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IMPROVING RAILROAD "LESS-THAN-CAR-LOAD" FREIGHT
BY THE USE OF CONTAINERS AND CONTAINER CARS

BY

KENNETH WALTER SCHOENEBERG

A

THESIS

submitted to the faculty of the
SCHOOL OF MINES AND METALLURGY OF THE UNIVERSITY OF MISSOURI
in partial fulfillment of the work required for the

Degree of

MASTER OF SCIENCE IN CIVIL ENGINEERING

Rolla, Missouri

1948

Approved by

E. W. Carlton
Professor of Civil Engineering

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INTRODUCTION

Less-than-car-load (L.C.L.) freight has been and is becoming more of an acute problem with the railroads of this country. They are rapidly losing this vital and important function of their transportation service.

Following, is a brief history of the railroads along with a discussion of their present day problems dealing with less-than-car-load freight service.

It is believed, by the author, that a system of developing and using containers and container cars along with a pick up and delivery service will solve these problems the railroads now experience. If this method of freight transport would be adopted by the railroads, not on a temporary or small scale, but on a large, nation-wide and interstate scale, the producers, the shippers would readily acknowledge such improvements both physical and economical so that the railroads would recapture their long lost place in the field of L.C.L. freight service.

CHAPTER I
BRIEF HISTORY OF RAILROAD TRANSPORTATION
IN THE UNITED STATES

To fully understand the present day situation of the railroads, a review of their development would be beneficial. In the booklet, "Development of Railroad Transportation in the United States", by Carlton J. Corliss, many vital facts on this subject are discussed, some of which will be quoted.

Of all the forms of transportation which have been developed during man's onward march, the one which has contributed most to the spread of civilization, the creation and diffusion of wealth, the expansion of industries, and improvements in the standard of living, is the railroad. No other industry so fully enters into the everyday life of the American people.

The railroads have been tremendously important from the broader standpoint of national development. Until the advent of railroads, the nation's commerce moved principally upon navigable rivers, a few canals, and upon primitive highways which served largely as tributaries to them. Travel in those days was difficult, communication was slow, and shipping by land was often prohibitive in cost. Lack of efficient transportation impeded social progress, confined trade to small areas, and restricted the development of our natural resources.

As the rails were pushed across the country, frontier communities took on new life and a new outlook. In many parts of the country the railroads were the pioneers, the trail blazers, carrying the torch of civilization, making the vast regions accessible to the farmer, the lumberman, the miner, and the manufacturer.

Wherever the rails were laid down, towns sprang into being, industry took root, commerce developed, communication was speeded up, agricultural production increased, lands which had formerly been worthless became valuable. Virgin forests and unseen wealth beneath the soil were made available to the use of man. Distance no longer was a barrier to trade. Railroads founded and developed new markets for producers, new sources of supply for consumers.

When the first common carrier railroads were opened, in 1830, there were less than 13 million people in the entire country -- nearly all in the area east of the Mississippi River. In the entire region west of the Mississippi River, including the Pacific Coast area, there were fewer people than there are today in the city of Richmond, Virginia. In the entire country, there were then only five cities of more than 25,000 inhabitants -- New York, Philadelphia, Baltimore, Boston, and New Orleans -- all located on or near the seacoasts.

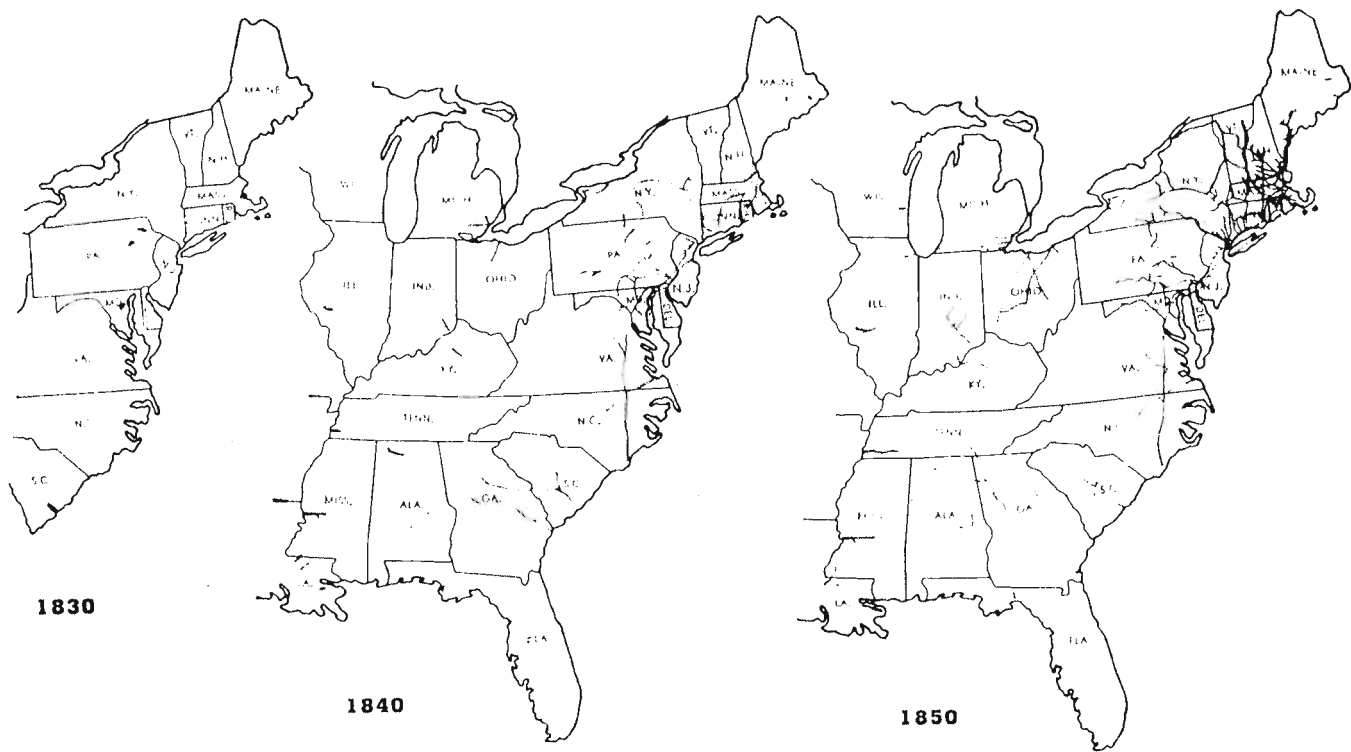
Today, there are more than four hundred cities with

populations ranging from 25,000 upward, and they are distributed throughout the country. Chicago, the world's greatest railway center, has grown in this period from a frontier trading post consisting of a few huts to a city of about four million, and such great centers of population and industry as Los Angeles, San Francisco, Portland, Seattle, Salt Lake City, Denver, Fort Worth, Dallas, Omaha, Kansas City, Tulsa, Oklahoma City, Des Moines, Sioux City, Milwaukee, Minneapolis, Indianapolis, Birmingham, and Atlanta did not exist at the beginning of the railroad era. The industrial and agricultural growth of the country has been equally striking.

From 1830 to 1850 small railroads sprang up in many eastern states as shown in Plate I. ⁽¹⁾

(1) Corliss, Carlton J. Development of Railroad Transportation in the United States 1945

" By 1850 there were more than 9,000 miles of railroad in the United States, chiefly in states bordering on the Atlantic Ocean. Most of the railroads of that day were short, but many of them were connected with other lines to form through routes of travel and commerce. For instance, in 1850 one could travel by rail all the way from Waterville, Maine, to Buffalo, New York, by using some twelve different railroads and changing



1830

1840

1850

Plate I

cars several times en route. Such a journey required about four days -- considerably more time than is now required to travel by train from coast to coast.

"In 1850, Congress passed the first land-grant measure to aid in the construction of railroads. The specific purpose of the Act was to promote the construction of the Illinois Central and Mobile & Ohio railroads, the two roads to form a through rail route from the Great Lakes to the Gulf of Mexico."⁽³⁾

From 1850 to 1871, the Federal Government continued its policy of granting lands to aid in the construction of pioneer railroads through sparsely-settled or unsettled areas of the public domain. This method proved highly successful to both the Federal and State governments and the country at large. The land-grant policy gave great help to the construction of several strategically important railway lines, and these lines contributed greatly to Western development. (Plate II)⁽²⁾

(2) Corliss, op. cit. p. 4.

"The period from 1880 to 1890 was one of rapid expansion. More than 70,301 miles of new lines were opened in that decade, bringing the total network up to 163,597 miles. In thirty years from 1860 to 1890 the total mileage of the region west of the Mississippi River increased from 2,175 to 72,389 and the population



Plate II

of that area increased fourfold."⁽³⁾

The expansion of the railway network continued through the 1890's and with diminishing pace up to 1916, by which time nearly every state and nearly every county and every important city and town in the United States was served directly by one or more railroads and was provided with daily railway service to and from all parts of the country.

"In 1916, the year before our entry into World War I, railway mileage reached its maximum in this country -- 254,000 miles. Since then the aggregate length of road has dropped to about 227,000 miles."⁽³⁾ But this does not mean that the railway plant has been retrogressing since 1916. The contrary is true.

The earlier period of railway development was a period of pioneering, a period of rapid expansion, when lines were being pushed into virgin territory. The number of miles of line increased rapidly during that period. But when the country had been covered with a network of rail lines the need for territorial expansion became less urgent, and, with the extensive agricultural and industrial development of territory served by the railroads, the need for intensive development of existing lines increased. Therefore, in the last quarter of a century the railroads have been engaged primarily in increasing the capacity and efficiency of the existing plant.

The railroads have not only increased their capacity through the construction of multiple tracks, additional yard tracks and sidings, industry tracks, larger shops, more powerful locomotives, larger cars, and so on, but they have improved their facilities in a thousand ways in the interest of increased comfort, convenience, speed, safety and efficiency." Since World War I the railroads have invested more than \$13,000,000,000 of new capital for additions and betterments." (3) In other words, throughout this period, including several years of serious depression conditions, they have spent upwards of \$1,000,000 a day, on the average, for improvements to their properties.

This expenditure of new capital for additions and betterments in the years following World War I up to the present date was brought on mainly by the growth of several new agencies of transport, namely the bus, truck, and airplane. The railroads had grown big enough, but now with the advent of competition they were compelled to specialize in bettering their rolling stock, schedules, and facilities. This movement has continued up to the present date and now we are coming into the age of further development prefixed by the term "Streamlined". The four chief modes of transport, air, water, motor and rail, are now in a period of keen competition, all working towards and for the betterment and benefit of the public.

The railroads are meeting their competitors in the field of passenger transportation with new, fast, diesel powered, streamlined trains, faster and more convenient schedules, and a predominant effort towards the comfort of the passenger. The through car and train has come into being, dispensing with the necessity of layovers and changing of trains while en route from coast to coast and most any other direction and length of travel.

However, in the field of freight transportation, the railroads have been confronted with many problems arising from the competition they now experience. Several of these problems are in the Less-than-car-load freight classification, which the railroads have been trying to solve ever since the advent and growth of the motor transport industry. To date, only minor improvements have been made in railroad Less-than-car-load service with the utilization of present methods of handling and facilities. The motor transport industry is draining the railroads of their Less-than-car-load business to the extent that it has become a critical enterprise with them.

(3) Corliss, Carlton J. Development of Railroad
Transportation in the United States 1945

CHAPTER II

PROBLEMS ARISING FROM AN UNSATISFACTORY RAIL

LESS-THAN-CAR-LOAD-LOT SYSTEM

Much of the less-than-car-load-lot (L.C.L.) traffic is profitless and the service is unsatisfactory both from the viewpoint of the shipper and the railroads. This profitless and unsatisfactory service aspect has brought forth a big question in the minds of railroad officials, namely, "How can L.C.L. service be improved?" Studies have been made and statistics kept for the past few years dealing with distribution patterns of merchandise traffic over the country and where and how these traffic losses occur. Merchandise traffic is that type of freight shipment which is made up of numerous small articles, such as producers and consumers goods. L.C.L. freight accounts for a substantial part of the total tonnage of all shippers in this category. This substantial part is the result of a changed pattern which came into being after World War I and which is being adopted by an increasing number of wholesalers and retailers. In October, 1941, the Interstate Commerce Commission said⁽⁴⁾ (248 I.C.C. 73, p. 79):

(4) Leighton, Leon, How Can L.C.L. Service Be Improved, Railway Age, Vol. 122, No. 21, pp. 1066-1069, May 24, 1947.

"The trend is now toward small units of sale and rapid

turnover. The former method of buying merchandise in large quantities in straight carloads, and storing until used, or shipping to wholesalers or jobbers and distributing locally, has been largely discontinued as being uneconomical."

This development may be even more marked in the future. The uncertainties of price trends, the ever-present danger of sudden diminution of purchasing power, the overhanging threat of new products or of improvements in existing products, and the reluctance of distributors to tie up liquid capital, will induce them to confine their inventories of supplies to just the immediate foreseeable requirements.

The growing importance of small business in the distribution field is a second factor which is likely to increase the volume of L.C.L. freight. Many producers have developed or are developing their small retail outlets in order to assure a wide advertising and distribution field for their products.

The whole set up of the present method of distribution is frustrated when L.C.L. freight is not handled expeditiously. The delayed arrival of such shipments not only will cause disastrous consequences to the producer, but distributors as well will experience similar results because their business can not be conducted efficiently on a small basis unless they have a dependable inflow of replacement stock.

The railroads during the past war years have built up good will among the shipping public due to the vast increase in volume of traffic along with the "pick and choose" policy seemingly set up by many trucking firms. Because of this good will, the railroads will retain the long haul traffic recaptured from the trucks and will also recapture a fair amount of the short haul L.C.L. traffic only if L.C.L. service meets the needs of the shipper. But this opportunity, that now confronts the railroads to regain this L.C.L. traffic, will be lost entirely if unsatisfactory service once again causes the shippers to turn to the trucking industry for the handling of their small freight shipments.

The history of diversion of L.C.L. traffic from railroads to trucks is set forth in Table I taken from the Interstate Commerce Commission's compilation of Freight Commodity Statistics.⁽⁵⁾ This table shows a

(5) Leighton, op. cit. p. 11

comparison of tons originated and freight revenues for the manufacturers and miscellaneous classification on one hand and L.C.L. freight on the other, this data being compiled from the three year period (1928-1930) to date. The table also shows the relative percentages based on this three year average taken as 100 per cent.

The two classifications are properly comparable,

DIVERSION OF L.C.L. TRAFFIC TO TRUCKS

	Tons Originated (Millions)		Freight Revenue* (Millions)		Percentage of Base Period			
					Tonnage		Revenue	
	Mfrs.& Misc.	L.C.L.	Mfrs.& Misc.	L.C.L.	Mfrs.& Misc.	L.C.L.	Mfrs.& Misc.	L.C.L.
1928-1930 ...	307	34.2	\$1,602	\$486	100.0	100.0	100.0	100.0
1931 ...	207	22.8	1,083	340	67.6	66.5	67.6	70.0
1932 ...	144	15.2	769	253	46.9	44.5	48.0	52.1
1933 ...	157	14.4	820	229	51.2	41.9	51.2	47.1
1934 ...	179	14.4	923	224	58.5	41.9	57.6	46.1
1935 ...	197	14.0	1,065	226	64.1	41.0	66.5	46.5
1936 ...	245	16.3	1,309	256	79.9	47.6	81.7	52.8
1937 ...	265	17.2	1,368	262	86.5	50.2	85.4	54.1
1938 ...	195	14.4	1,076	241	63.4	42.1	67.2	49.5
1939 ...	233	14.9	1,289	252	76.0	43.5	80.4	52.0
1940 ...	262	14.7	1,436	248	85.5	42.9	89.6	51.0
1941 ...	337	18.1	1,952	307	109.8	52.9	121.8	63.2
1942 ...	377	17.6	2,875	339	122.8	51.5	179.5	69.8
1943 ...	412	18.9	3,518	359	134.2	55.3	219.6	73.9
1944 ...	431	20.1	3,759	374	140.4	58.8	234.6	77.0
1945 ...	412	20.8	3,496	386	134.2	60.8	218.2	79.4

* Freight revenue includes revenue on tonnage originated, tonnage terminated, and tonnage handled intermediate.

TABLE I

because all the important commodities which move via L.C.L. fall under the manufacturers and miscellaneous classification when they move in carload quantities. The far greater decline of L.C.L. freight than of manufacturers and miscellaneous freight during the period 1933 to 1940, and the fact that since then L.C.L. tonnage and revenue reached respective peaks of only 60 per cent and 80 per cent of the base period while the corresponding figures for manufacturers and miscellaneous tonnage and revenue are 140 per cent and 235 per cent, demonstrate the substantial inroads made by the trucks into the L.C.L. traffic.

Part of this loss represents short hauls, where the railroads say they can not hope to compete effectively with the trucks. But a large portion is long-haul traffic which shifted to trucks because of rate concessions or superior service or both. With the rates on a comparable level, the railroads can get and keep a large volume of the long-haul business and recapture a fair portion of the short-haul business if they will give satisfactory service.

Inadequate L.C.L. service produces another serious result, namely, that of shutting shippers out of distant markets. With a much improved service larger and more distant markets could be maintained by many producers of important products. Proper L.C.L. service will not only keep and enliven plants now located where the railroads

have quantities of inbound and outbound shipments, but will also give rise to new plants and new business.

The railroads are dissatisfied with the present method of handling L.C.L. traffic because the operation is so unprofitable. It has been said by Mr. Palmer, President of the New Haven Railroad that, "To date in 1946, L.C.L. tonnage was running higher than before, but the railroads are still suffering a substantial out-of-pocket loss in handling this traffic."⁽⁶⁾

(6) Leighton, Op. cit. p. 11

Most long haul direct merchandise cars show a satisfactory profit. However, it is the L.C.L. hauls, the traffic with the most handling and transferring that shows this loss.

Table II⁽⁷⁾ shows a general estimate of minimum

(7) Leighton, Op. cit. p. 11

costs of pick-up and delivery operations and platform handling. Since the great part of L.C.L. freight moves from, to, or through large cities these rates or figures play a big part in cutting into the possible profit on such freight.

St. Louis, Missouri, as a large terminal and interchange point, will show this effect and resultant profit decline. Many eastern and western roads terminate

MINIMUM COSTS OF PICK-UP AND DELIVERY
AND OF PLATFORM HANDLING

(Cents per 100 lb.)

	Larger Cities	Smaller Cities
Pick-up	\$0.15	\$0.10
Delivery	0.15	0.10
Platform Handling:		
a) Origin	0.08	0.06
b) Destination	0.08	0.06
c) One Intermediate Transfer	0.08	0.08
Total of Out-of-Pocket Costs:		
Between smaller cities	\$0.40	
Between a smaller and a larger city	0.47	
Between larger cities	0.54	

in St. Louis and as a result create quite a substantial amount of interchange of car load and L.C.L. freight through this terminus. The switching of this traffic from one road to the other is done by the Terminal Railroad Association of St. Louis. This Terminal Railroad does intra city switching, that is, the switching of cars from one road's freight terminal and freight house to the others. This switching service is in itself quite a costly thing for the railroads involved in the transfer of freight. However, in the case of L.C.L. freight, another high cost enters into its present day movement through a large terminal. That is the cost of terminal platform handling. For example, when L.C.L. freight comes into the St. Louis terminal from the east, destined for a point west or southwest of St. Louis, it must be handled and rehandled through at least two or more freight houses while enroute through the terminal from the one road to the other. The inbound road, the Pennsylvania Railroad for example, at its freight house, will transfer an L.C.L. shipment destined for movement out of St. Louis on the Frisco Railroad, from the car it arrived in to a so-called shuttle or "trap" car which the Terminal Railroad will accept and move to the Frisco's inbound freight house. There the shipment is again handled and classified and taken to the outbound freight house of the Frisco. It is again handled and placed into a car which moves

out of St. Louis bound for its destination on the Frisco. There it can be seen, that one L.C.L. shipment en route through a terminal was handled and moved in three different operations. Each time it was handled, a needless cost was experienced by the railroads involved. There are many such terminals as St. Louis, some of them not as large and some larger and it can be seen that even if one of these terminals is encountered in the routing of an L.C.L. shipment from one point to another; the handling encountered will certainly cut into the possible profit of such a shipment. This same shipment could very well have been subjected to the same ordeal of transfer many times while en route from originating point to destination. Of course, to this should be added the handling of the shipment at its originating and destination point, that is, from factory to pick-up truck, to freight house, to freight car and visa-versa at the destination point.

Table III⁽⁸⁾ shows clearly, for example, the tons

(8) Direct communication from Mr. J. J. Cummins, General Agent, Frisco Lines, St. Louis, Missouri.

of L.C.L. handled; wages to foreman, clerks and laborers; and the average cost per ton of L.C.L. freight at several terminal points on the Frisco Railroad. The comparative figures emphasize how each terminal cost varies by virtue of its locality and size. Where the higher figures of

PLATFORM PERFORMANCE AT LARGE TERMINALS
OF THE FRISCO RAILROAD

June 1947

	Tons Handled	Wages to Foreman Clerks & Labor	Average Cost per ton
St. Louis, Mo.			
7th Street	11,722	\$26,479.00	\$2.26
Broadway	6,953	15,505.00	2.23
Springfield, Mo.			
Mill Street	4,535	5,396.00	1.19
Chase Street	10,059	12,423.00	1.23
Kansas City	4,872	8,003.00	1.64
Memphis	9,608	20,515.00	2.14
Birmingham	4,708	5,171.00	1.10
Tulsa	5,777	6,489.00	1.12
Oklahoma City	4,886	4,120.00	.84
	<hr/>	<hr/>	<hr/>
TOTAL	63,120	\$104,101.00	\$1.65

average cost per ton prevail, another factor enters, in that these terminals are large interchange points with other railroads.

Also, noting the relatively same amount of tons handled at Kansas City, Birmingham, and Oklahoma City as compared to the average cost per ton at each of these same terminals, it can be seen that the cost per ton at Oklahoma City is far less than at either of the other two. This is because there is only one freight depot at Oklahoma City and all handling is done in one operation through it. At Kansas City where the average cost per ton is \$1.64, there are several freight depots and freight traffic moves through them as through the St. Louis terminal.

With respect to the Springfield figures, Mill Street Freight house is on the South side of the city and the Chase Street Freight house is on the North side. All trains enter Springfield through the North side yards and any shipment that is destined to the South side or main business district of the city must first be handled through the Chase Street depot and thence on to the Mill Street depot for distribution.

Table IV⁽⁹⁾ shows the monthly reports of platform

(9) Cummins, J. J. op. cit. p. 19

FIGURES TAKEN FROM MONTHLY REPORTS OF PLATFORM PERFORMANCE

FRISCO RAILROAD, ST. LOUIS 7th STREET DEPOT

	January	February	March	April	May	June
Tons L.C.L. Handled ...	12,349	11,240	12,951	12,625	11,845	11,722
Wages Paid To Employees.	\$31,448.26	\$27,942.90	\$31,413.60	\$29,587.17	\$27,943.52	\$26,478.96
Average Cost Per Ton	\$2.55	\$2.49	\$2.43	\$2.34	\$2.36	\$2.26

TABLE IV

St. Louis, 7th Street Freight House. It shows monthly figures on platform performance from January to June 1947.

Table V⁽¹⁰⁾ shows man hours worked at this same

(10) Cummins, J. J. op. cit. p. 19

freight house for the same months as covered by Table IV.

All of these figures clearly show some of the typical expenditures encountered by the railroads for the present day handling of L.C.L. freight only. These facts and figures have nothing whatsoever to do with car load shipments but just with the subject at hand -- "L.C.L."

In preparing costs, no allowance seems to have been made for the amount of loss or damage to L.C.L. freight in excess of the normal carload experience. This item cannot be expressed in so many dollars or cents per one hundred pounds but it is recognized by operating departments of all railroads that with the present type of platform labor, this excessive loss and damage has become an important element of L.C.L. costs.

An example previously taken up of an L.C.L. shipment moving through the St. Louis terminal can also be used to illustrate the loss and damage aspect of L.C.L. costs to the railroads. The overcrowded facilities at the various freight houses along with the present day caliber of platform labor is brought to light many times

MAN HOURS BY CLASS LABOR, FRISCO RAILROAD ST. LOUIS, 7th STREET FREIGHT STATION

Period - January 1, 1947 -- June 1, 1947

	January	February	March	April	May	June	Total Hours
General Foreman	208	184	208	208	208	200	1,216
Asst. Foreman	416	368	408	416	416	400	2,424
Foreman's Clerk	201	184	208	208	208	200	1,209
Inbound Foreman	208	184	208	208	208	200	1,216
Delivery Clerk	208	184	208	208	208	200	1,216
Loading Clerk	416	360	383	408	416	400	2,383
Receiving Clerk	826	736	832	803	624	600	4,421
Check Clerk	5,001	4,284	4,911	4,584	4,016	3,624	26,420
Stowmen	5,813	4,922	5,789	5,967	5,880	5,554	33,927
Pickers	5,769	4,982	5,447	5,205	4,819	4,446	30,668
Cooper	208	184	208	208	208	200	1,216
Truckers	12,447	10,597	12,583	11,443	10,917	9,945	67,932
Motor Operators	<u>1,580</u>	<u>1,310</u>	<u>1,568</u>	<u>1,527</u>	<u>1,592</u>	<u>1,456</u>	<u>9,033</u>
TOTAL	33,301	28,479	32,961	31,393	29,720	27,425	183,281

TABLE V

when a shipment of L.C.L. freight is handled and rehandled through a terminal.

Certainly the railroads try and do sell these damaged articles for what they can get, but still that fact does not justify and compensate the great loss of revenue incurred by the damaging of the article in the first place.

The railroads will never lose all of their L.C.L. traffic, enough will stick to the rails to require the maintenance of facilities and organizations to handle it. So the conclusion seems inevitable - since it is impracticable to give up the traffic - that the solution must lie in building up the volume by methods that will reduce the unit cost of handling it.

CHAPTER III
SOLUTION TO PROBLEMS

A solution to these problems of the present day profitless and unsatisfactory handling of L.C.L. freight traffic by the railroads can be brought about through the use of containers and container cars.

In the past, this idea of using containers and container cars was thought of and tried by one or two eastern railroads. The results were not satisfactory, mainly because their field of endeavor in carrying out this idea was very limited. Limited in this respect, in that just a few container car units were built and used, and only in one or two localities on one railroad. Proper facilities for handling the containers were maintained at only a few key terminal points. All in all the idea was not given proper chance to show its merits, of which the system of using container and container cars definitely has many advantages.

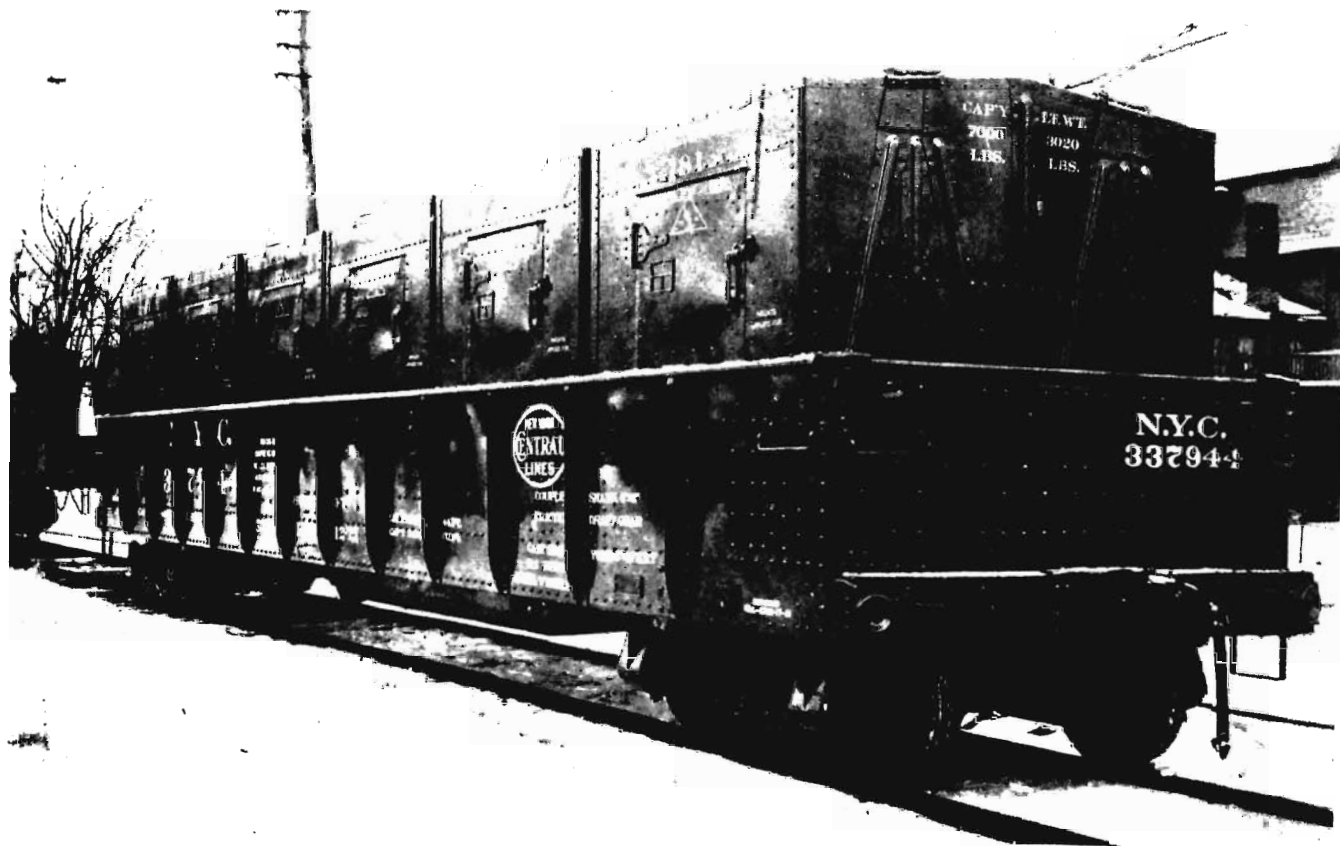
However, from these meager experiments in the use of containers and container cars, there was developed and put into use the air activated type container for transporting materials in bulk such as cement, sand, soda ash, volcanic ash and other pulverulent materials. Also, later developed was the drop bottom container for use in transporting cement, stone, sand, gravel or other aggregates. Both the air activated and drop bottom

type containers now in operation have been manufactured by the American Car and Foundry Company and licensed under the L.C.L. Corporation and are in use on several railroads such as the New York Central, the Delaware, Lackawana, and Western, the Lehigh Valley, and the Pennsylvania.

Although the two types of containers mentioned for transporting bulk materials were developed, the system of using merchandise containers for L.C.L. freight was just about done away with. The New York Central, however, has and is still using merchandise containers and container cars which were developed and manufactured by the American Car and Foundry Company and licensed under the L.C.L. Corporation. They are being used only to a limited extent. Plates III, IV and V show these merchandise containers and cars.

The idea for the use of merchandise containers and container cars did not seem feasible in the eyes of the railroads as a whole because, as was stated previously, it was not given a proper chance to show its merits. In order for this system of handling L.C.L. freight to work, all the railroads must work together to bring about its reality. In other words just trying it out on a small scale will never work, as seen from past experience. It must be tried and developed on a large, nationwide scale -- all roads participating.

With this problem of L.C.L. freight of utmost



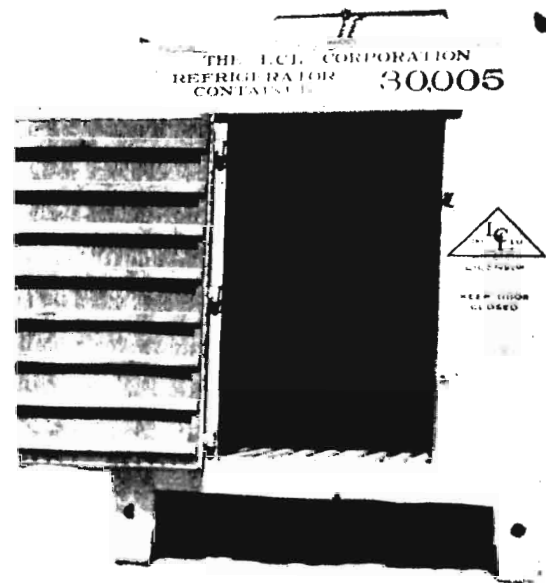
Merchandise container car unit, consisting of 6 legless type merchandise containers on solid side gondola car.

Plate III



Leg Type Merchandise Container.

Pictures
on this page
illustrate
CONTAINERS
for merchandise freight
and refrigerator
freight



Refrigerator Container.

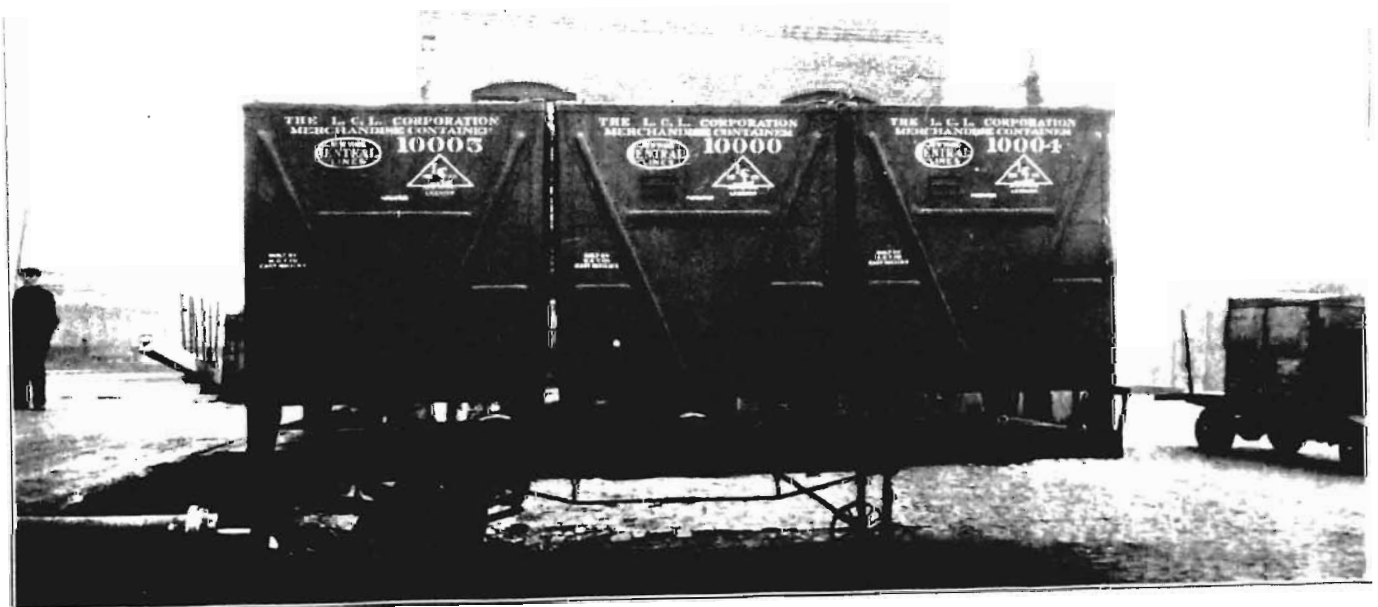
<u>Outside</u>	Dimensions	<u>Inside</u>
7'-2½"	Width	7'-0"
9'-3½"	Length	8'-4"
9'-4¼"	Height	7'-0"

Door Openings: 3'6" x 5'-8⅛"
Single door in both short sides.

Capacity: 408 cu. ft.—10,000 lbs.
Light Weight: 3,500 lbs.



Leg type merchandise container, with door open, being conveyed on lift truck.



3 leg type merchandise containers loaded on a highway trailer.

importance at this time, the railroads should set aside their competitive grievances between one another and think mainly of the competitive fields of transport they are facing as a whole such as, trucks, river barges, and the airplane. These other agencies of transport have been of growing concern to the railroads, especially the trucking industry, since this method of transport has expanded so rapidly during the past decade in the field of freight and especially L.C.L. shipments.

Another problem the container and container car system will solve, is that of periodic car shortages now experienced by the railroads each year. Box cars are at a high premium constantly and statistics show that thirty per cent of the box cars now in use go to L.C.L. traffic. In other words the container cars would relieve this car shortage by replacing the thirty per cent of cars now used for L.C.L.

Those cars now used for L.C.L. shipments are loaded the greater part of the time in an uneconomical manner. That is, by virtue of weight, size and amount of shipments, cars are only half or three-quarters loaded. This uneconomical practice can be overcome by the use of containers because the container is a small unit and part of a car and where a group of individual shipments would not fill a box car, they would fill one or two containers. These one or two containers in turn will move on a standard flat car along with other

containers destined for other localities along the same railroad, thus utilizing transporting equipment to its maximum extent. Also in using standard flat cars for containers, further utilization is accomplished because no special type car need be manufactured and when the flat car is not needed for container transport it can be used in its original capacity.

CHAPTER IV

THE CONTAINER SYSTEM IN OPERATION

The first operation or step taken in the transporting of an L.C.L. shipment is, of course, transferring the shipment from the producer or the shipper to the common carrier for movement to its destination. This is now done by a drayman with a pick up and delivery truck of the railroad. The drayman loads the shipment into his truck and then takes it to the freight terminal, unloading it on the freight platform prior to reloading into a box car. With the container and container car system in operation, this same drayman, equipped with a flat bed truck on which are mounted one or two containers, depending on the size needed, will load the shipment into the containers at the factory and then take them to the railroad terminal where they will be placed on a flat car for movement over the railroad. Here in the first operation an economical betterment has taken place, both for the shipper and the railroad. First, the handling of the shipment has been cut to a minimum. With the use of the container the shipment is handled only once, that being when it is placed into the containers at its originating point or factory. The present day system calls for three separate handlings of the shipment before it is ready for movement over the railroad. Therefore, a saving will come to the railroad in two manners by this minimum handling,

one, a saving of wages paid to personnel now employed in handling the shipment and, two, a possible and probable saving in damages due to excess handling.

As seen in Table II and III present day costs for handling of L.C.L. freight at terminal freight houses is eight cents per one hundred pounds or on an average of \$1.65 per ton. These figures can be brought to within one-half of their present size or numerical value by the adoption of the container system, because this system will cut the number of handling operations from three to one, and cut wages now paid to freight house personnel engaged in the handling process to nearly one-fourth their present sum. Such positions as truckers, motor operators, pickers, coopers, stowmen, receiving clerks, check clerks, loading clerks, and inbound foreman will not be needed and would be abolished.

Present day average wages paid to these personnel are as follows:(11)

(11) Cummins, J. J. op. cit. p. 19

Truckers	\$188.00 per month
Motor Operators	197.00 per month
Pickers	197.00 per month
Cooper	197.00 per month
Stowmen	197.00 per month
Check Clerks	213.00 per month

At a large freight terminal such as the Frisco Railway's St. Louis, 7th Street Depot, the average employment of the above named is fifty-eight truckers, seven motor

operators, one cooper (a man whose job is repairing broken boxes and crates), twenty-seven pickers, twenty-five stowmen and twenty-two check clerks. Thus the total wages earned on an average by these employees amounts to \$22,542.00 per month. By abolishing these needless positions it can be seen that the saving in these wages alone would contribute an appreciable decrease in the overall average cost per ton of handling L.C.L. freight at this one freight terminal.

Referring to Table IV and using figures representative of the month of January 1947, the saving per ton of L.C.L. handled is shown as follows:

$$\frac{\text{Total wages paid to employees}}{\text{Average cost per ton}} :: \frac{\text{Wages of abolished jobs}}{\text{Saving per ton}}$$

$$\frac{\$31,449.26}{2.55} :: \frac{\$22,542.00}{x}$$

$$x = \$1.824$$

thus a saving of \$1.82 per ton L.C.L. can be realized by the abolishing of needless jobs through the adoption of the container system of handling L.C.L. traffic. This type and comparable amount of saving could be reflected to all freight terminals of all railroads and consequently bring about a considerable decrease in the railroads "out of pocket" costs of handling L.C.L. traffic.

From the Division of Freight Loss and Damage Claims of the Frisco Railroad, figures were obtained on actual

amounts paid out for L.C.L. freight damages and losses from January through June of 1947. The breakdown of monthly payments are as follows:⁽¹²⁾

(12) Direct communication from Mr. H. K. Hayes, Superintendent of Freight Loss and Damage Claims, Frisco Railroad, Springfield, Missouri.

Month	Claim Payments on L.C.L. Freight	No. Claims Paid on L.C.L. Freight
January	\$21,156.14	6,794
February	27,020.23	6,614
March	21,533.65	6,576
April	20,741.83	7,083
May	24,755.06	7,496
June	33,405.52	8,494

The first column represents actual payments on L.C.L. freight made during the month specified.

The second column represents the number of individual claims paid on L.C.L. freight and is just an estimate. This is true because, recently a survey was made upon instruction from the Interstate Commerce Commission, developing that approximately 70% of all claims received involved L.C.L. freight, and thus the figures shown represent that 70% of all claims received by the Frisco. The other 30% of course were claims on car load freight.

No figures are available as to the average loss per shipment of L.C.L. freight, however, during the year 1946 the Frisco's ratio on L.C.L. traffic was 3.2%, or in other words \$3.20 per \$100.00 revenue was paid

back through damage and loss claims. This figure is low comparing it with that of the Association of American Railroads for 1946. Their figure representing losses and damages was 5.85% or almost 6% for 1946.

This shows clearly the fact, that through the handling process involved in L.C.L. traffic the railroads lose an appreciable amount of revenue. In handling L.C.L. freight the railroads not only encounter an "out of pocket cost" but added to this is the loss on damaged shipments.

A second economic betterment can be realized by the shipper. Through the use of the containers the shipper can realize a saving in that the items in his shipment will not require the crating and packaging as called for by present day methods of L.C.L. transport. At least fifty to seventy-five per cent of crating and packaging costs will be saved, and extra heavy cartons and boxes will be done away with as they are simply used as a precaution against breakage and damage due to excess handling. Also the shipment will arrive at its destination in a useable condition and will save him the extra time and expense of replacing the damaged shipment to the customer. The shipment placed in the containers will not be taken out of the containers until the destination has been reached and only at the door of the consumer or consignee. This saving will

mean a great deal to the shippers of this country and will in turn create added volumes of L.C.L. traffic for the railroads. The shipper will also value highly the pick up and delivery, door to door service created in conjunction with the container system.

The second operation in the transporting of an L.C.L. shipment is the moving of the shipment over the railroad to its destination point. Here the railroads will experience another saving through the use of container and container cars. This saving will be realized the same in the first operation of the container system just mentioned, through the minimizing of handling.

One of the greatest problems of present day transport of L.C.L. freight is, as previously described, the expensive handling of such freight through terminals. The container system would replace this expensive and extensive handling with a minimum and inexpensive handling. Today the individual items of an L.C.L. shipment are handled numerously when the shipment is transferred from one road to another through a terminal, but with the advent of the container system only the container will be handled. The container will be transferred but twice from one car to another in the movement through the same terminal. This means less personnel, less time consumed, and less possible damages to the shipment, the latter of which is of importance to both the railroad and the shipper.

The method of transferring the containers would be a simple one. Each railroad entering a terminal point, such as St. Louis, Chicago, Kansas City, would have a gantry crane located in its freight yards. This crane spanning two or three would simply pick up the container from a car on the incoming road and set it on a "trap" or "shuttle" car. This car in turn is moved to the outgoing road yard where a similar crane will transfer it to a car destined for movement to the localities of the various containers placed on that car. In other words, the outgoing road would place containers on one car that contained shipments for points within one or two divisions on that road.

The third and last operation encountered in the transport of an L.C.L. shipment is similar to the first only in reverse, in that the shipment is taken from the railroad and delivered to the consumer or consignee. Here again handling expense, time and possible damage are brought to a minimum through the use of containers.

Today the railroads will deliver the shipment but often the consumer or consignee has to see to it that the shipment is taken from the railroad freight house and delivered at his own expense. The container system will incorporate a pick-up and delivery service where by the container will be taken from the railroad car, at the destination point, placed on a flat bed truck

and the shipment delivered to the door of the consumer. The empty container would then be taken back to the railroad for further use of other L.C.L. freight.

L.C.L. shipments would be expeditiously placed in the containers at the originating points. That is, there would be given considerable thought and effort as to the placing of individual shipments or of combining individual shipments into one container where these shipments have the same or relatively close destinations. In other words, two shipments, one going to Memphis and the other going to Chicago, would not be placed in the same container, at Kansas City the originating point. Freight for one locality would be placed together in one container so as to minimize handling along the line. Of course, in some cases of small volumes of outgoing L.C.L. shipments at small stations, shipments would in turn be placed into other containers at a terminal point for further movement to their destinations because of their diversified destinations and small size.

As stated, the container system would incorporate a pick-up and delivery service. This service would be of greater extent than it is today. To show this more clearly and for example to bring out other points mentioned previously an example using a section of the State of Missouri and the Frisco Railroad will be used.

Quite a volume of L.C.L. freight originates in St. Louis for distribution to many small communities in the central section of Missouri along or close to the Frisco Railroad. On one day, for example, enough L.C.L. freight for these communities, such as Rolla, St. James, Cuba, Salem, Licking, Newburg and Vichy (Fig. 1) will be picked up in St. Louis and placed in three containers, one container being loaded with items for Rolla only. These three containers would be placed on a flat car along with one other container probably destined for Springfield or some other point in the same division of the Frisco Railroad. This car would move out of St. Louis in the evening arriving in Rolla a few hours later. At Rolla, where the train would stop for a few minutes, the containers would be transferred from the flat car to the station platform by means of a stationary gantry crane. In turn, empty containers or containers loaded with outbound L.C.L. would be loaded onto the car and the train would again be on its way. Then the containers left on the platform would be loaded onto trucks. One truck would deliver the freight in the Rolla container to the consumers in Rolla while another truck would take the other two containers and deliver their contents to their proper destinations in the various other communities in the vicinity of Rolla.

LOCALITIES SERVED THROUGH TRANSFER AND
DISTRIBUTION POINT - ROLLA, MISSOURI

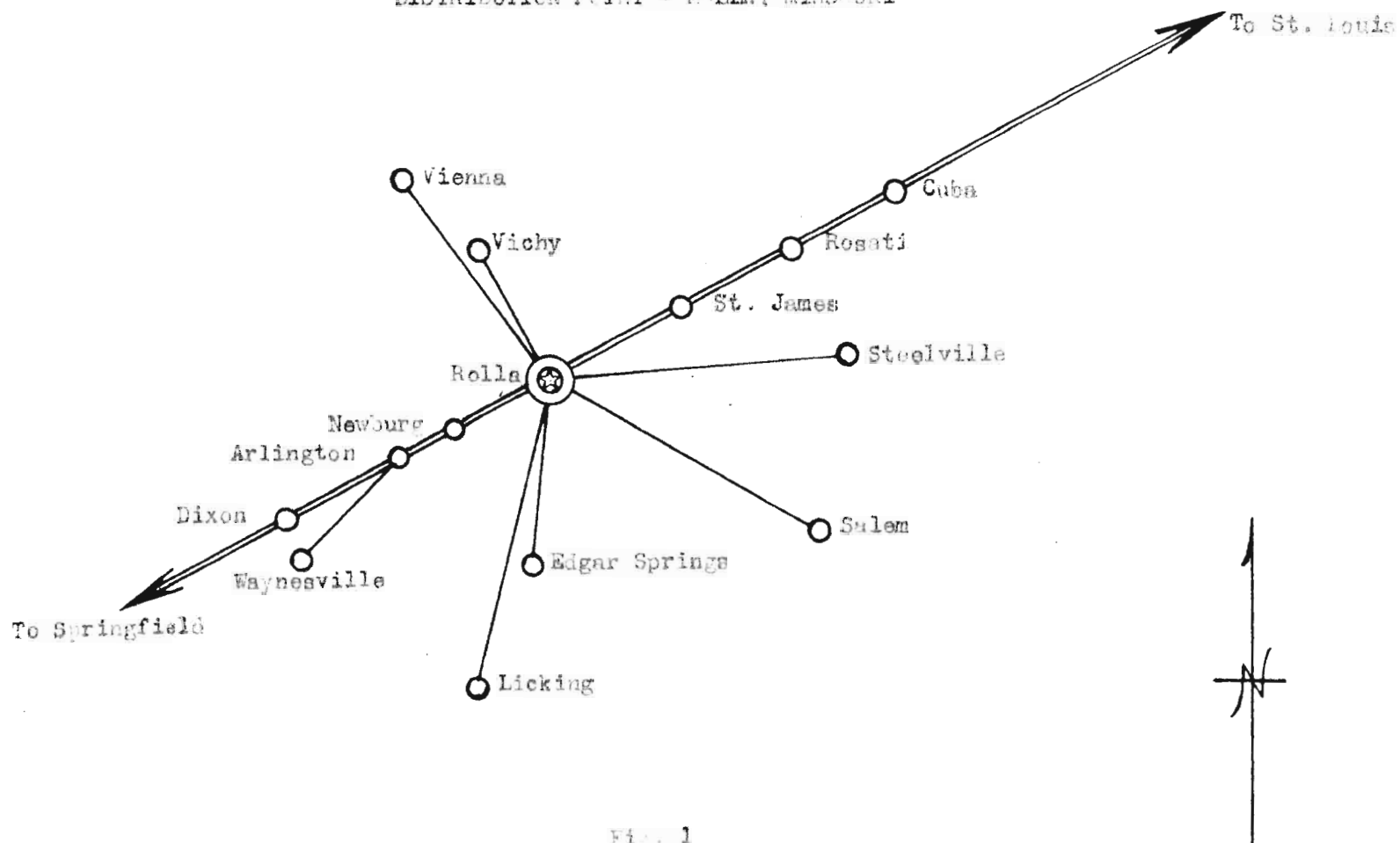


Fig. 1

Rolla would be the center or local distributing point for this area of twenty or twenty-five miles radius where containers would be transferred from train to truck and visa-versa. All along each railroad, such as Rolla on the Frisco, transfer points would be set up, each serving as the center or key point for an area containing several smaller communities. In this manner all stations on a railroad would not have to be equipped with a gantry crane or similar equipment for transferring containers from rail to truck, thus minimizing purchasing costs and operating costs of such equipment.

CHAPTER V

THE CONTAINER AND AUXILIARY EQUIPMENT

The containers which will be used in this system of improving railroad L.C.L. freight service will be of comparable size, type, and weight to those containers previously used by the New York Central Railroad. However, to incorporate more flexibility into their use two changes or improvements would be introduced.

The first improvement would be in the placing of the doors of the container. The doors would be placed in the long side of the container instead of the short side as is the case with those containers previously used. That is, they would be placed in the sides which are parallel to the long axis of the railroad flat car or truck body. This improvement would provide accessibility to the interior of the container at all times while either on the railroad flat car or, of more importance, while on the truck for loading and unloading purposes.

The second change or improvement would be the adoption of containers of various lengths to facilitate the handling of odd length and size shipments such as steel bars and plates, pipe and tanks. Therefore, the containers would not be of one standard size only, such as those previously used, but would also be of one-fourth car and one-half car lengths. This feature

also provides more flexibility in the use of the container system. (Fig. 2)

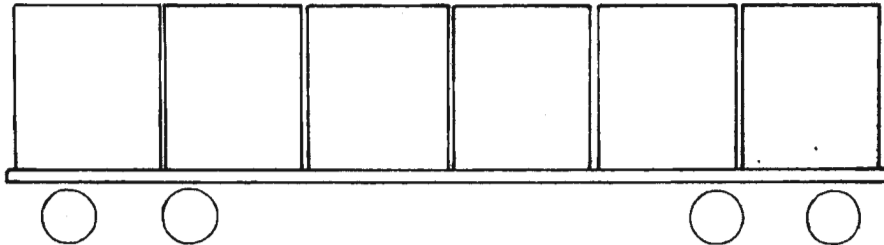
The containers would be of the leg type, that is, four legs would protrude from the bottom corners of the container. These legs would provide stability and rigidity between the container and the flat car while en route over the railroad and also between the container and the truck bed while moving via truck.

The trucks used in the container system would be of the flat bed type having sufficient length of bed and horsepower to carry a half car container if necessary.

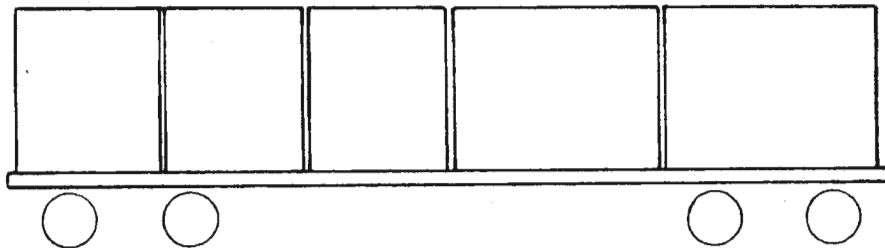
The gantry crane equipment would be of two types. (Fig. 3) In the terminal freight yards a traveling type crane would be used. This crane would probably span two or three tracks of the freight yard along with a roadway for the trucks carrying the containers. Numerous gantry cranes of this type are to be found in use today in freight yards of any section of the country.

At the transfer or distribution stations, previously discussed, a stationary gantry crane would be used. This crane would span a siding track and a roadway for trucks. It would be of lighter construction than the traveling cranes used in the terminal yards by virtue of its smaller span. Both the traveling type and the stationary type crane would be of twenty to thirty ton capacity.

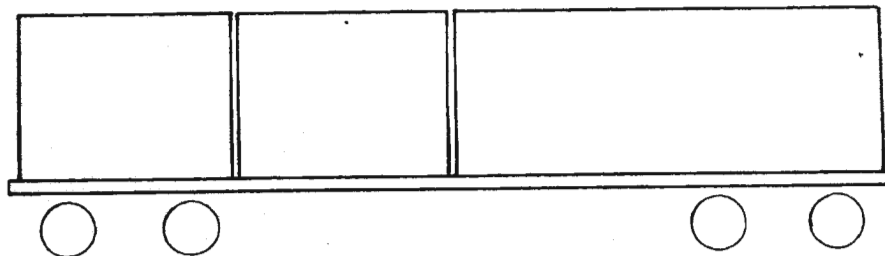
EXAMPLE ARRANGEMENT COMBINATIONS
OF CONTAINERS ON RAILROAD FLAT CAR



6 Standard $1/6$ Car Containers on One Car



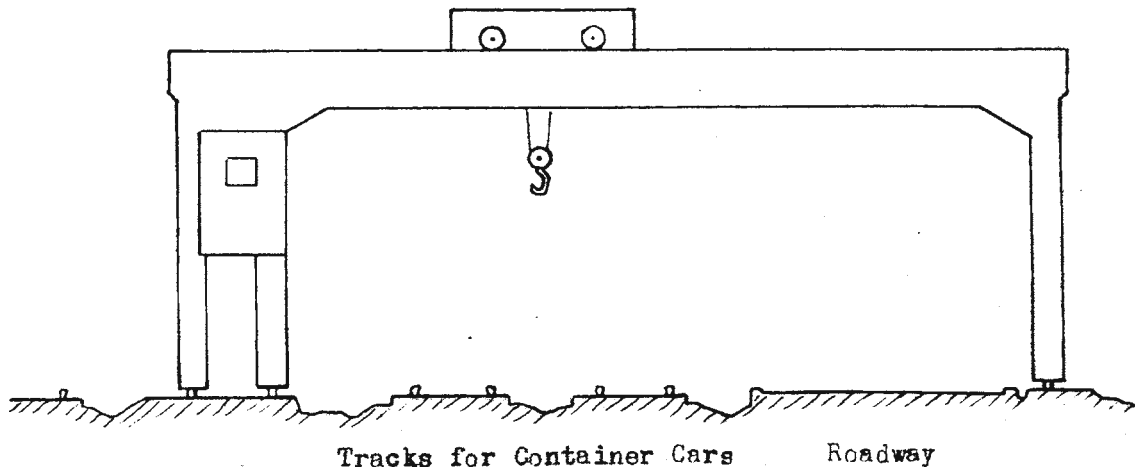
3- $1/6$ Car and 2- $1/4$ Car Containers on One Car



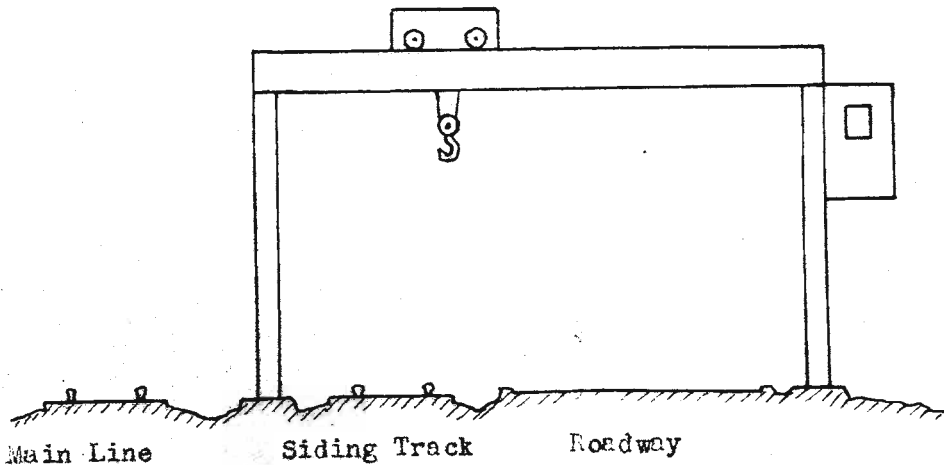
2- $1/4$ Car and 1- $1/2$ Car Containers on One Car

Fig. 2

TYPICAL GANTRY CRANES AT TERMINAL YARDS AND LAYSIDE
STATIONS FOR TRANSFER OF CONTAINERS FROM RAILROAD
TO TRUCK AND TRUCK TO RAILROAD



Traveling gantry crane in freight yards
spanning two tracks and roadway



Stationary gantry crane for transfer points
spanning one siding track and roadway

Fig. 3

CHAPTER VI

ECONOMIC ASPECTS OF THE CONTAINER SYSTEM

During the past few years the railroads have been trying to solve the problem of how to improve this L.C.L. freight service by means of adopting and using new types of moving conveyances in their freight stations and making studies on proper loading of shipments in box cars. Today they are still experiencing a large out-of-pocket cost of handling L.C.L. freight, the freight loss and damage figure is still high, and freight rates are at a higher peak than ever before. This proves that by trying to improve the service with small advances of effort, the railroads have not benefited themselves or the shipping public with a reasonable improvement in L.C.L. freight transportation. It seems inevitable then that a large scale improvement will have to be invoked before out-of-pocket costs disappear, loss and damage claims decrease appreciably, and, most important of all, freight rates are lowered.

In analyzing the container and container car system of improving L.C.L. service, it can be seen that through the application and use of this system, as described here, these detrimental conditions, now plaguing the railroad freight industry, will be compensated for.

An initial outlay or investment is of course inevitable in a new venture of this kind. Containers

and gantry cranes will be the essential and principle items of expense.

However, to make possible an economic betterment for both the railroads and the shipping public, several facts present themselves which will more than offset the initial and operational expense of the container system.

First, no new container cars need be built because flat cars now in use will be the carrier for the containers. Second, trucks will not have to be purchased for the pick up and delivery service. Almost all railroads in the United States today have their own trucking system and these trucks now in use would be placed into service with the container system. With using trucks in this manner the railroads would achieve a true coordinated system of rail-truck service. Third, as discussed previously, wages of needless personnel now employed at the freight houses will be saved. Fourth, loss and damages due to excess handling will be decreased appreciably. Fifth, a speedier and more efficient L.C.L. freight service will be rendered. Sixth, and most important, as a result of all these combined freight rates could be decreased. Summing this into a brief statement, the ultimate goal of the railroads will have been achieved through the adoption of the container system of handling L.C.L. freight.

The goal is rendering the most efficient and economical freight transportation service to the public.

CHAPTER VII

CONCLUSION

The railroad industry is one which has but one commodity to sell- that commodity being transportation service. An organization that has service to sell is constantly catering to the public, the user of this service. Many years ago when the railroads were young and growing in size they were the chief mode of transportation and by virtue of this position in the transportation field, they did not cater to the public, instead the public catered to them. Thus, with this attitude that they ruled the transportation industry, the railroads developed into maturity soon to find that the one chief factor of private enterprise, competition, was plaguing them. By the time they realized that something must be done to improve their services, both freight and passenger, the motor, air and water transport industries had grown and achieved a firm foothold in producing the transportation the public was demanding.

Keen competition is now going on and the railroads are trying to hold their place in the transportation field. Through the competition set forth by the trucking industry the railroad L.C.L. business has been on a constant decline and has reached the point where out-of-pocket costs are experienced in order for the railroads to keep the business. The railroads must therefore

improve the L.C.L. service they now give by some means other than those of meager extent which have been and are still being tried. It is concluded therefore that with the application of the container and container car system, the railroads could meet their competitors in the field of L.C.L. freight transportation and give the shipping public the benefit of a resultant efficient and economical transportation.

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VITA

Kenneth Walter Schoeneberg was born on November 5, 1921, at St. Louis, Missouri, the son of Mr. and Mrs. Rudolf L. Schoeneberg.

His early education was received in grade school and high school at St. Louis, Missouri. He entered the Missouri School of Mines and Metallurgy in September 1940 and graduated in January 1944 with a B. S. Degree in Civil Engineering.

While at the Missouri School of Mines he was a student in advanced R.O.T.C. and in the fall of 1942 joined the enlisted reserve corps of the U. S. Army. Upon graduation in January 1944 he was sent to Ft. Belvoir, Virginia, to the Officer's Candidate School and on June 14, 1944, he was commissioned a second Lieutenant in the Corps of Engineers. The remaining part of 1944 was spent in the E.R.T.C., Camp Claiborne, Louisiana. On December 25, 1944, he was assigned overseas duty with the 1330th Engineer Regiment and remained overseas both in the European and Pacific Theaters until September 1946 when he returned to civilian life.

In February 1947 he entered the Missouri School of Mines for graduate work in Civil Engineering.