High Acceleration Transfer Shuttle Car for Simultaneous Loading and Unloading Passengers of High Speed Trains Traveling in Deep Tunnels

April 12, 1966

To whom it may concern:

This letter and attached details and photographs pertain to a method which I have devised for the simultaneous transfer of passengers to and from a High Speed Train, while moving.

A High Acceleration Transfer Shuttle, propelled by linear motors accelerates down slope to train tunnel. It automatically synchronizes speed and couples along side the centrally located Loading Car of a High Speed Train, traveling at 200 mph. Semi-circular compartments containing passengers and their luggage rotate 180° about common centers (between the two vehicles) transferring passengers.

After transfer takes place the Transfer Shuttle returns to station to unload. Aboard the train the people move out of said semi-circular compartments into coaches of High Speed Train. Passengers then due to unload at next station, load into emptied compartments and sequence is repeated.

Containerized luggage is automatically stored along the lower level of all coaches by a longitudinal and transverse conveyor system. Code notched containers are automatically retrieved and stored in lower level of semi-circular compartments for transfer at proper destination.

Such Transfers take place at way stations between major cities such as Boston, New York and Washington. At these cities train would stop for loading and unloading.

Sincerely,

George F. McGinnis

George F. McGinnis
2215 Lake View Avenue
Los Angeles, California 90039

GFM:ejh
Enclosures

High Acceleration Transfer Shuttle Car
for Simultaneous Loading and Unloading Passengers
of High Speed Trains Traveling in Deep Tunnels

(Hypothetical Speed, 200 MPH)

Reason

Such a system would permit High Speed Trains to give express service, on three minute headways, to way points between major cities such as Boston, New York and Washington.

Feasability

1. High acceleration and deceleration rates of 0.5g (11 mphps) can be obtained by use of linear motors, thus overcoming the traction limitations of steel wheels on steel rails.
   (City and Suburban Travel, Dec. '65)

2. The linear motor lends itself well to the precise acceleration control needed for synchronizing High Speed Train and Transfer Car speeds.

3. Advances in tunnel boring and tunnel design will soon cause tunneling and land acquisition costs to intersect. This could happen by 1970.
   (Rand Report, George A. Hoffman; Engr. News Record 12-6-65; Tunnel Boring in Hard Rock, J. M. Glass, Hughes Tool Co.)

Features

1. Linear motors for propulsion of Transfer Car.

2. Semi-circular compartments are able to trade space on a common axis, leaving no vacant spaces or holes to cover on side of train.

3. Each compartment seats a total of 39 people for a transfer of 156 people.
   a. Transfer of greater numbers could be achieved either by using larger, articulated Transfer Cars (with more circles) or
   b. By running two transfer cars along side the same train spaced several cars apart.

4. Pressurization Sealing
   a. Retractable seals around side panels to maintain train pressurization.
   b. Retractable seal between train and Transfer Car to maintain pressurization during transfer.

5. Side coupling of Transfer Car to train the instant speeds are synchronized.
   a. Coupling at top of car may be necessary to maintain vertical stability.

6. Double End Operation
    a. Automatic flop-seats so passengers are always in the most comfortable position for taking acceleration and deceleration forces.

7. Loading Car, situated at center of train divides traffic through coaches in half.

8. Waiting Rooms in Loading Car have same capacity as transfer compartments, so passengers for next station do not interfere with passengers coming aboard.

9. Transfer Car has two 3' wide doors per compartment to facilitate fast loading in station.

10. Semi-circular configuration conveniently excludes "entryway space" from "transfer space".

11. Track gauge of 7'-0" with car width of 14'-0" adds to stability needed during transfer of passengers.

12. Mostly three-two seating in transfer compartments with 3'-0" aisles. Train coaches have three-three seating with 3'-0" for aisle.
    a. Wide coaches with three-three seating shorten walking distance to "loading car".
    b. 36" wide aisles will speed traffic to and from "loading car".

13. Seating
    a. 29" seat pitch in transfer compartments and waiting rooms of "loading car".
    b. 34" seat pitch in passenger cars.
        1. Passenger cars seat 180
        2. 6 car train seats 1080
           8 car train seats 1440
           (Center "loading car" excluded)

14. Paging System
    a. Allows 5 minutes for passenger to walk to loading car for transfer points 50 miles apart.
    b. Allows 2 minute walk time for transfer points 20 miles apart. (Car lengths, 85'-0". Three or four cars on either side of centrally located loading car.)

15. Lower level of train for auxiliary equipment and automatic luggage storage.

16. Containerized luggage
    a. Manually packed at station in containers 2'-6" wide x 2'-5" high x 3'-6" long.
        1. Each semi-circular compartment has storage space for 19 containers.

b. Automatically stored in lower level of transfer compartments.
c. Once aboard, containers are conveyed automatically for storage along lower level of passenger cars.
d. Containers are retrieved to transfer compartment prior to transfer at destination.

17. Description of Station
    a. Passengers use coded tickets or credit cards in automatic reservation turnstiles.
    b. Ticket or card is returned and is used for exit at destination. Credit charge is made at destination turnstile.
    c. Luggage is conveyed from turnstile to lower level and packed in containers, code notched for destination.
    d. Passengers pass through doors much like elevator doors when entering Transfer Car.
    (Passengers do not see exterior of Transfer Car.)

18. Transfer Car moves ahead to track that is then lowered to 20% slope.
    a. 20% slope adds 4.4 mphps to acceleration.
    b. Slope eases acceleration effect on passengers.
    c. Slope at end of transfer run aids in deceleration and returns Transfer Car to station level for return run.
        1. Return run could be made over same track to save tunneling costs.
    d. Sloped acceleration run permits stations to be close to surface.

19. Television and music in Transfer Cars to ease effect of windowless car on passengers.
    a. Transfer Cars would have windows if study proved them necessary.
    b. Windows between semi-circular compartments would provide transfer thrill for passengers.

Operation Times for 200 MPH Transfer

1. Transfer Car loading in station. (passengers entering through 4 doors) a. New York Rapid Transit allows 3 sec. loading time per prepaid passenger.	90 sec.
2. Transfer Car wait on slope.	30 sec. max.
3. Transfer Car acceleration to 200 mph in $\frac{1}{2}$ mile.	18 sec.
4. $\frac{1}{2}$ mile Transfer Distance.	8 sec.
5. 1 mile Emergency Braking Distance.	16 sec.
6. $\frac{1}{2}$ mile Braking Distance.	18 sec.

7. Return to station. 60 sec.

8. Total for shuttle run. 120 sec.

9. Transfer Car unloading in station. 90 sec.
(passengers exit through 4 doors.)

10. Loading or unloading of Transfer Compartments aboard High Speed Train.
    a. Allowable time on 50 mile station spacing - 5 min.
    b. Allowable time on 20 mile station spacing - 2 min.

Advantages

1. Combines air travel speed with "mass conveyance capability" of railroads.

2. Energy savings in not having to decelerate and acceleration High Speed Trains; energy expended only on passengers loading or unloading.

3. Faster trips means more trips per train, thus less equipment needed.

4. Life of mainline roadbed, rails and equipment extended by eliminating braking and accelerating at way points.

5. Passengers are deposited at a mid-city terminal where connections can be made with other forms of transportation.

6. Low Cost inter-city transportation will encourage people to travel.

7. City cores will be preserved and growth pressures on our largest cities will be reduced.

8. With the masses traveling to distant cities more frequently car rentals will increase greatly.

9. Will reduce load on our highways, allowing them to function efficiently.

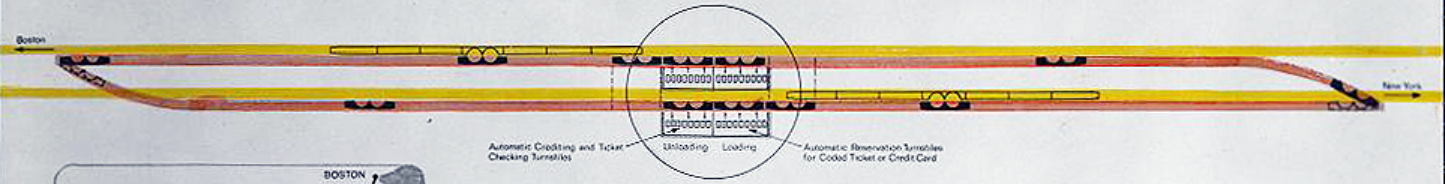
10. Reduce air pollution.

11. Will lower our traffic death toll.

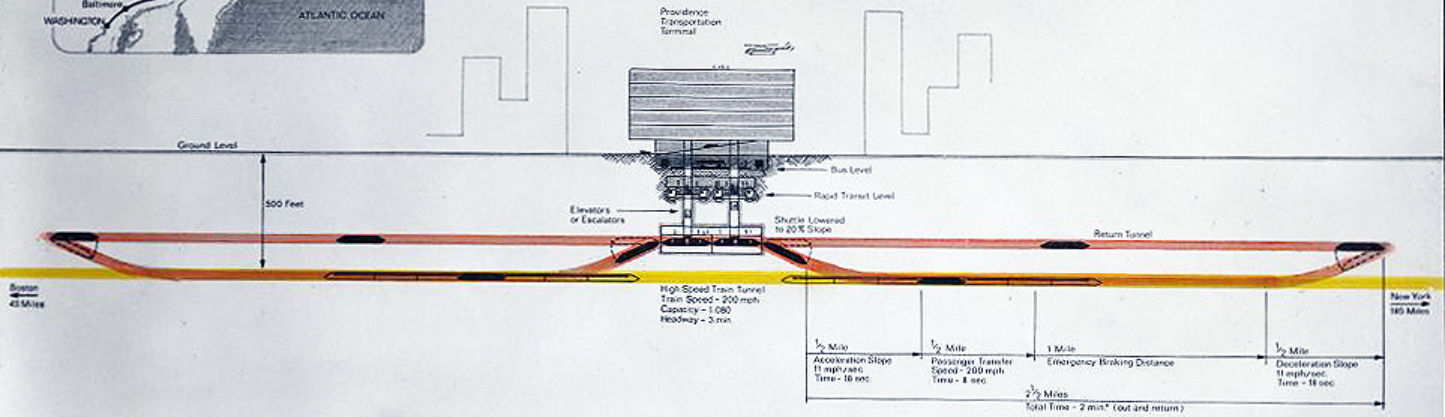
12. Trains will haul containerized freight during the night hours.

13. Present railroad system continue to be developed for heavy freight only.

14. Transfer system could be applied very successfully, to todays railroad system.



PLAN



ELEVATION