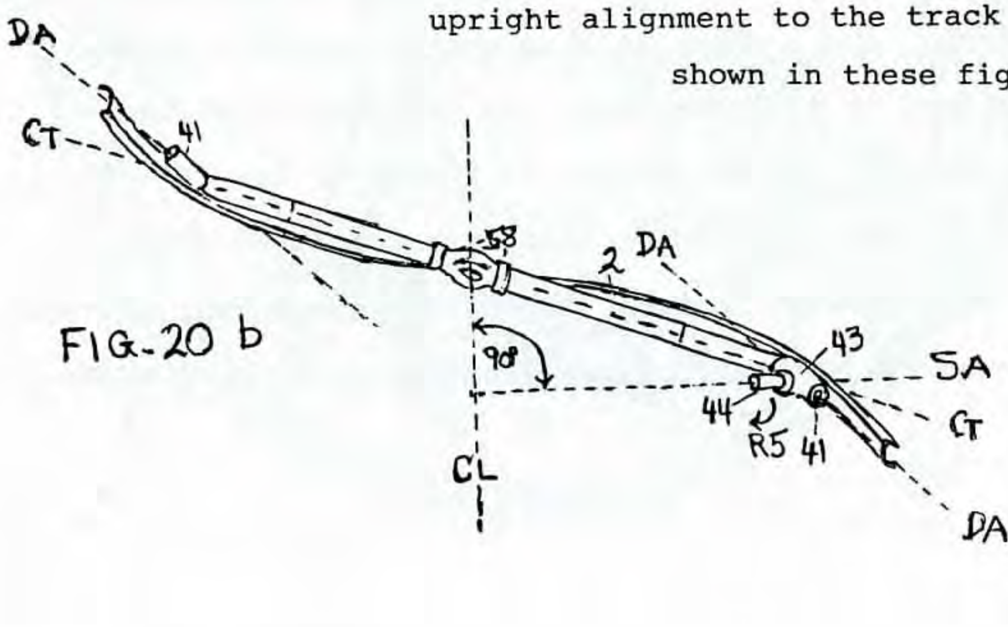


FIG-20 b

The tangent (CT) along which the outer bar (33) rests, is nearly but not exactly aligned with the correct rolling position of the wheel, except when the track is pitchless / in idle position. The detracting sleeves (40) are rotated (R4) in order to bring the tilt axles (41) at the outer bar ends more nearly along the wheel's directional axis (DA), intersecting the track (2), as drawn. Still, the tilt axle's (41) alignment is insufficient, as Figure # 20b shows, the wheel contact tangent (CT) fails to adjust to the track's (2) "S" shape at pitch, and in order to turn (R5) the wheel slightly, to its directional axis (DA), the motor bar pivot (44) must be incorporated. Turning the wheel through the motor bar pivot (44), however, will only be successful if the motor bar is on the wheel upright/standing axis (SA), which is why it is centered inside the "off-set wheel" (Figure # 19-8). The standing axis (SA) is on a tangent drawn perpendicular from center line (CL) through the motor bar's (43) center, and through and perpendicular to the tilt axle (41), and if this is always the case, the wheel will move forthrightly. All 4 wheels' standing axes (SA) shows as an "X" looking from far afront. However, if it is found upon closer scrutiny, that the tilt axle ∠ must itself pivot (R6) several degrees in order to keep the motor bar (44) centered on the wheel's standing axis (SA), then a pivot and lever (50) to make that adjustment need only be operated like the extending sleeve (40) and motor bar pivot (44) is, off the inner to outer bar relationship.

FIGURE # 21 a

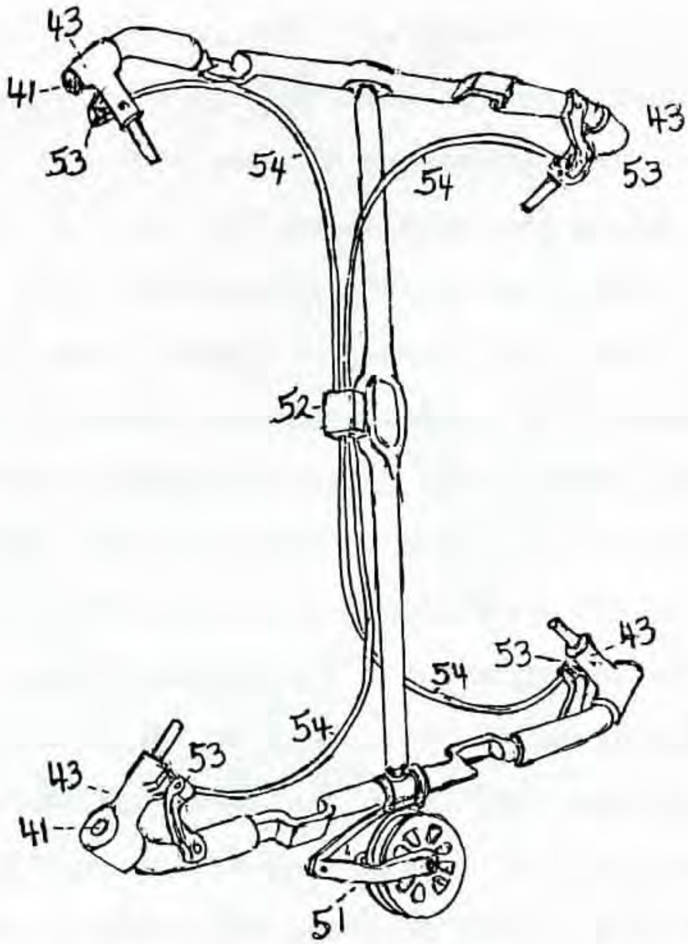


Figure # 21a is a generalized view of a mounted "wheel tilting" mechanism, which leans wheels "into the pull " corresponding with the track's bevel (review Figure # 15). Because the wheel's tilt track bevel angle is often independent from the track pitch, it is regulated independently, unlike the previous wheel adjustment systems. The "wheel tilting" mechanism consists of a device (51) to continuously measure the track bevel angle, to enact a "tilt motor" (52), which cranks "tilt screws" (53) through flexible drive shaft (54), pivoting the motor bars (43) on the tilt axles (41). Blow-ups of this system follow.

FIG 21b of 51

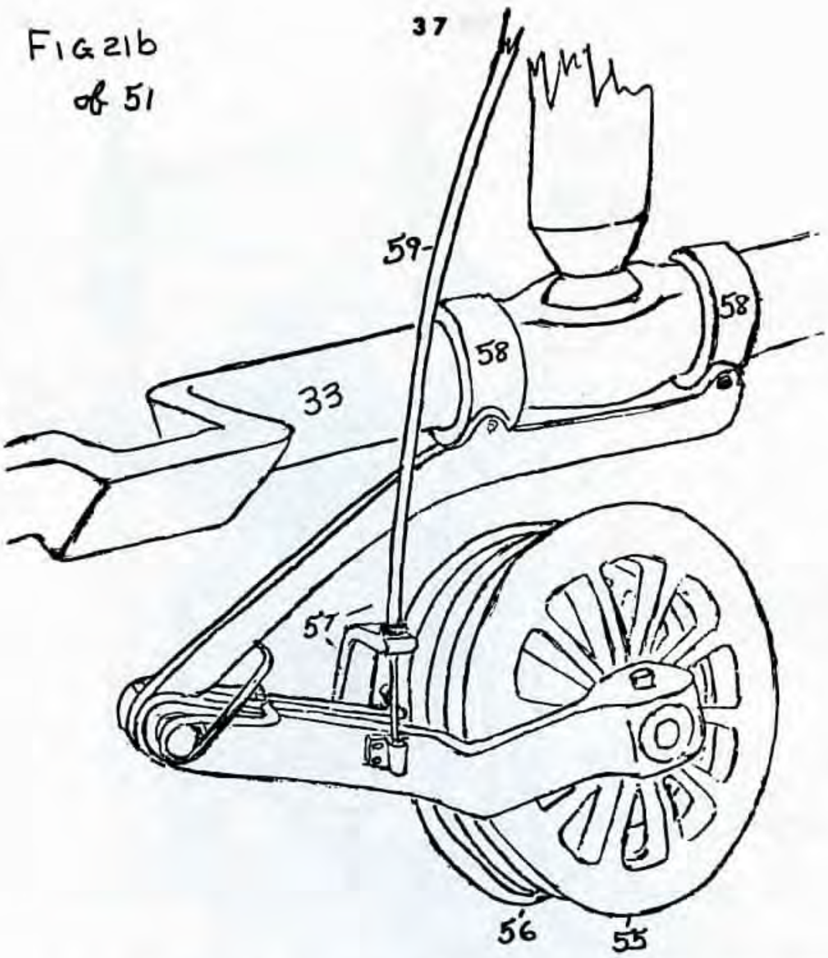
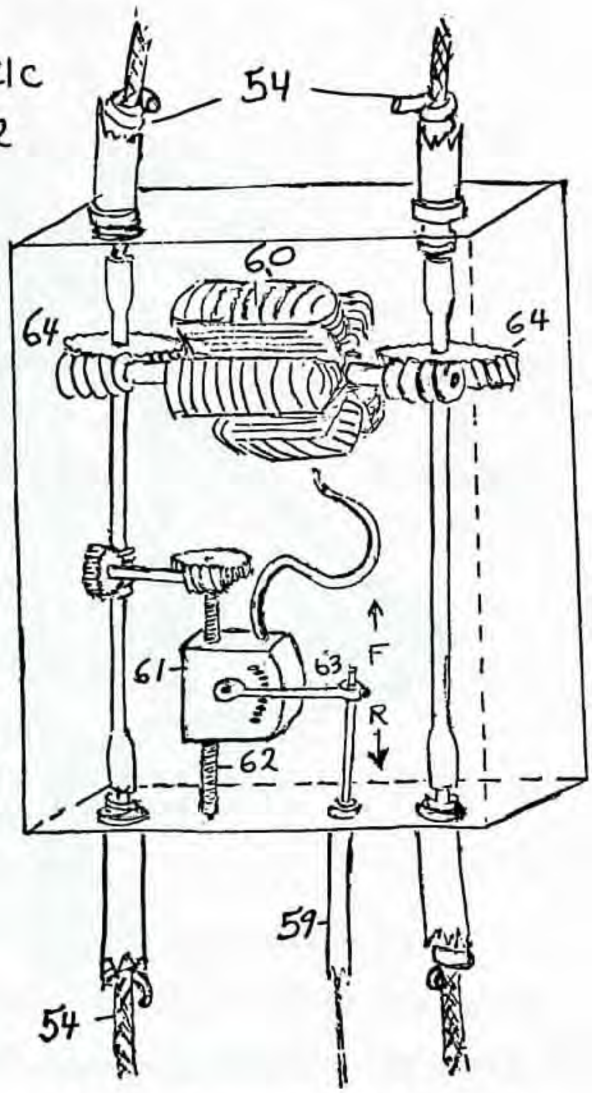


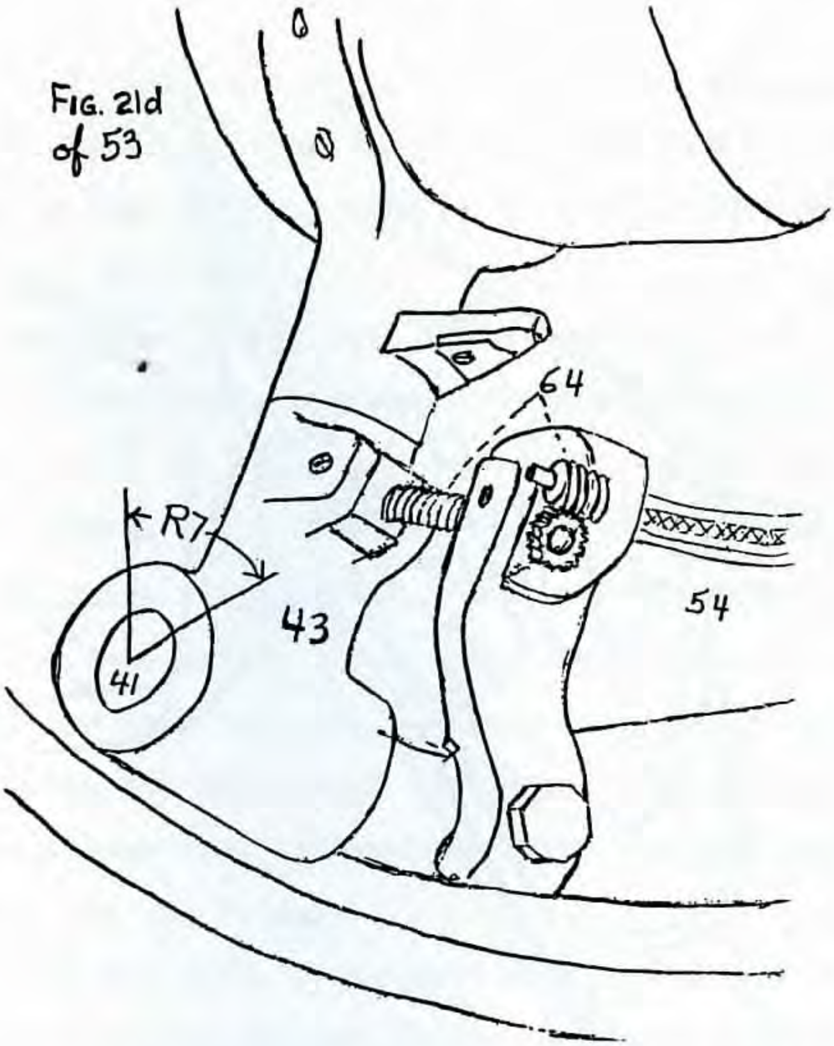
Figure # 21b is a blow-up of a "split wheel" track bevel measuring device (51), which is actually two small wheels (55 & 56) that move up and down independently of each other, at opposite sides of the track, in accordance to the track's changing bevel, and signifying the track bevel through a cable mounting (57). The "split wheel" (51) is drawn only to show the simplicity of a bevel measuring apparatus, though an electric distance sensor held near the track, or even a "rub" sliding on the track, might do the same job better; this remains to be seen. Rings (58) rotate freely on the outer bar (33) always holding the split wheel (51) or any other bevel measuring device squarely on track's center (Figure # 20b-58).

Fig. 21c
of 52



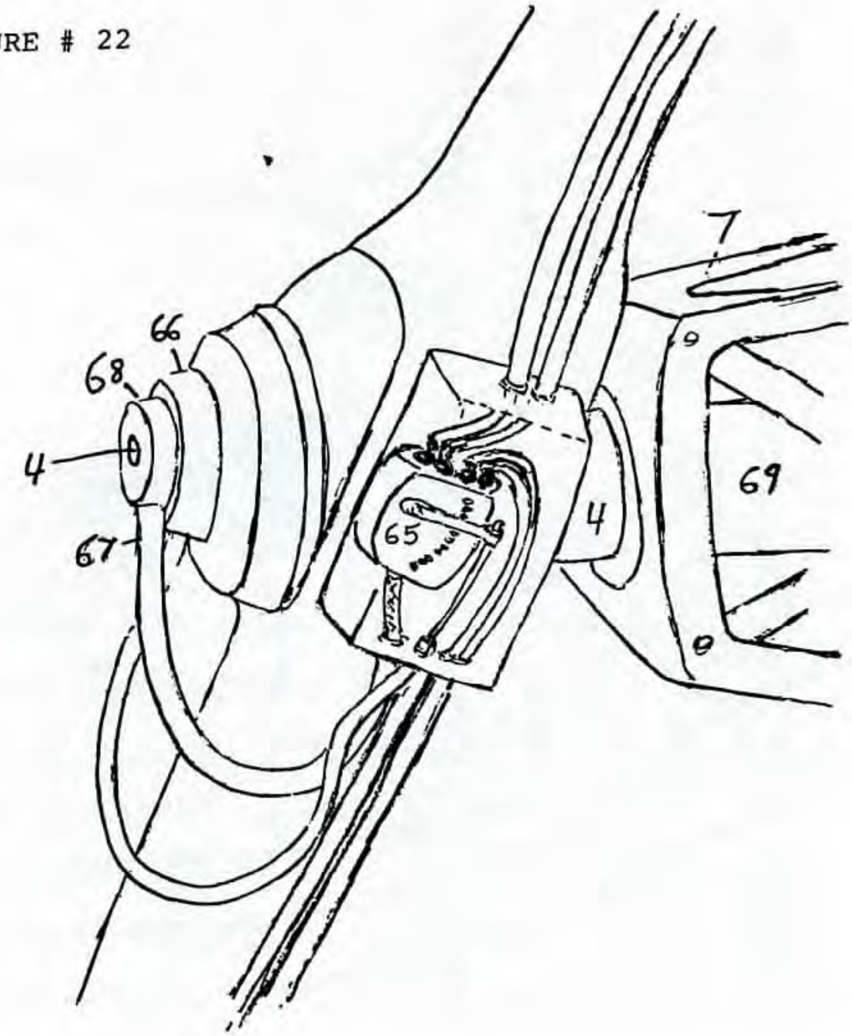
The bevel indication cable (59) is attached into the "tilt motor housing" (52), the blow-up of which is Figure # 21c. The tilt motor armature (60) is reversible, 1/10th horsepower or less, and speed regulatible, but unusual in that it is often only momentarily turned on, and is thus a strong starter.

The cable (59) indicating the track bevel angle instigates the motor's (60) turning through a reversible (F & R) reastat (61) which will seek a position on a screw (62) in order to center its lever (63), turning the motor (60) off (study drawing), in turn the "tilt drive cable" (54) will constantly be adjusted correspondingly to the track's bevel indicator cable (59).



The tilt drive cable (54), a "flexible drive shaft" from the tilt motor (60), turns four "tilt screws" (53), one of which is blown-up as Figure # 21d, which utilizes a series of worm gear reductions (64) to rotate (R7) the motor bar (43) approximately 20° either way on the tilt axle (41), to align the wheel to the bevel in the track. However, tilt screws (53) need not be turned by flexible drive shaft (54), rather, straight shaft,bearings, universals, and shaft extenders can be utilized in this function effectively, but would have complicated a drawing.

FIGURE # 22



In order to control the cars in their passage, it is necessary to set a "road speed" at which all the cars, either loaded or empty, will always go. Thus at the center of each wheel carriage (Figure # 22), there is a power regulator (65) which sustains the car's road speed by adding power when its wheel carriages are rotating (Figure # 16-R1) too slow, and then again, reducing power when the wheel carriage is rotating too fast.

A tachometer (66) counts the wheel carriage's revolutions, and corrects this by adjusting the power regulator (65), a reastat.

The power cable (67) has a rotating electrical contact (68) to supply energy to the wheel carriage, and it is opportune to run the power cable (67) through the center of the "end axle" (4), thus minimizing the rotating contact's (68) size and friction. The tachometer (66) can utilize the same narrow forward portion of the stable (non-rotating) end axle (4), for the same reasons. Figure # 22 does not show how the common tachometer (66) controlled power regulation (65) system functions, but only suggests a location for its engage.

The end axle (4) is held by the beam (7) which allows the end axle several inches horizontal movement in and out from the beam (4) end. Resembling a common shock absorber (69) in a position to dampen sudden starting or stopping jolts when the car goes in or out of "idle" (Figure # 6a), its placement there is primarily to allow one wheel carriage to idle slightly less than a full revolution before the wheel carriage on the other end of the car is idled, a situation which alters the distance between the car's wheel carriages.

CLAIMS (Improvements)

1. A rail vehicle without wheel traction deficiency during starting/acceleration.
2. Fully automatic control of a rail vehicle's starting acceleration.
3. A rail vehicular incorporating perfect gearing and innert ideal gear ratio transition to power itself.
4. A rail vehicle's gearing relationship that assures little additional strain or need or excess power on the motors while accelerating.
5. A rail conveyance utilizing small, constant speed motors, with a high efficiency ratio compared to conventional tractive motor systems.
6. Gradual acceleration and braking of a rail vehicle without lurching or jarring.
7. A rail vehicular braking system that eliminates possibility of "skidding"/loss of wheel to rail adherence.
8. Automatic control of a rail vehicle's braking.
9. A rail vehicle that slows without the use of friction brakes.
10. Correspondingly to claim # 9, a rail vehicle eliminating conventional "brake liabilities" such as brake failure, brake adjustment, brake replacement, wheels with flat spot from skidding, and the damage and noise thereof.
11. A rail vehicle that ascends or descends inclines with-

out possibility of loss of traction.

12. A rail vehicle that ascends and descends inclines automatically without an operator in control.

13. A rail vehicle that can ascend inclines of 20 or 30 percent, without motor strain, stalling, or default.

14. A rail vehicle able to negotiate any and all terrain, with minimal automatic mechanic adjustment as it does so.

15. A rail vehicle that automatically adjusts its power for use around curves.

16. A rail vehicle which automatically adjusts its bank in curves, according to the weight and shape of the load within.

17. A rail vehicle that banks from a low center of gravity, in such a way as to keep freight upright, undamaged from tippage.

18. A rail vehicle that eliminates wheel flange-rail contact in curves and its subsequent friction and wear.

19. A rail vehicle which is automatically controlled through curves, not capable of "centrifugal derailment.

20. A rail vehicle disallowed by its encircling track from becoming a "run-away" should derailment occur at any time.

21. A rail vehicle which is halted automatically without operator.

22. A rail vehicle capable of being halted in an exact spot, each and every time.

23. A rail vehicle able to slow down and be halted in an exact spot, while still retaining a great part of the vehicle's cruising speed momentum.

24. A rail vehicle able to compile forward momentum through the vehicle is itself halted.

25. A halted rail vehicle that can extend momentum to accelerate to cruising speed in far less elapsed time than any conventional rail vehicle of its weight and power.

26. A rail vehicle that is easily inserted into intervals in flows of on-going traffic, because of its high acceleration rate.

27. A rail vehicle requiring a minimal "runway" track structure for acceleration and braking.

28. A rail vehicular which provides stable access to its cars, where they are to load and unload.

29. A simplification of a rail vehicle's security, and muffling of its sound, as it passes by the homes on a siding.

30. A rail vehicle which can serve numerous homes on a signal siding, reducing equipment needs for a by-pass systematic at each home.

31. A rail vehicular which automatically eliminates a vehicle's collision into one that is stopped and unloading, though it is on the same track.

32. A rail vehicle which utilizes a single switch able to serve a multitude of sidings.

33. A rail vehicle which has a fully automatic switching-routing system.

34. Switching and routing of a rail vehicle allowing the greatest number of direction choices with a minimum of room (land area).

35. A switching/routing of rail vehicles which eliminates the need to reverse car motors, even if the vehicle's direction is reversed.

36. Switching/routing of a rail vehicle that reduces the possibility of at-speed switch point derailment, or "cutting" this or any switch.

37. A rail vehicular which allows all switching/routing equipment to be located indoors, eliminating corrosion, icing, tampering, and accidents to it.

38. Rail vehicle automatic destination reading equipment which is simplified, perhaps even mechanical, as cars halt on turntables for switching/routing.

39. Automatic vehicle reliability and roadworthiness checks are enabled at many points, as the vehicles halt for switching/rerouting.

40. Automatic vehicle weighing to determine individual transport charges is simplified, taking place as the rail vehicular is switching/rerouting.

41. A rail vehicle switching/routing by-pass system utilizing a centralized power source, kept in an existent available structure.

42. A rail conveyance which automatically holds vehicles in a line when necessary, without having these vehicles touch together, or push each other end to end.

43. A rail conveyance with automated capacity to align the switching/routing equipment to efficiently sort as much incoming traffic as possible.

44. A rail conveyance with automated capacity to eliminate any and all traffic jams.

45. A rail conveyance with automatic mainline traffic control through automatic maintenance of intervals between vehicles.

46. A rail conveyance with an automatic systematic through which vehicles going too fast or too slow on the mainline can be withdrawn, corrected, and reinserted.

47. A rail conveyance with an automatic system that can remove a line of vehicles caught-up, though still moving, together, and put them back on the mainline separately.

48. A rail vehicular offering total automaticity of its normal operation.

49. A rail conveyance with a track structure of welded continuous rail, without contraction or expansion points, unlike those requiring costly replacement and repair on the straight rail track design.

50. A rail vehicular which is easily covered, unlike any such conventional, preventing electrocution, accidents,

slick track, stoppage by snow, corrosion, and noise.

51. A rail vehicular able to carry as large a container as any covered conventional vehicular of the same size (covers generally restricting load size regardless of track type).

52. A rail vehicular more easily mounted on hills or cliff side, without additional track holding structure, or damage to the ecology by "leveling" its path.

53. A rail conveyance track structure easily elevated or suspended to form bridges.

54. A rail conveyance track support system which offers a simplified height adjustment through the use of "side poles".

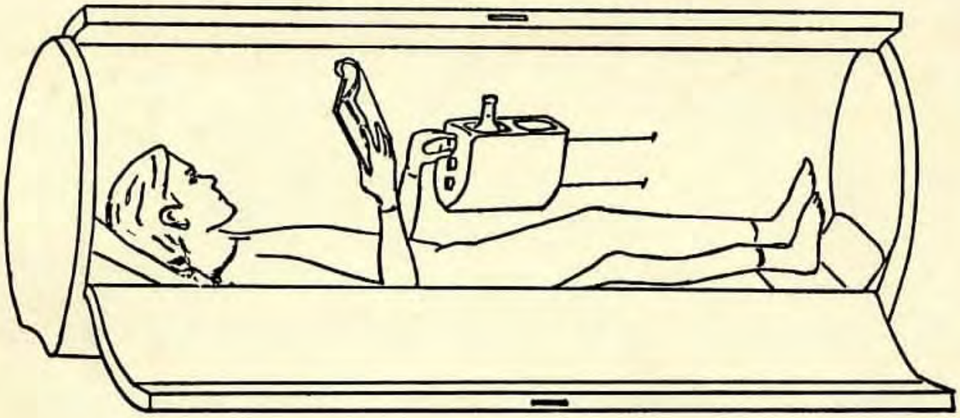
55. A rail conveyance track structure in which the third rail offers structural support to the track work as a whole.

56. A rail vehicle with less flange wear than is conventional with straight rail.

57. A rail vehicle with equalized beveled wheel to beveled track, for most efficient rolling, beyond that of the conventional two straight rail attitude, a beveled wheel on a flat track, to reduce flange wear in curves.

58. A rail vehicle which, due to an "off-set" of its weight over and under its track, has built-in shock absorption capacity, without need of "springs".

TO TRANSPORT ONE IN A "CAPSULE", WE MUST OVERCOME HIS OR HER CLAUSTROPHOBIA -- THIS DONE BY AN INNER SURFACE OF LIGHT, refracting through PLASTIC INNER WALLS, good ventilation, and certain types of music.



IF MAN COULD ADAPT TO "CAPSULES" (of which this drawing is only one type) to carry him and his things between HOMES, as well as areas associated with the MASS TRANSIT, then my revolutionary HELIXTRAM shall and should receive some massive ovation, but not, perhaps, until "they've" acknowledged its Patents' Claims, 58 in number (making it one of the world's high ones), things a HELIXTRAM SYSTEM CAN DO, never before possible. I URGE INVESTIGATION of its METHOD, and set forth my personal promise to CORRESPOND, JOIN, and AID IN determining the Helixtram's worth and EN-JOIN YOU IN H.I. (Helixtram Investigation) if you wish -- our organization to CORRESPOND until its TRUTH BE KNOWN & ITS COURSE BE JUDGED. IF INTERESTED, WON'T YOU SEND ME YOUR NAME, and a little bit you think about it in a letter, and I will attempt to circulate the INCOMING opinion.