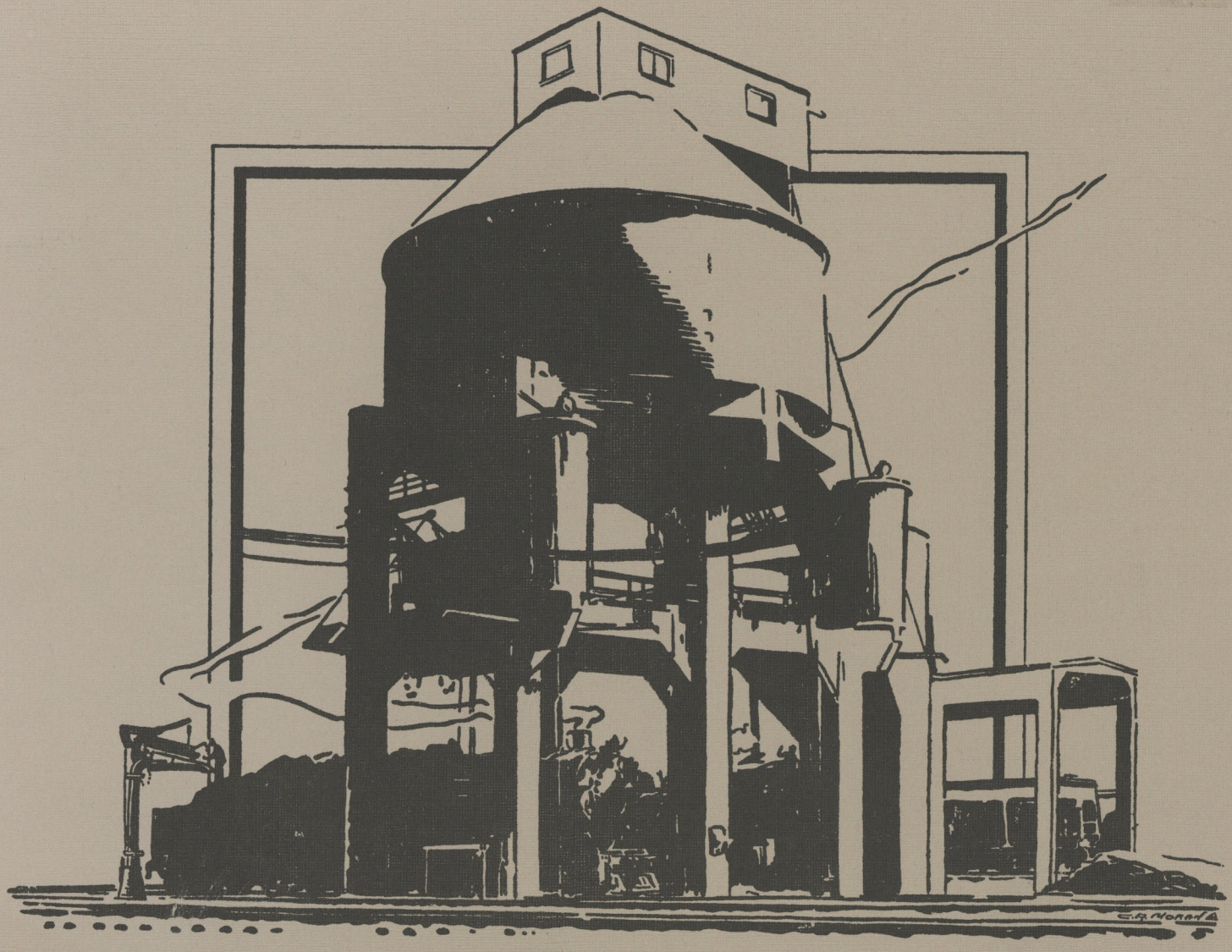

LOCOMOTIVE COALING STATIONS

Yard Storage Systems
Cinder Conveyors
Sand Plants

Bulletin No. 73001

Fairbanks, Morse & Co.

Preface to the Reprint

This catalog was originally issued by Fairbanks, Morse & Co. in the mid-1930s, giving railway executives and engineering department officers an inventory of the type of steam locomotive coaling stations available from that firm. The publication's utility today is to help explain to historians the technology of railway coaling stations of "modern" design and to provide model railroaders with accurate plans and photos for reconstructing these most visible remnants of the steam age on American railways.

Fairbanks, Morse & Co. of Chicago was one of several large engineering companies that built railway coaling facilities, its primary competitors being Ogle Construction Co. and Roberts and Schaefer Co., both also of Chicago. (Also during this time, Fairbanks, Morse was a major manufacturer of railroad and other scales for weighing heavy loads. Best known is F-M's brief entry into the railroad diesel locomotive market in the 1950s). Most concrete coal stations, as well as cinder conveyors seen in modern steam locomotive terminals, were built by one of these three companies. Ross & White Co. of Chicago and Howlett Construction Co. of Moline, Illinois, also constructed these types of facilities, but on a much smaller scale.

All these firms, including Fairbanks, Morse, originally built wooden coaling towers and then in the 1920s began to gradually phase out this technology, replacing it with either reinforced concrete or steel construction.

Railroads initially built their own coaling docks, which were usually long, trestle-like structures on which carloads of coal were pushed by switching locomotives up a long incline 20 or more feet above ground level. The coal was then released into pockets and subsequently into tenders of waiting locomotives by means of hoppers and chutes. As locomotives became larger, the need for faster delivery as well as better utilization of space in engine terminals brought about the demise of the trestle coaling station.

Its replacement was a wooden tower-like structure that stood on stilts above the yard tracks, engine tracks or mainline and held coal lifted into its large hopper either by conveyor or chain-and-bucket elevators. These coaling stations varied in size from tiny 50-ton-capacity towers to huge 1,000-ton and larger structures. Many of them were built by individual railroads, with machinery supplied by one of the companies noted above. In some cases the entire structure was contracted to Roberts & Schaefer, Ogle or F-M.

In the 1920s the technology of reinforced concrete construction was rapidly developing and this very permanent construction, requiring little upkeep (as opposed to wooden facilities) was soon adopted wholesale by the railroads. Leading coaling station construction firms shifted gears to accommodate these new materials and methods, with the result being hundreds of giant concrete coaling stations that dotted American railway corridors, in giant yards and out in lonely fields, wherever the need to refuel locomotives existed. A few all-steel stations were built but their upkeep was still considerably greater than their concrete counterparts.

So solid and permanently built were the concrete coal docks--the structures went by a variety of names: coaling stations, fueling stations, coal docks, coal piers, coaling platforms, some harkening to an older technology--that when steam locomotives passed from the scene they were left standing because it was simply easier to leave the massive structures standing than to tear them down. They still were used often for sanding diesels and to mount yard lights on, certainly the sturdiest anchors possible for them!

Even today, fully 40 years after steam locomotives populated American rails in great numbers, many great coal docks still stand as the last really visible remnant of the Age of Steam. Now, however, in the railroads' continuing efforts to downsize and to reduce the number of unused structures on which they must pay taxes, coaling stations are being demolished in ever increasing numbers. The day will come when few remain. It is now up to the historian to preserve them by photograph and drawing and the modeler to replicate them in miniature.

We hope this reprinted catalog/manual will help both those efforts.

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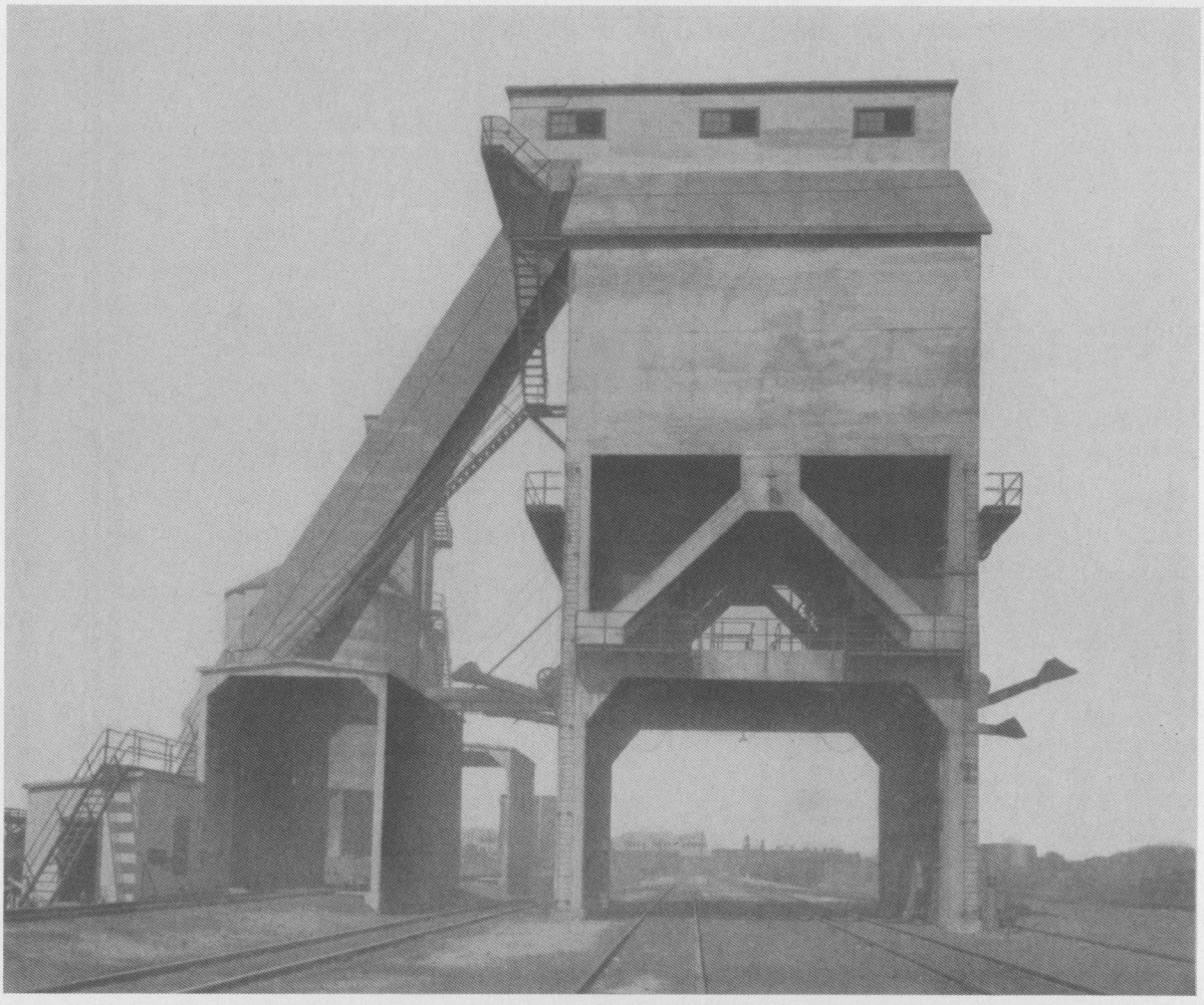
FACILITIES and experience play a major part in the design and construction of coaling stations, sand plants and cinder conveyors, and these factors have contributed largely to the success of over 700 Fairbanks-Morse stations built during the past 25 years. The most prominent railroad companies of the United States and Canada have availed themselves of Fairbanks-Morse service, which covers every phase from the preliminary plans to the finished structure, and centers the responsibility for successful operation.

Conveyor-Type Coaling Stations



Coaling station and sand plant at Shopton, Iowa, one of the 54 Fairbanks-Morse stations on the lines of the Atchison, Topeka & Santa Fe Railway Co. The coaling station has a capacity of 1,000 tons, serves four tracks, and is equipped with four 15-ton scales for weighing all coal issued. The sand plant is exceptional in that it provides storage for a six months' supply

SINCE the introduction of the conveyor type of locomotive coaling stations about 25 years ago, their successful operation has resulted in many of the most important railway systems in the country adopting them as standard equipment. During this time there have been numerous improvements and refinements made in the design and construction which have contributed to their efficient operation and added to their popularity.

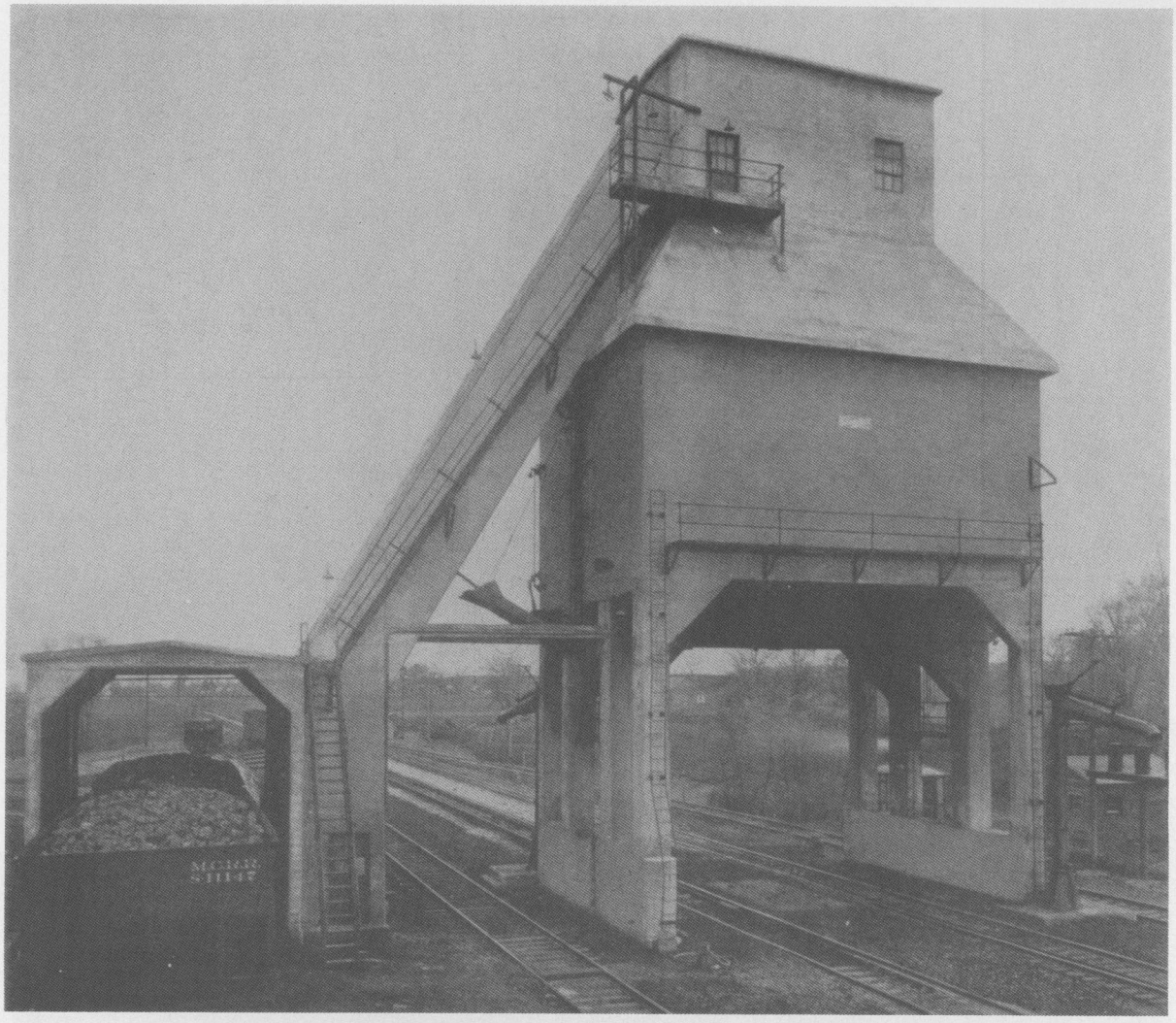
The steady growth and continued success of Fairbanks-Morse conveyor-type coaling stations has been due to the rigid maintenance of exceptionally high standards of design and construction. Constant improvement in the mechanical equipment and a steady trend toward sim-

A capacity of 800 tons is provided in this coaling station built for the Southern Railway at Atlanta, Ga. Coal is served to the tenders on three tracks from the platforms. Two scales, with 15-ton scale pockets and type-registering beams, give printed records of all coal issued

plicity in both construction and operation have produced in them a degree of dependability that cannot be excelled. This has been made possible by the application of experience gained in the complete manufacture and installation of hundreds of successful coaling stations.

While the primary function of coaling stations has always been to save time and money in refueling locomotives, modern stations can also provide a means of accurately checking fuel consumption by weighing all fuel when issued. They also make it possible to take on coal and water and to decinder at a single stop of short duration.

One of the outstanding features of a modern coaling station of this type is the

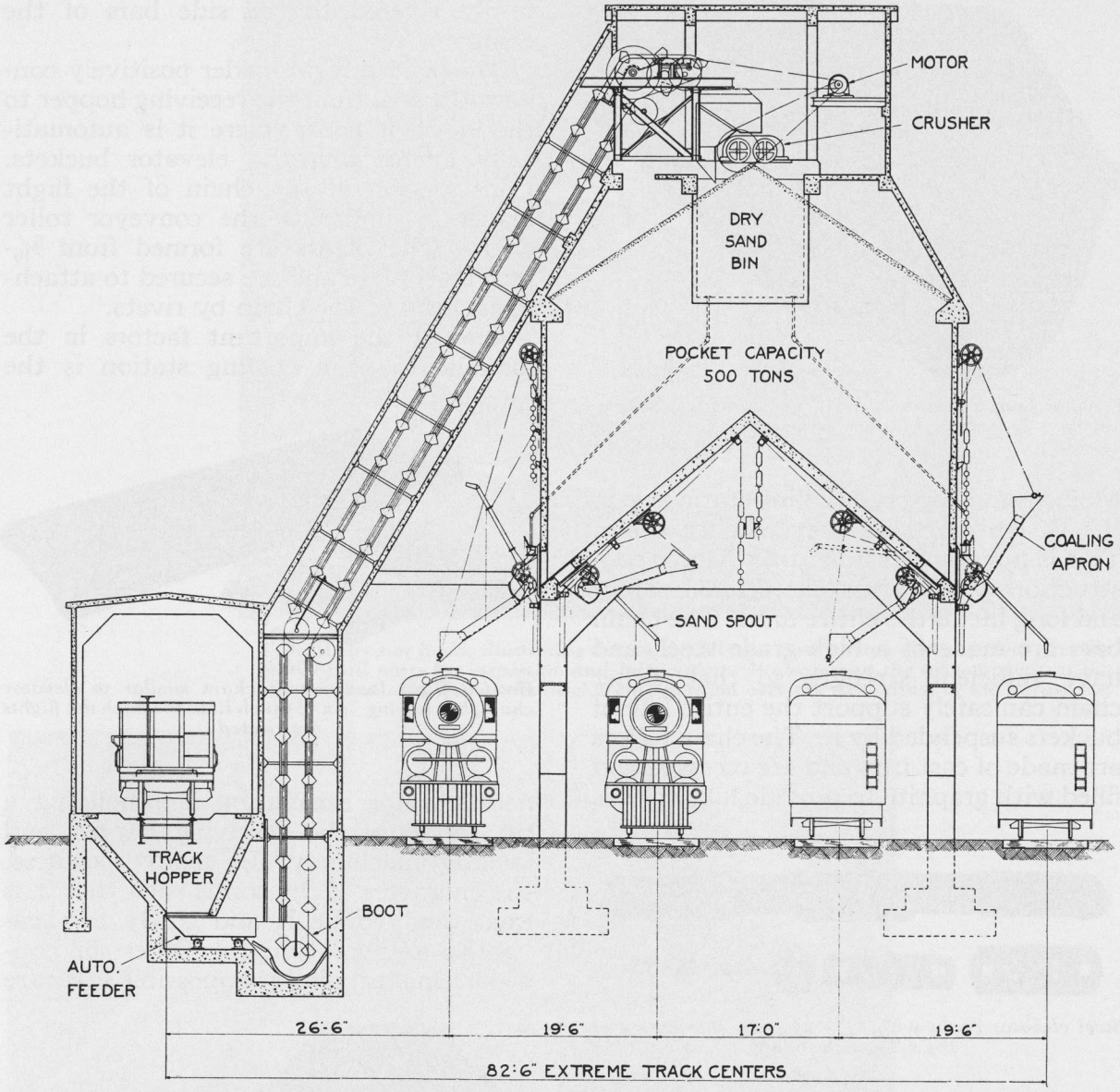


The 500-ton locomotive coaling station, on the Michigan Central Railroad at Augusta, Mich., is a typical modern station. Situated halfway between Detroit and Chicago, it enables locomotives on the main line going in either direction to take on coal and water at one stop and in less than one minute

entirely automatic operation. From the time coal is dumped in the receiving hopper until it is issued by the fireman or station attendant, no manual operations are required. Consequently, the attendance costs at such a station are remarkably low, and the total handling cost per ton of coal is reduced to a minimum.

Because the dominant influence in the design of Fairbanks-Morse coaling stations has been simplicity of construction and operation, they are maintained easily and economically. Any mechanic without special training can service a complete station, as there are no complicated mechanisms or delicate adjustments. They are so sturdily constructed and properly designed that shut-downs are very infrequent, and even in case of an accident are limited to a short time.

Coaling stations of the conveyor type are also economical to install, and can be constructed to fit the requirements of any railroad, and for any track arrangement.

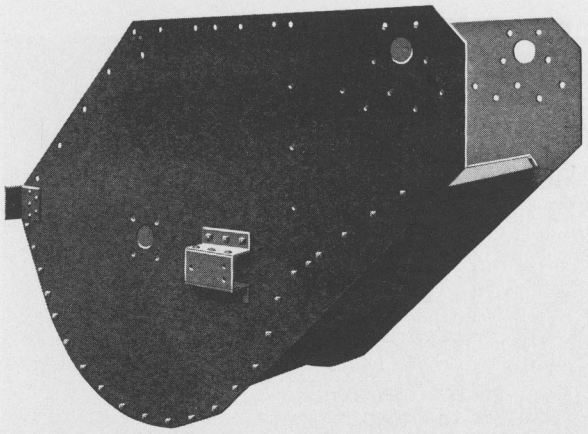


This cross-section drawing illustrates the construction of the station at Augusta, Mich., shown on the opposite page. Notice that the coal is crushed before storage and is delivered to the tender ready for stoker service

An exceedingly shallow pit is required for the conveyor loader, which further simplifies the installation and greatly reduces both the initial cost and maintenance cost.

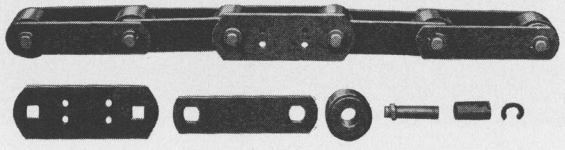
Fairbanks, Morse & Co. are able to furnish unusually efficient and reliable equipment to meet the power requirements for any coaling station. Where electric service is available, Fairbanks-Morse ball-bearing motors can be used as driving units. They are grease lubricated and require but a few minutes' time once a year for this service. In localities where electric power is not available at low rates, Fairbanks-Morse Diesel engines can be used. They invariably render a highly dependable service and are unusually economical power sources because of the great savings in fuel that they accomplish.

The keynote of success of Fairbanks-



Elevator boot with sides formed of 3/16-inch steel plate, having a 1/4-inch steel bottom plate which is removable

Morse conveyor-type coaling stations is in the design of the conveyor roller chain. This is a feature of Fairbanks-Morse construction which gives exceptional safety and long life to the entire unit. The chain bars are made of a high-grade steel, and have sufficient strength so that either chain can safely support the entire line of buckets suspended by it. The chain rollers are made of cast iron and are recessed and filled with graphite to provide lubrication.



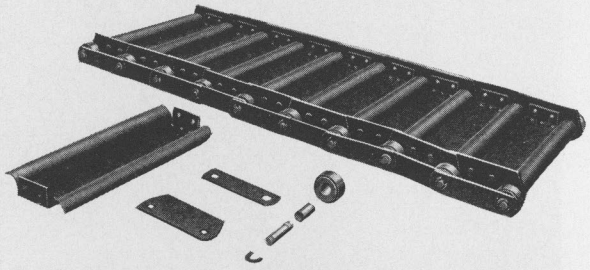
Steel elevator chain with 5/16 x 2 3/4-inch side bars and 1 5/8 x 3 1/2-inch rollers

The rollers are arranged in such a manner that they turn on large bushings, thus giving ample bearing surface.

The bushings and pins are made of hardened steel. Each has one end machined to fit into the square holes in the side bars of the chain and are thus prevented from turning. No lock nuts or cotter pins are required as the bushing and pin are both permanently secured in position by a closed soft-steel keeper. There are no attachment links on the chain because the bucket ends are embossed and firmly riveted to the side bars of the chain.

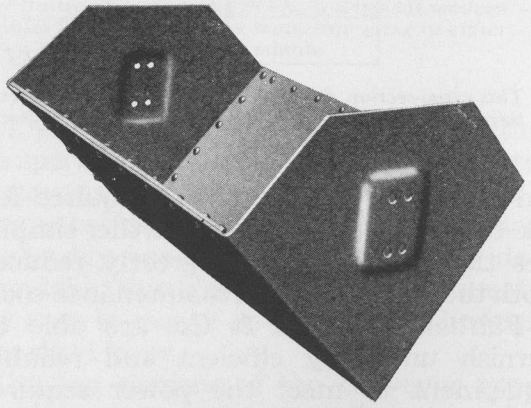
The beaded flight loader positively conveys the coal from the receiving hopper to the elevator boot, where it is automatically loaded into the elevator buckets. Construction of the chain of the flight loader is similar to the conveyor roller chain. The flights are formed from 3/16-inch steel plate and are secured to attachment links in the chain by rivets.

One of the important factors in the installation of a coaling station is the

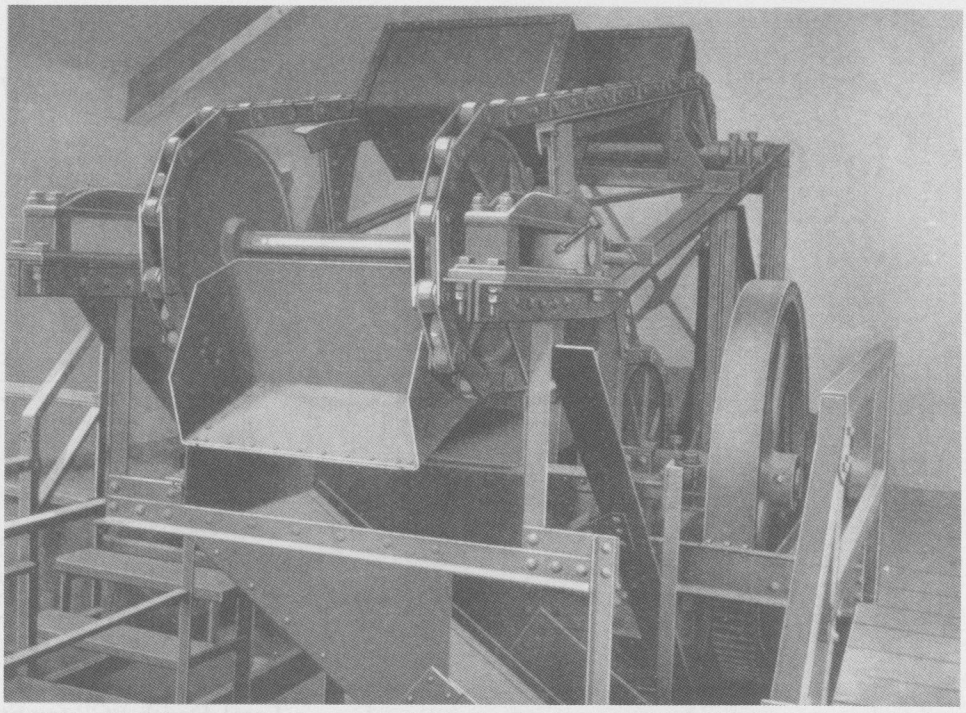


Beaded flight loader with chain similar to elevator chain, but having 5/16 x 4 1/2-inch links to which the flights are riveted

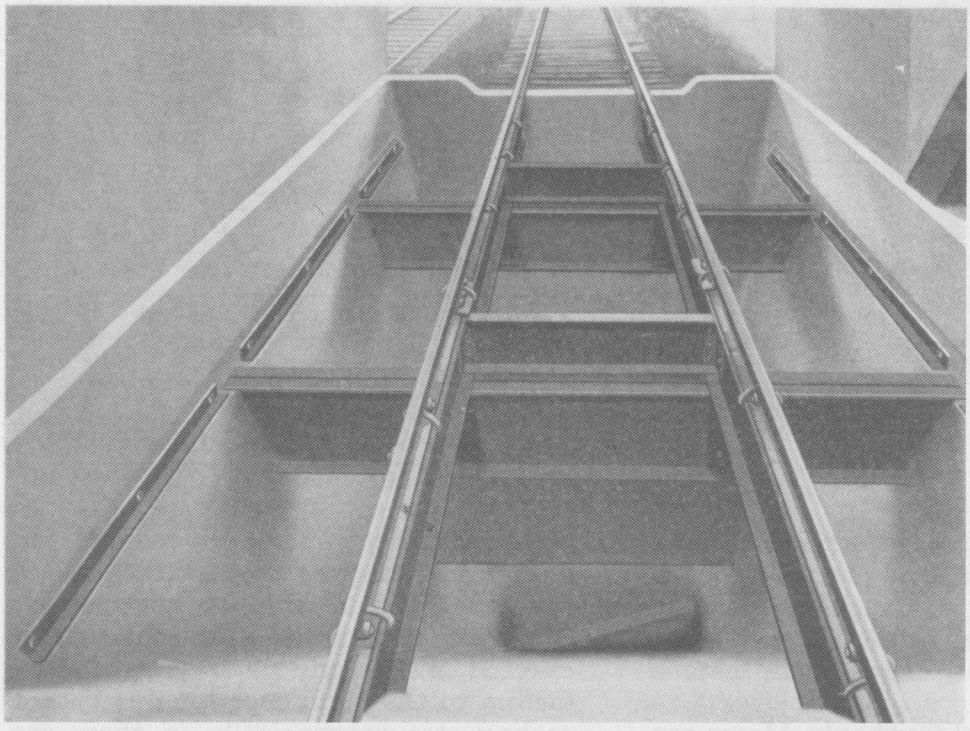
necessity for excavating and building a pit to house the receiving hopper and loading machinery. In many localities, the character of the soil is such that it is exceedingly difficult and costly to excavate to any great depth. Other soil conditions make it almost impossible to secure



"V" pattern elevator bucket, having the ends of 1/4-inch steel embossed for riveting to the conveyor chain. The sides are made of 3/16-inch steel plate and have 1/4 x 1 1/2-inch reinforcing steel bars at the edges

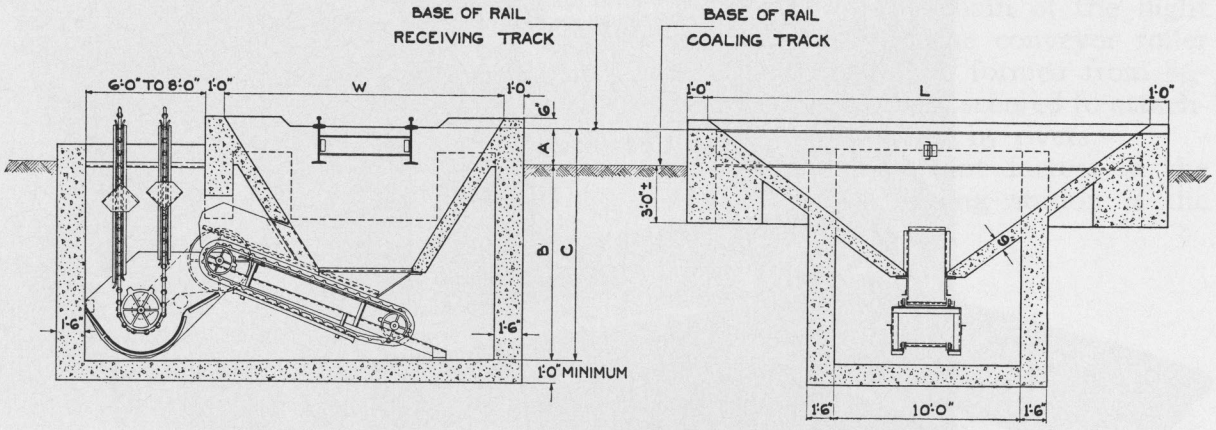


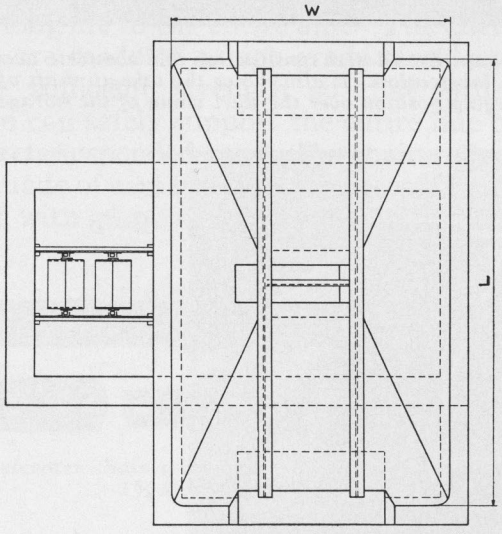
Typical elevator head, illustrating the sturdy, all-steel construction and complete accessibility of all parts for inspection and lubrication. It also shows the take-up shaft of the elevator and a bucket in the discharging position over the steel chute of the storage bin



This receiving hopper in a typical station shows the supports for the breaker bars which regulate the size of coal admitted to the conveyor. The steep sloping walls and rounded valleys insure positive feed through the loader until the hopper is completely emptied

Hoppers and Machinery Pits for Conveyor-Type Locomotive Coaling Stations





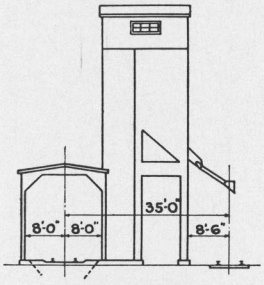
Total Depth "C" for Standard Receiving Hoppers

Hopper Length "L"	Hopper Width "W"						
	10′	11′	12′	13′	14′	15′	16′
10′	7′ 8″	7′10″	8′ 1″	8′ 3″	8′ 5″	8′ 9″	8′11″
12′	8′ 3″	8′ 5″	8′ 7″	8′ 9″	8′11″	9′ 3″	9′ 6″
14′	8′10″	9′ 0″	9′ 1″	9′ 3″	9′ 6″	9′ 9″	10′ 0″
16′	9′ 6″	9′ 7″	9′ 9″	9′11″	10′ 1″	10′ 3″	10′ 6″
20′	10′ 9″	10′10″	10′11″	11′ 1″	11′ 3″	11′ 5″	11′ 7″
24′	12′ 1″	12′ 2″	12′ 3″	12′ 4″	12′ 6″	12′ 7″	12′ 9″
30′	14′ 0″	14′ 1″	14′ 2″	14′ 3″	14′ 4″	14′ 5″	13′ 7″
36′	15′11″	16′ 0″	16′ 1″	16′ 2″	16′ 3″	16′ 4″	16′ 5″
40′	17′ 3″	17′ 4″	17′ 5″	17′ 6″	17′ 7″	17′ 8″	17′ 9″
44′	18′ 7″	18′ 8″	18′ 9″	18′ 9″	18′10″	18′11″	19′ 0″

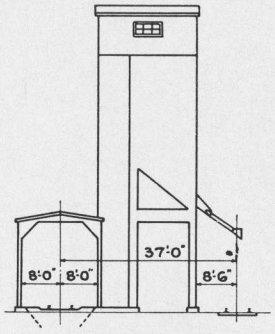
an adequate bearing surface for the foundations of a deep pit because of the presence of water. In such cases the use of piles is necessary, although such a procedure considerably increases the installation cost.

An advantage of Fairbanks-Morse conveyor-type locomotive coaling stations is in the design of the pit and loading equipment. The depth has been reduced to a minimum and the design of the foundation simplified to facilitate construction. A reduction in installation costs is thus effected and is one of the contributing factors to the preference for this type of coaling station, especially in those sections where the soil conditions are unfavorable.

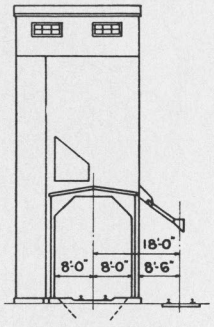
Standard Track Arrangements for Conveyor-Type Locomotive Coaling Stations



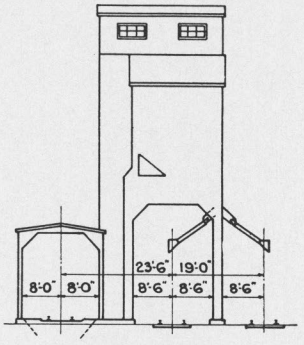
Type CRO1
50 to 100 tons



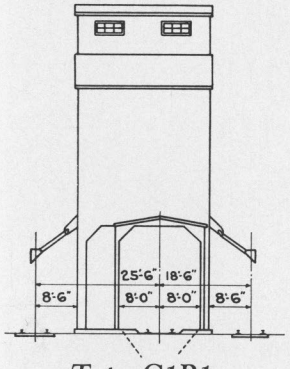
Type CRO1
100 to 200 tons



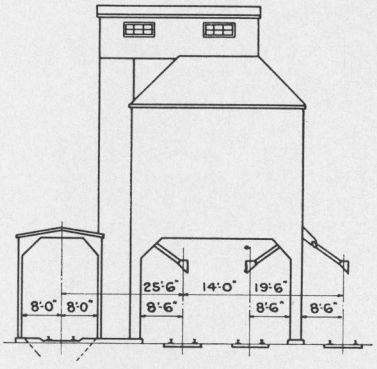
Type COR1
150 to 300 tons



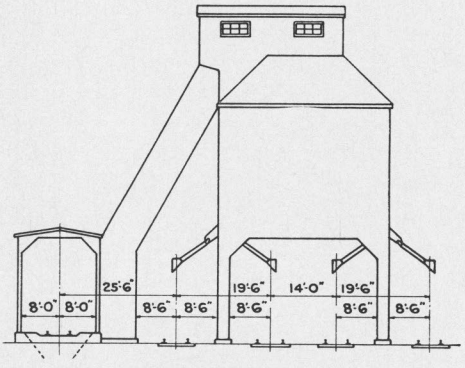
Type CR11
150 to 300 tons



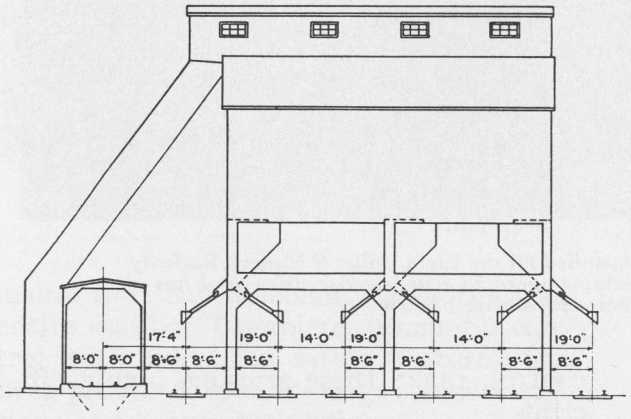
Type C1R1
300 to 500 tons



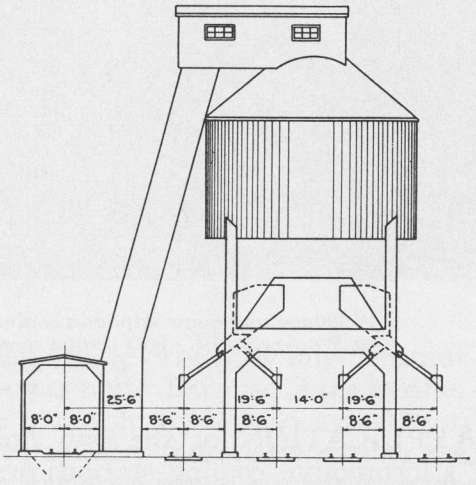
Type CR21
500 to 1,000 tons



Type CR121
500 to 1,000 tons



Type CR1221
1,000 to 2,000 tons



Type CR121
500 to 1,000 tons

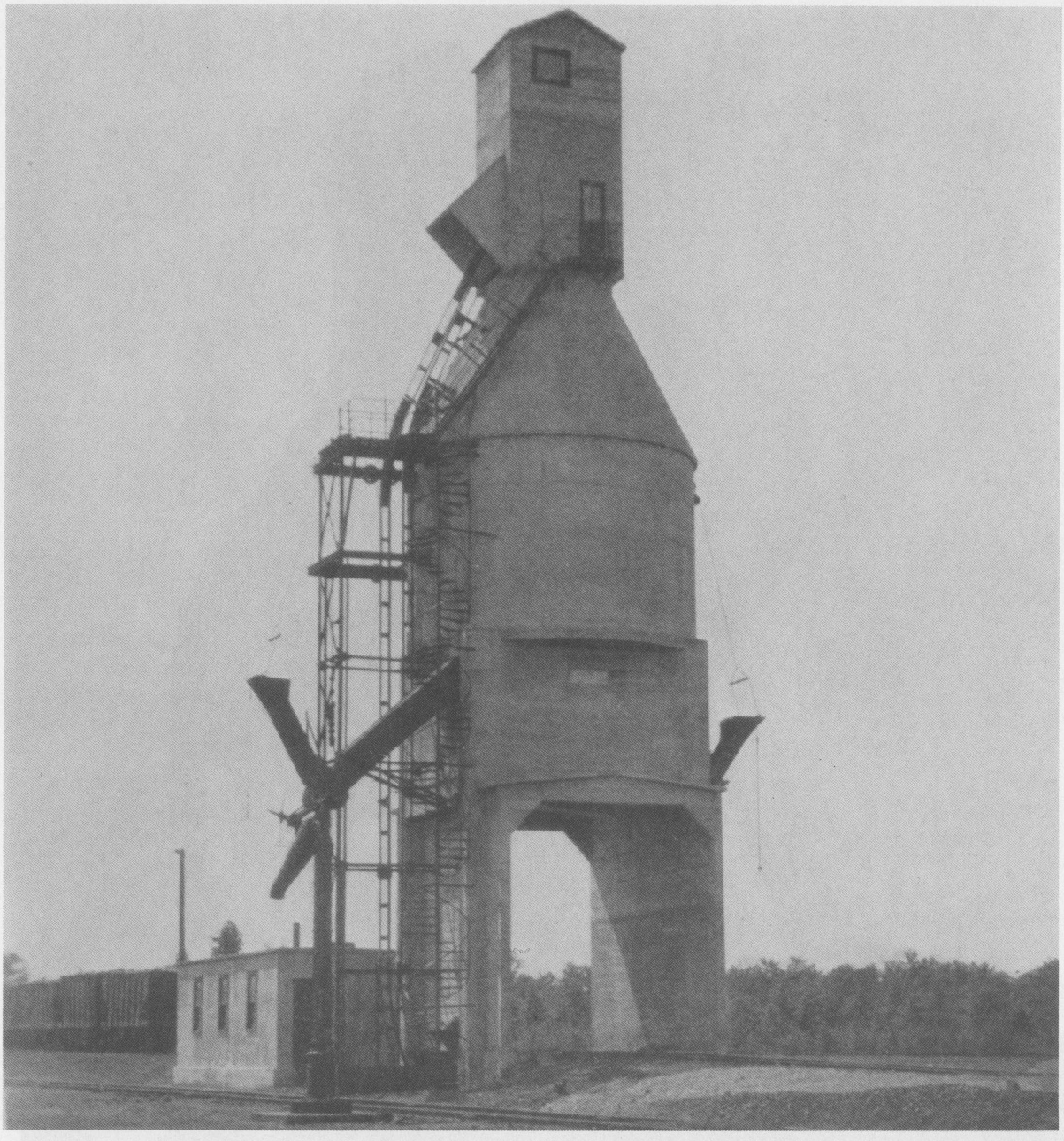
Other track arrangements and designs are made to suit local conditions

Skip-Hoist Coaling Stations

A 500-ton automatic skip-hoist coaling station installed for the Elgin, Joliet & Eastern Railway at Waukegan, Ill. This station serves two tracks, is operated with electric drive, and has a crusher located just above the storage pockets

APPLICATION of the skip hoist to locomotive coaling stations presents another method of handling coal economically. Developments in coal-handling and hoisting machinery, as well as automatic control, make these stations highly efficient.

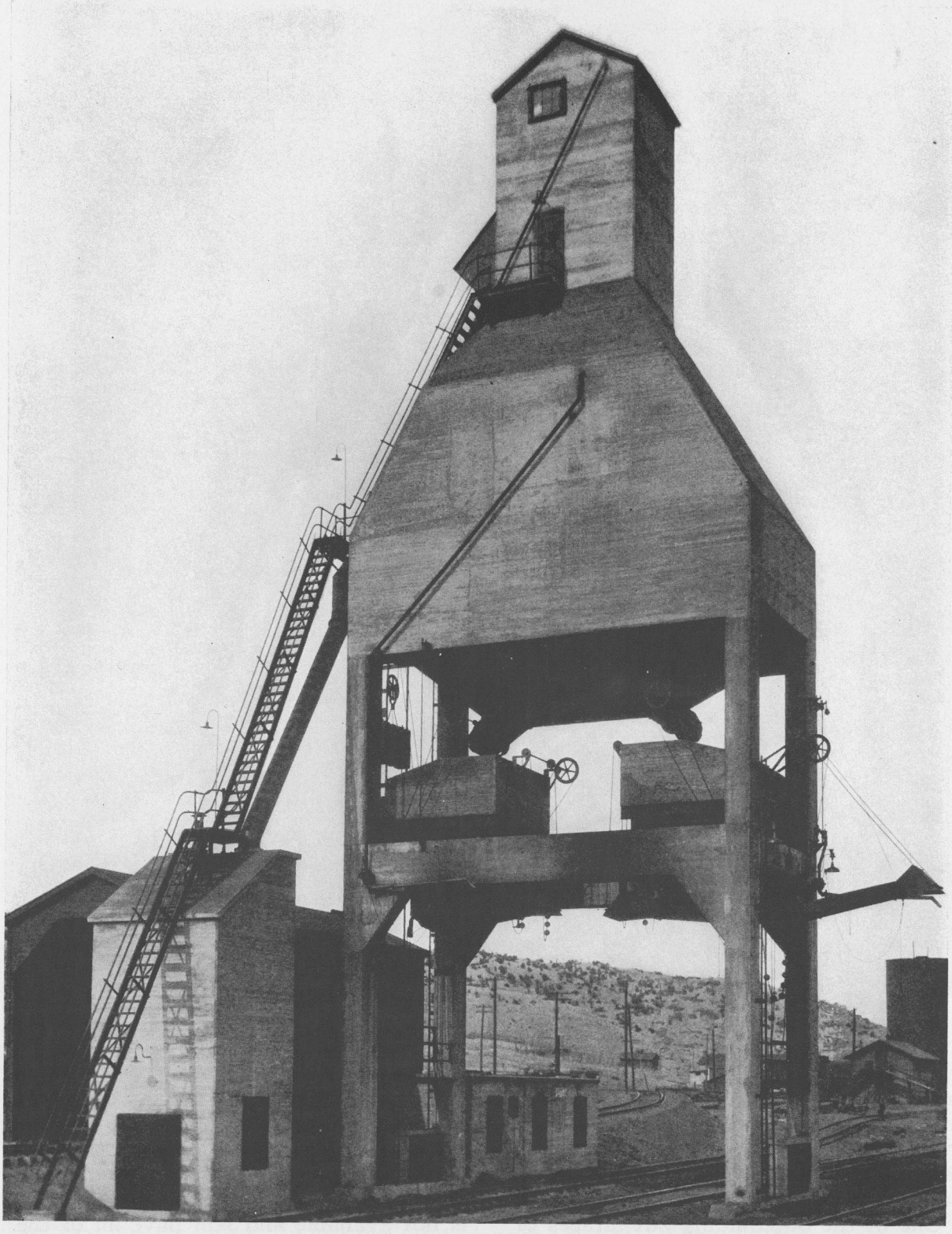
Fairbanks-Morse equipment has been designed along extremely simple lines to provide maximum dependability and to



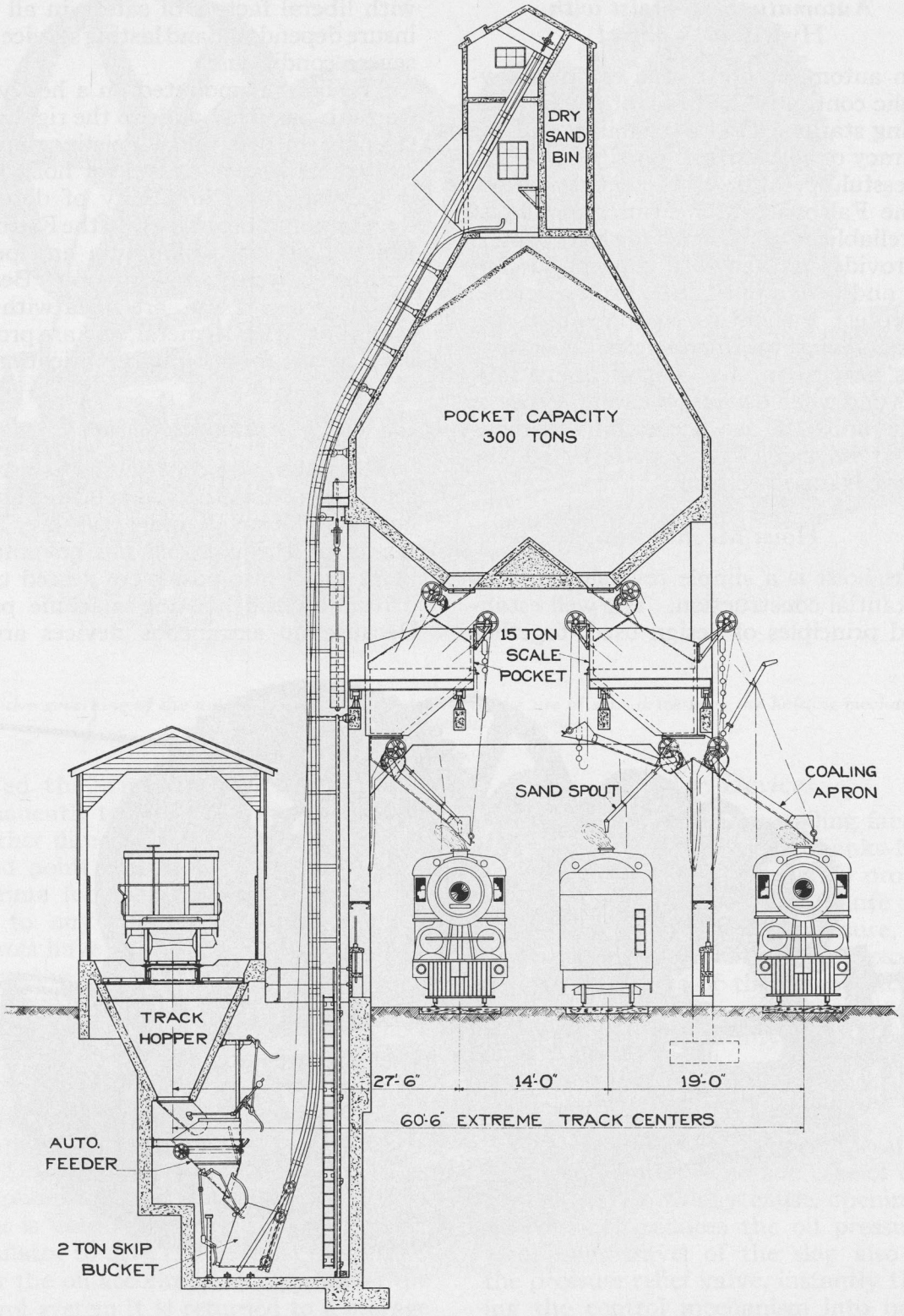
This 300-ton skip-hoist coaling station on the Pere Marquette Railroad at Baldwin, Mich., is driven by a Fairbanks-Morse Type Y oil engine

insure that any mechanic can service an entire station. Complete automatic control with adequate safety features has been provided, even for large capacity stations and heavy-duty hoists.

One of the outstanding advantages of Fairbanks-Morse skip-hoist stations is that they can be driven by any constant-speed power unit. Because of the hydraulic-type control, it is also possible to locate completely automatic coaling stations in localities where electrical service is not available and still have all of the safety and protective features.



Oil-engine drive is provided for this station on the Atchison, Topeka & Santa Fe lines at Lamy, N. M., because electric service is not available. Two 15-ton capacity scales are used to weigh all coal issued to the three tracks



A cross-section of the coaling station illustrated on the opposite page, showing the sand-handling and storage facilities in addition to the coaling equipment

Automatic Skip Hoist with Hydraulic Control

An automatic hoist with complete hydraulic control is the heart of a skip-hoist coaling station. On its reliability and the accuracy of adjustments possible rests the successful operation of the entire station.

The Fairbanks-Morse automatic hoist is a reliable hoist designed for heavy duty. It provides an accurate, automatic control, and is equipped with safety devices to protect the entire equipment of the station against all emergencies. In several years' service on the lines of many railroads and when driven by various types of power units, it has successfully demonstrated its capacity to perform all the work it is expected to do.

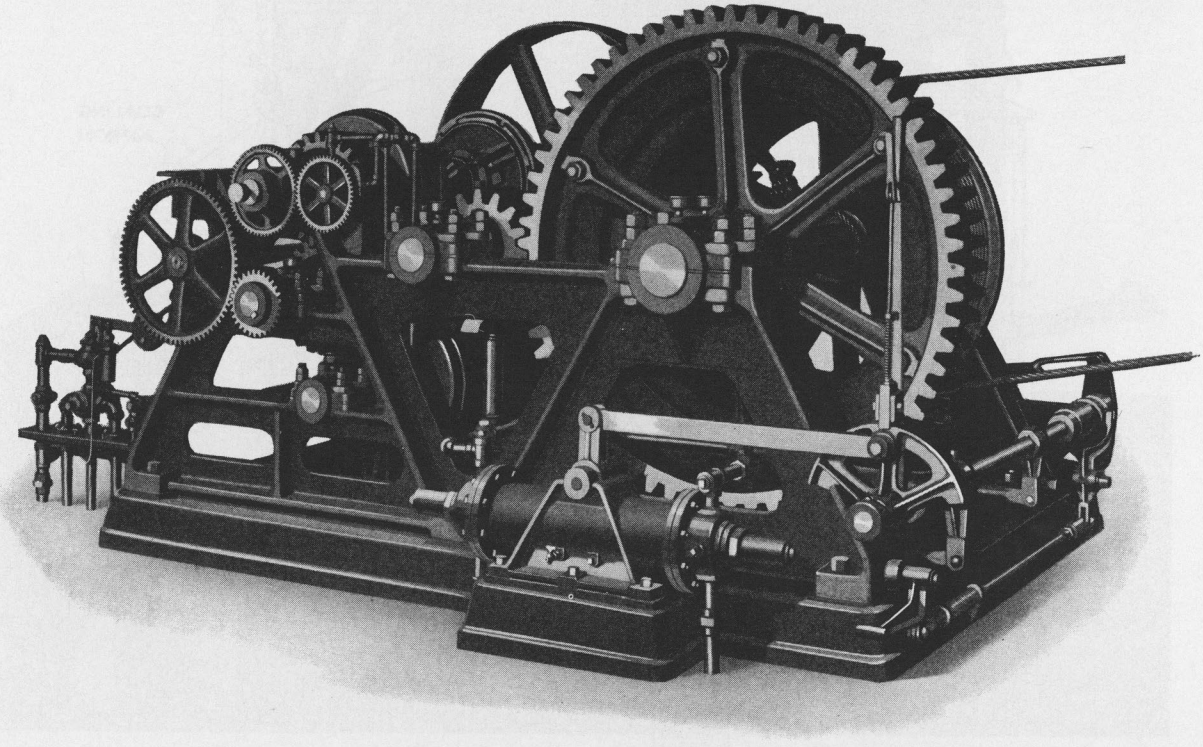
Hoist Mechanism

The hoist is a simple reversing unit of substantial construction. The well established principles of design used, together with liberal factors of safety in all parts, insure dependable and lasting service under severe conditions.

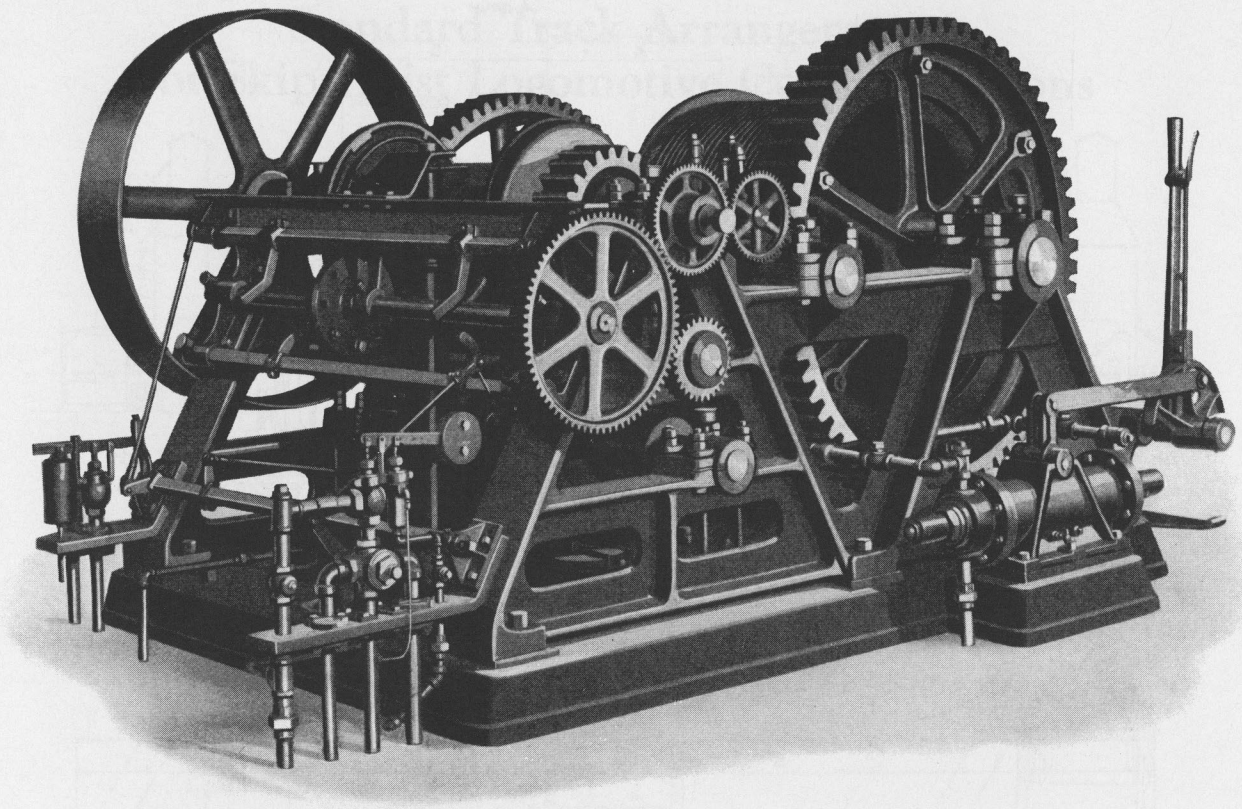
The hoist is mounted on a heavy cast-iron sub-base that adds to the rigidity and strength of the entire hoisting unit and eliminates several causes for hoist failure in this service. Simplicity of design reduces the number of parts in the Fairbanks-Morse hoist to a minimum and permits unusually sturdy construction. Bearings are of generous size, are lined with high-grade anti-friction metal, and are provided with means for thorough lubrication.

Automatic Control

The automatic control mechanism of a Fairbanks-Morse hoist is actuated hydraulically with thin oil under pressure. Movements of the controls are governed by parts which are positively geared to and driven by the hoisting machine proper. Because no extraneous devices are em-



This view of the automatic hoist well illustrates the substantial construction and sturdiness of the complete unit. The manual control equipment is shown in the foreground



Positive governing of the automatic controls is provided by the use of gear drive from the hoisting mechanism as illustrated in this view

ployed the controls can be adjusted permanently to limit the travel of the skip in either direction to an exact, pre-determined point, and to accurately regulate the time for loading and unloading the skip to any desired period. When the controls have been set for any given condition, the hoist can be operated continuously without further attention—loading the skip, hoisting to the storage bin where it is emptied, and returning for reloading.

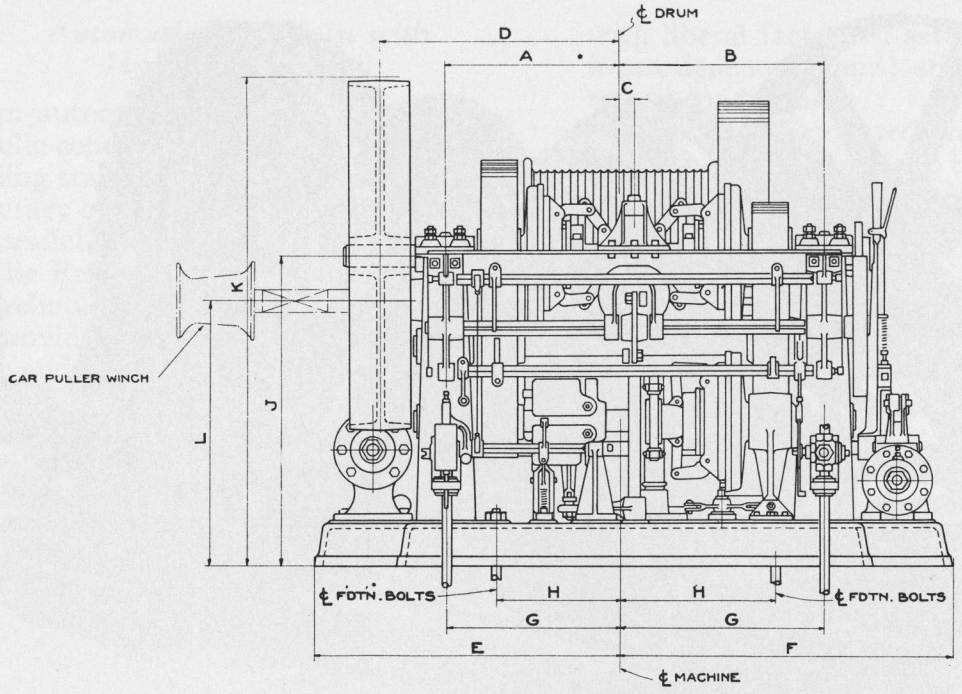
The control mechanism is located in an accessible position at one side of the hoist in order that adjustments can be made easily and quickly.

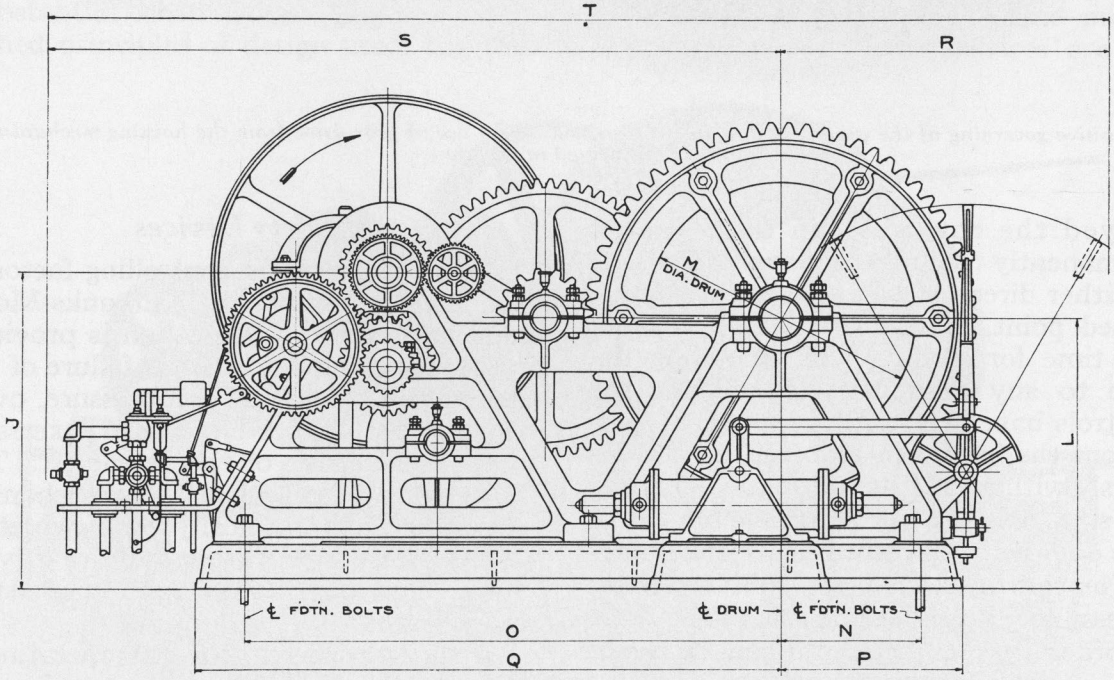
A pump mounted directly on the hoist frame is used in combination with an accumulator to give the necessary pressure. After the oil accomplishes its work in the control system it is returned to a storage tank under atmospheric pressure.

Safety Devices

Oil pressure is the controlling factor in the safety devices of Fairbanks-Morse automatic hoists. Protection is provided against such emergencies as failure of the driving unit, failure of oil pressure, over-run of the skip at either end, excessive speed, and errors of the attendant. The hoist is provided with a safety mechanism which acts automatically on a reduction of oil pressure to throw out the driving clutch and apply the brake in all such emergencies.

An inertia speed governor operating a pressure relief valve acts in case of excessive speed due to any cause, opening the valve which reduces the oil pressure to zero. Over-travel of the skip also trips the pressure relief valve, instantly throwing the control mechanism into neutral and applying the brake.

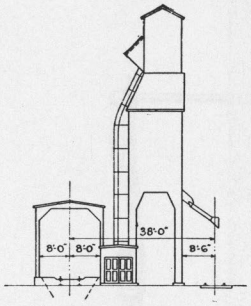




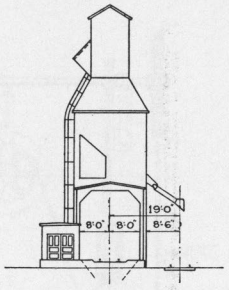
Principal Dimensions of Automatic Hoist with Hydraulic Control

	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	T
No. 1 Hoist	2′0″	2′4″	2″	2′10″	3′8¼″	3′7½″	2′2″	1′7″	3′6 13/16″	5′8″	3′ ½″	3′0″	1′7″	6′2″	2′¾″	6′7¾″	3′9″	8′3″	12′0″
No. 2 Hoist	1′8⅛″	1′9⅞″	⅞″	2′4⅝″	3′2″	3′1¼″	1′9″	1′3¾″	3′1″	5′1″	2′7½″	2′6″	1′5″	5′4″	1′10″	5′9″	3′5″	7′4″	10′9″

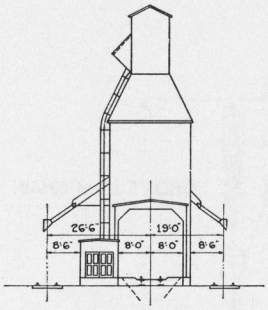
Standard Track Arrangements for Skip-Hoist Locomotive Coaling Stations



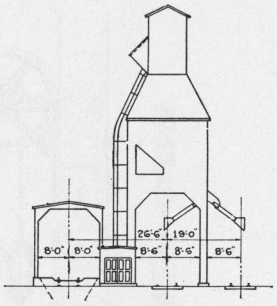
Type SRO1
50 to 100 tons



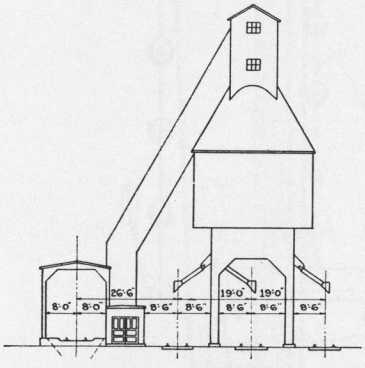
Type SOR1
150 to 300 tons



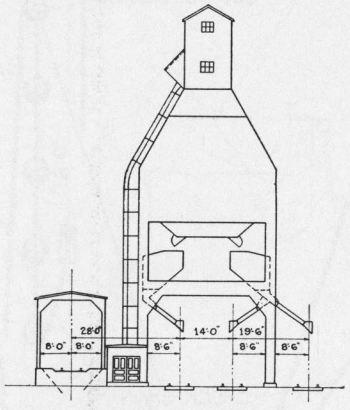
Type S1R1
300 to 500 tons



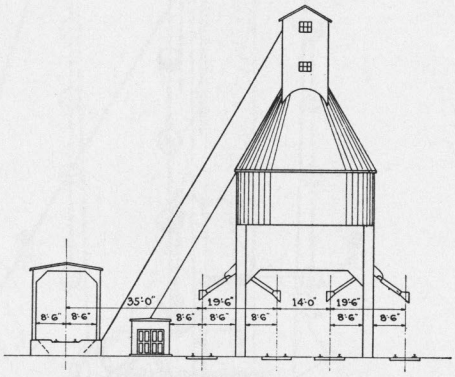
Type SR11
150 to 500 tons



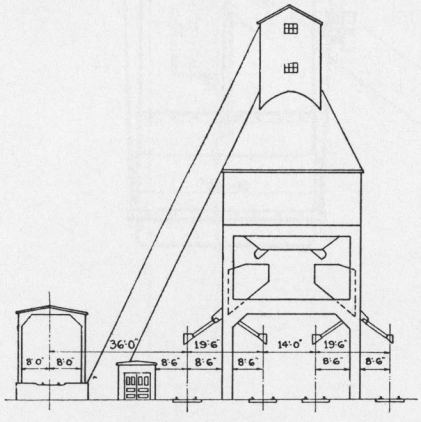
Type SR111
300 to 800 tons



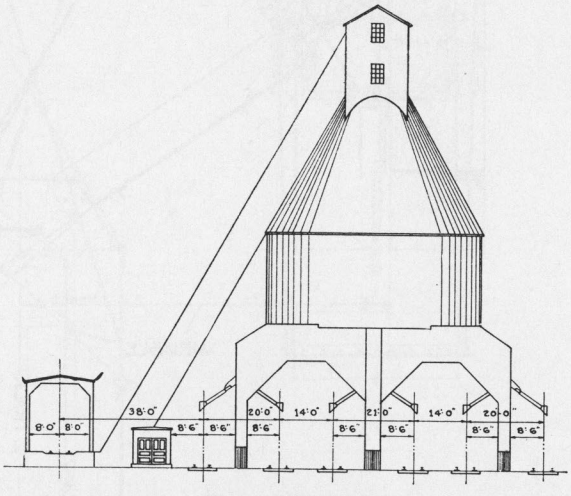
Type SR21
300 to 1,000 tons



Type SR121
500 to 1,000 tons



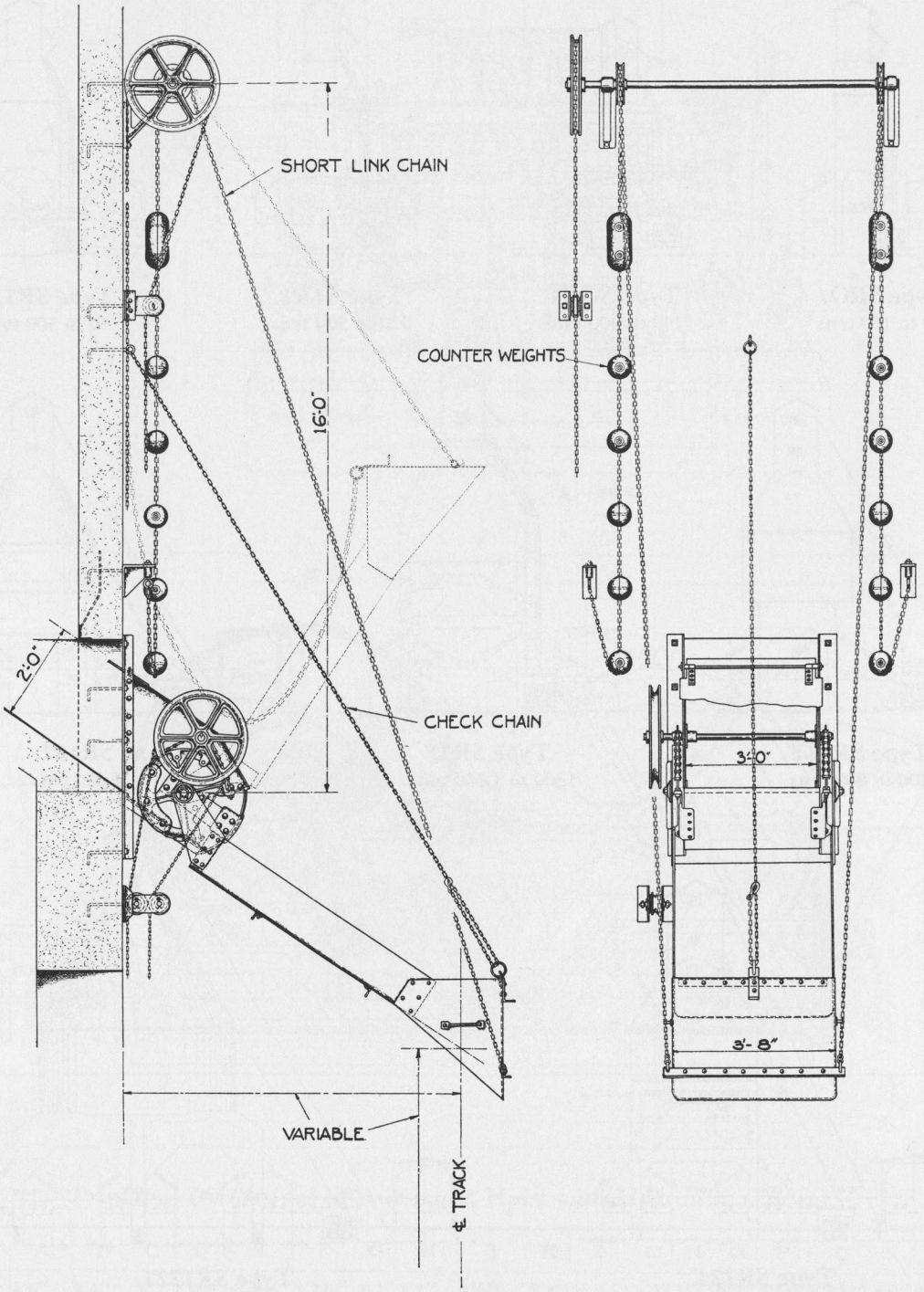
Type SR121
500 to 1,000 tons



Type SR1221
1,000 to 2,000 tons

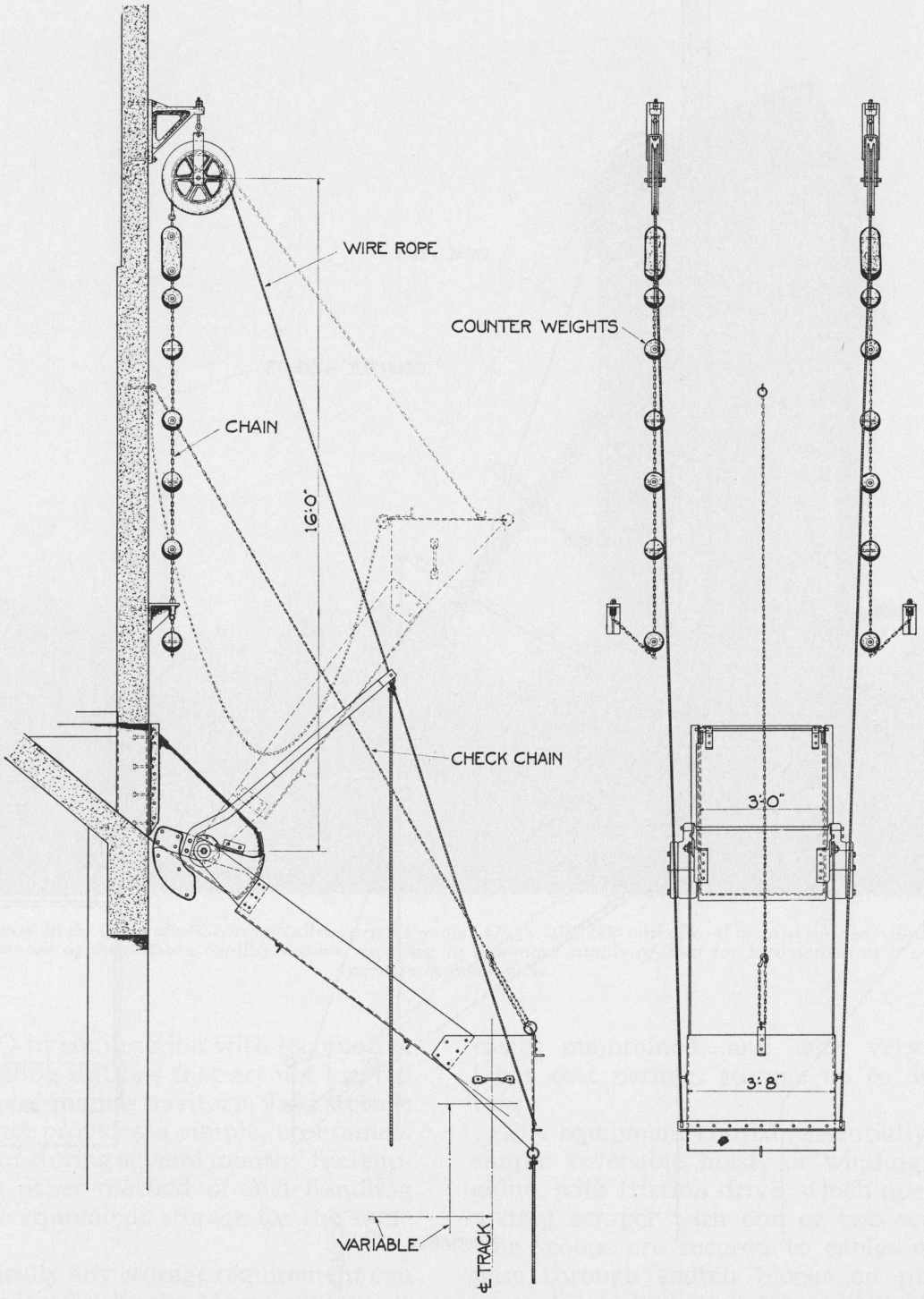
Other track arrangements and designs are made to suit local conditions

Outlet Fixtures for Coaling Stations



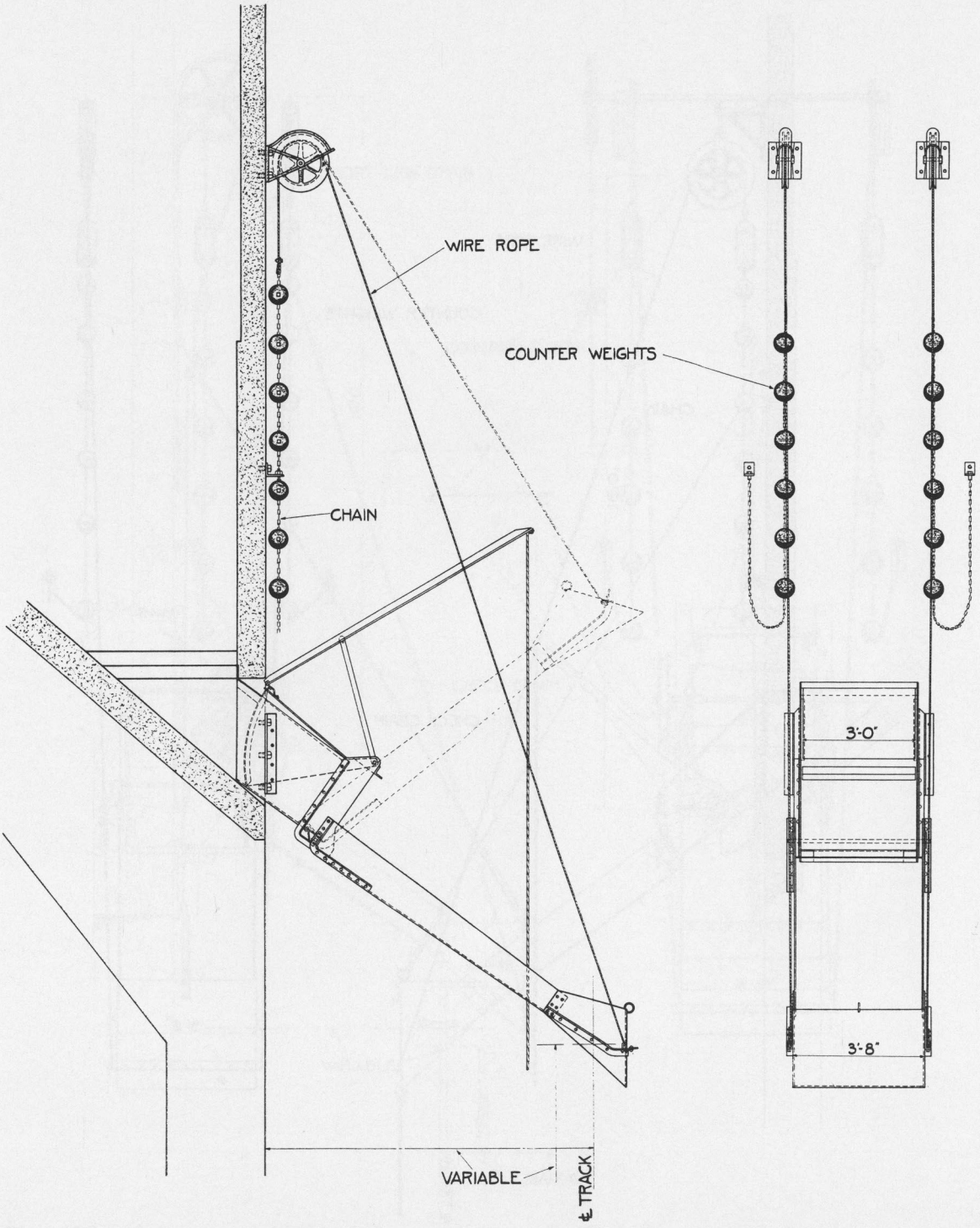
Type UC undercut gate with hooded apron (patented). Both the gate and apron are operated through a straight link chain from platform, gallery or locomotive tender

Outlet Fixtures for Coaling Stations



Type UL undercut gate with hooded apron. These are arranged to be operated from locomotive tender only

Outlet Fixtures for Coaling Stations



Type OL overcut gate with hooded apron. These are arranged for operation from locomotive tender only

Yard Storage Systems

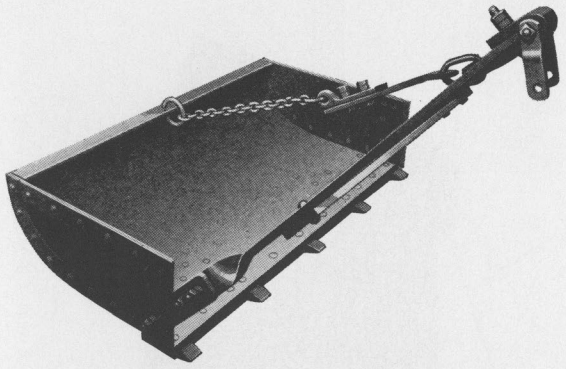
Installation on the Central of Georgia Railroad at Raymond, Ga., with 5,000 tons of coal in yard storage tributary to the hopper of the 150-ton coaling station, assuring an adequate supply of coal for locomotives at a small increase in investment

USED in conjunction with locomotive coaling stations that are not located close to coal mining territory, yard storage equipment provides a simple, economical method of storing several months' fuel supply. No other method of fuel handling gives the equivalent storage for the same cost.

Practically any storage requirement can be met with Fairbanks-Morse equipment at low first cost. It is simple in operation, easily maintained, and with very low labor cost permits storage up to 50,000 tons.

The equipment consists essentially of a simple reversible hoist, or winding machine, with friction drive, which operates a drag scraper with one or two scoops. The scoops are secured to cables which pass through snatch blocks on pulling posts located at the extremities of the yard. Two scoops can be controlled by a

single operator, one being loaded and in operation for each direction of rotation of the winding machine. One of the principal advantages of Fairbanks-Morse



Scoops constructed of steel plate with heavy reinforcing steel framework insure long service

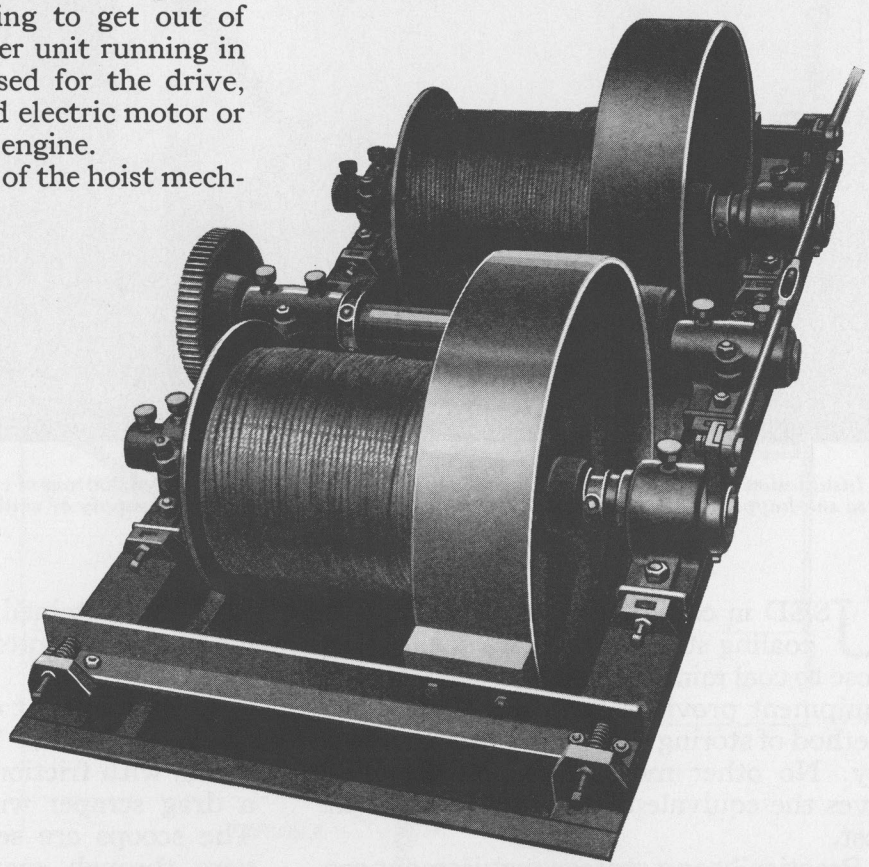
equipment is that there is no single expensive unit and nothing to get out of order. Any simple power unit running in one direction can be used for the drive, such as a constant-speed electric motor or an internal-combustion engine.

The reversing feature of the hoist mechanism is produced in a very simple and efficient manner. A friction drive is used, with a small driving wheel placed between the larger friction wheels on two winding drums. The larger wheels have an eccentric bearing block at one end and a pivoted bearing at the other end of the shaft. Only one wheel is in contact with the driving wheel at any time, and action of the operating controls shifts the wheels so that the drive can be in either direction, as desired. One drum is always winding up cable and the other drum is paying it out when the machine is in operation.

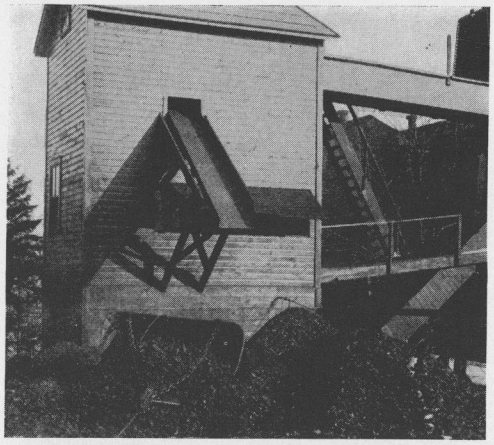
The simplicity of the entire mechanism is evident. The machine is operated easily and is economical to maintain. It can be located in the coaling station structure or in a separate housing adjacent to the receiving hopper.

The steel scoops which are secured to the cables are sturdily made and well reinforced to withstand exceptionally heavy service for long periods of time. The scoops are reversed easily on the cable so that coal can be reclaimed and stored with very little loss of time.

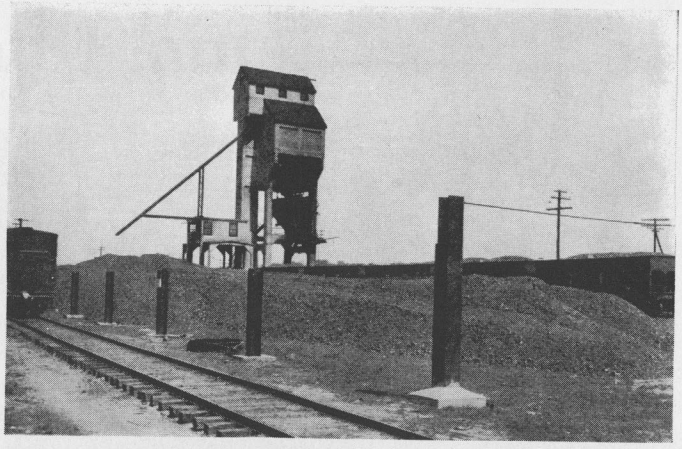
A steel stocking-out chute is included as part of the coaling station having yard



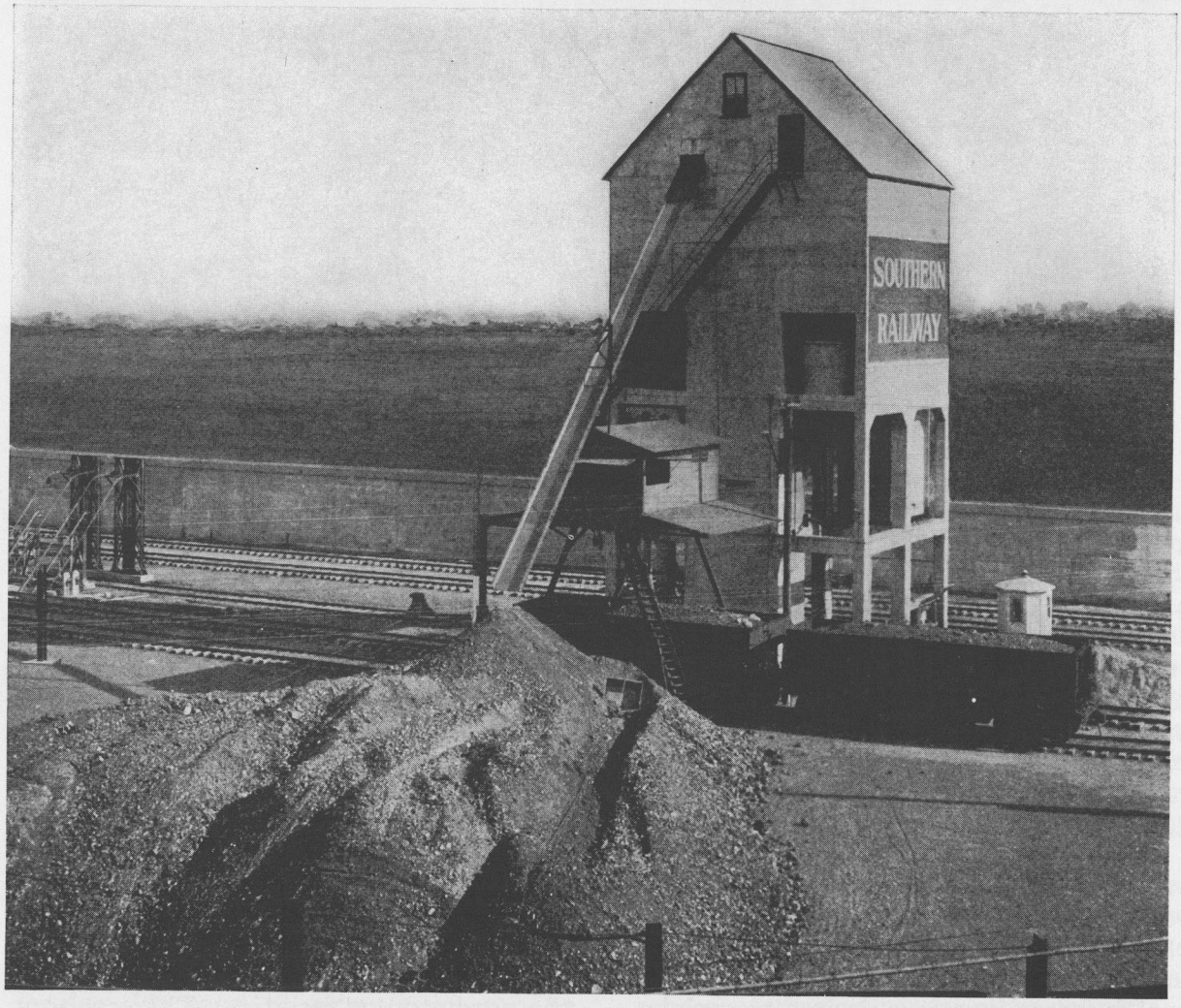
Complete accessibility of this reversible hoist results in simple maintenance. It is arranged to be driven by any constant-speed, unidirectional power unit



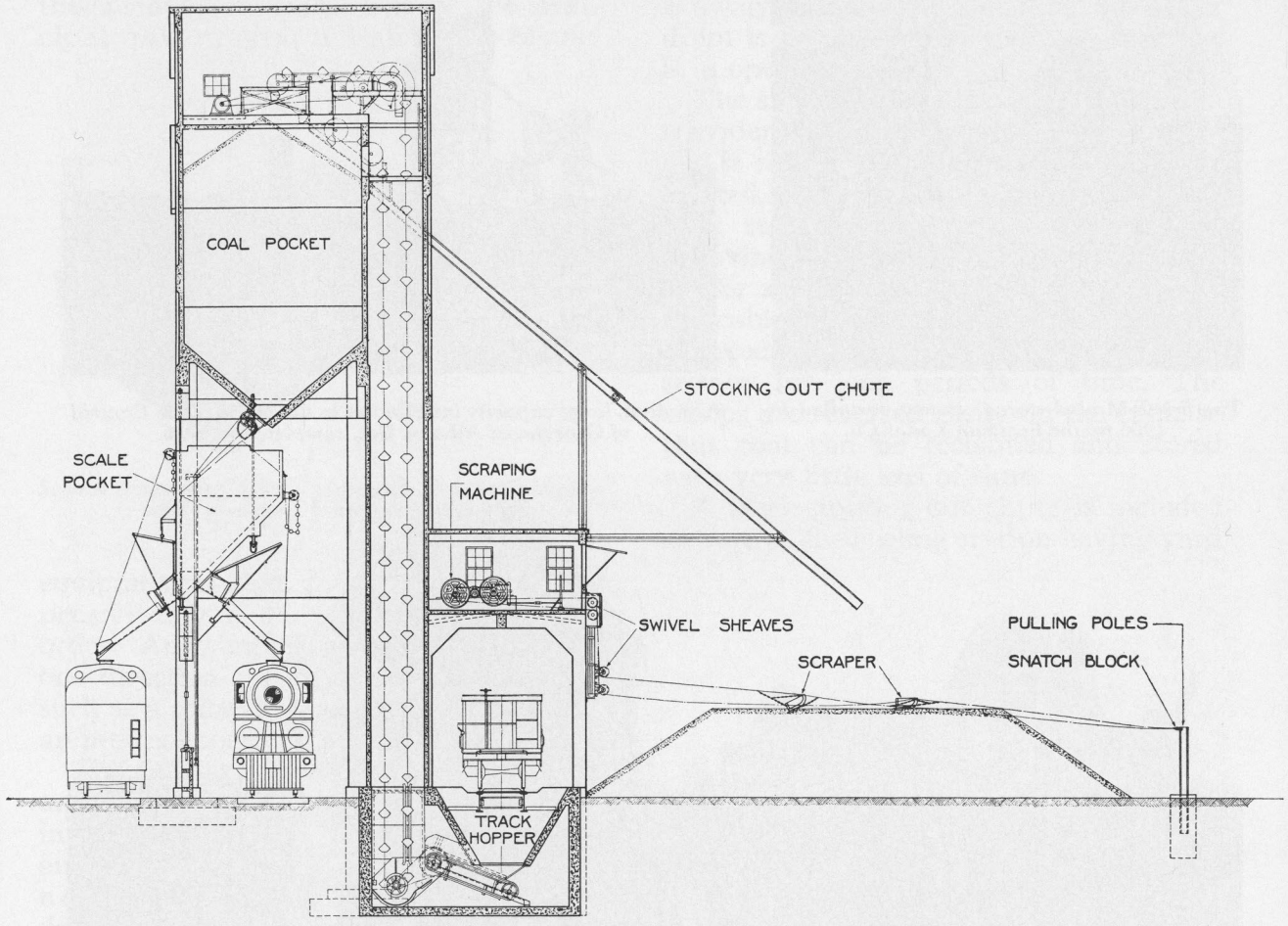
The first F-M yard storage system, installed in 1906 for the Eastman Kodak Co.



A modern, large capacity installation in the yards of the Central of Georgia, at Albany, Ga., completed in 1926



The yard storage system in connection with this coaling station built in 1912 for the Southern Railway at Richmond, Va., has proved of great value in many emergencies



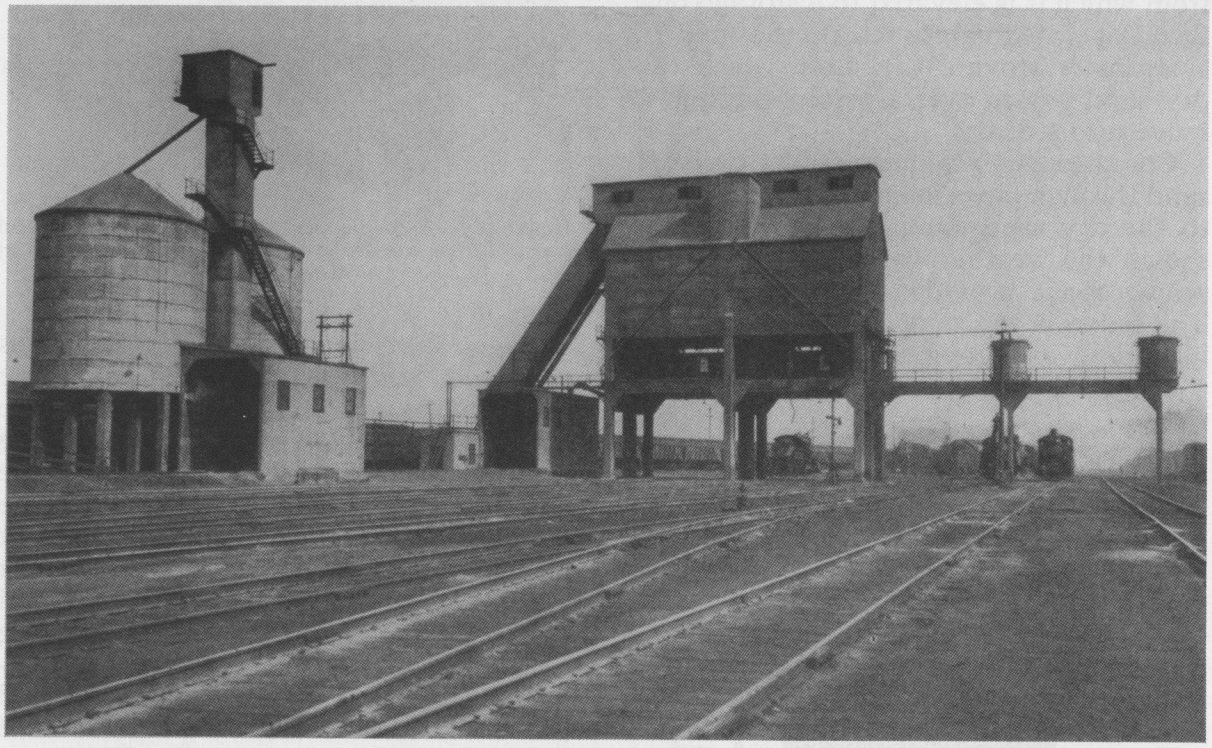
Cross-sectional drawing showing a coaling station with yard storage for coal adjacent to the receiving hopper. Where it is desired to store coal at a location isolated from a coaling station, this system can be used to advantage by installing a receiving hopper and elevator so arranged that coal can be delivered to the drag scrapers for storing and then reclaimed from storage and reloaded into cars

storage. When the coal pockets are filled to capacity the excess coal is delivered into the storage yard and dumped into a pile. By operating the scrapers the coal can be spread out to cover the entire storage area.

One operator, with an assistant whose services are required at infrequent intervals, can handle coal to the full capacity of the elevator without effort, either stocking out or reclaiming. In winter, when coal is frozen and it is desired to reclaim it, these drag scrapers can be used if the coal is first broken for handling by other means.

It is apparent from the accompanying illustration that the increased investment in equipment necessary to store 5,000 to 10,000 tons of coal in yard storage at a coaling station represents but a small percentage of the entire cost of the plant. Unless the daily issue to locomotives is not too great, the same man who operates the coaling station proper can also operate the yard storage facilities. The economy is evident.

Sand Plants



Atchison, Topeka & Santa Fe Railway Co., Argentine, Kan. Storage for 1,500 cubic yards of wet sand in two circular bins, with dryers, screens and compressed air system, shown at the left. 1,000-ton coaling station, including dry sand bins with fixtures for issuing sand to locomotives on ten tracks, shown at the right

ADEQUATE facilities for supplying sand to locomotives have an important bearing on the operation of motive equipment, whether the engines are of the coal-burning or the oil-burning type. These facilities should be extensive enough to take care of all demands, and should be designed to insure that the sand is thoroughly dried and screened so that it will flow readily when it is needed for traction. Provision not only should be made for sufficient storage of wet sand to permit economical handling and to last for a definite period of time, but the equipment for drying, storing and issuing sand should be efficient and labor-saving.

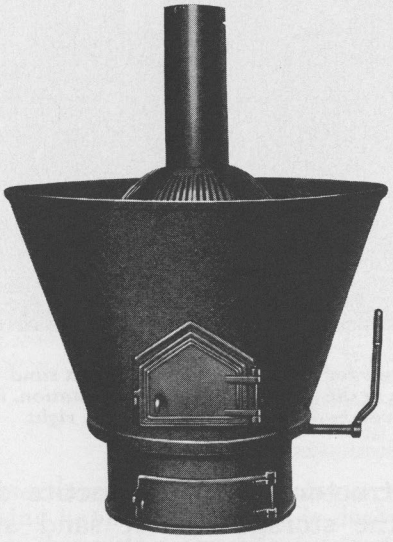
While dry-sand storage and facilities for issuing dry sand to locomotives can be economically included in the coaling station structure, modern practice dictates that the storage of wet sand and the facilities for drying it should be in a separate structure, or if they are in the same structure they should be entirely isolated from any coal storage or coal-handling machinery. Where the quantity of sand handled is comparatively small, usually the wet sand is stored on the ground, but where the quantity is large enough to warrant the expenditure for equipment the mechanical handling of both wet and dry sand is the most economical.

These factors are taken into consideration in the design of all Fairbanks-Morse sand plants, the efficient operation of which has been evidenced on the most representative railroads in the country.

Attention is called to the drawing on

page 27, which shows an elevation of a typical Fairbanks-Morse plant. Wet sand from incoming cars is dumped into a track hopper and fed to the conveyor boot, from which it is elevated to a storage bin. Hand-operated valves release the sand to a steam or stove dryer, from which the dry sand passes over a screen through a valve into a drum.

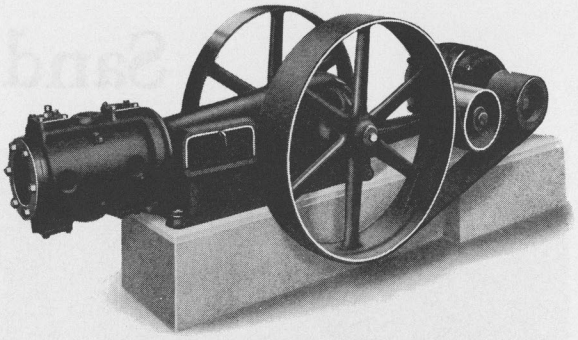
Compressed air is then used to force the sand through pipes leading from the drum to the dry sand storage. On page 28 is shown the weatherproof valve and telescopic spout provided for issuing sand. The valve is the undercut type, positive in action, and completely enclosed in a cast-iron housing. The spout is made of steel tubing, is telescopic and is adjustable to a wide range of positions.



Sutton sand drying stove equipped with external grating

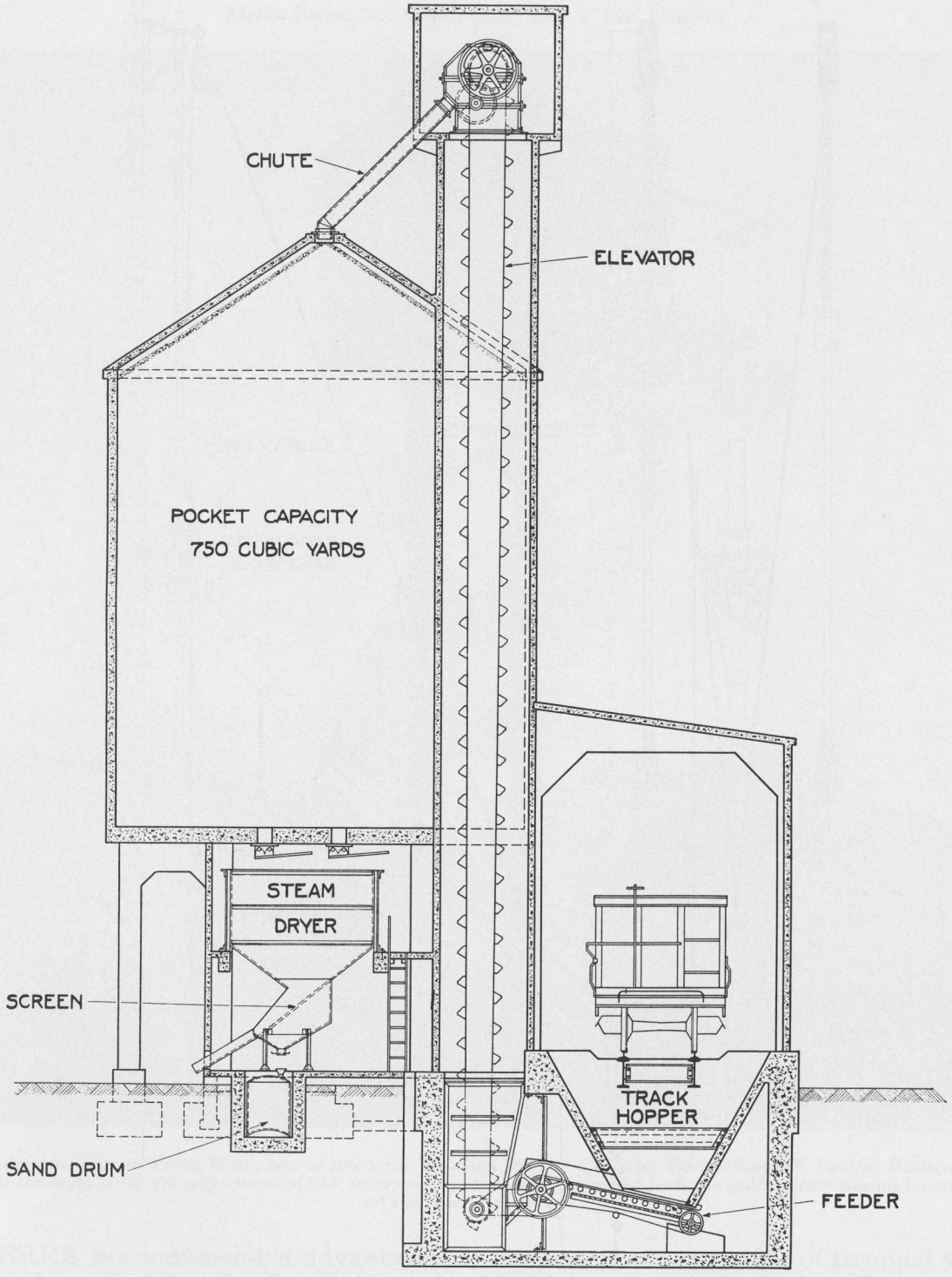
For supplying compressed air for elevating the dry sand from the drum to the storage pocket there is installed a compressor with a capacity of about 67 cubic feet of free air per minute at a pressure of 100 pounds per square inch. Compressor may be either horizontal or vertical.

Either a steam dryer or a stove dryer may be installed. The former consists of coils of pipe arranged in a hopper into which the wet sand is released from the storage. Live steam in the pipe coil dries the sand, and the latter runs into the drum when the valve is opened. The stove dryer is shown by the accompanying illustration. An iron grating keeps the wet sand from coming in contact with the main body of the stove and forms a hot air space which permits the escape of moisture and vapor. As soon as the sand dries it runs through a perforated ring on which the skirting rests. This arrangement insures fast, economical drying, and the three sizes of stoves manufactured have capacities ranging from $3\frac{1}{2}$ to 10 tons daily.

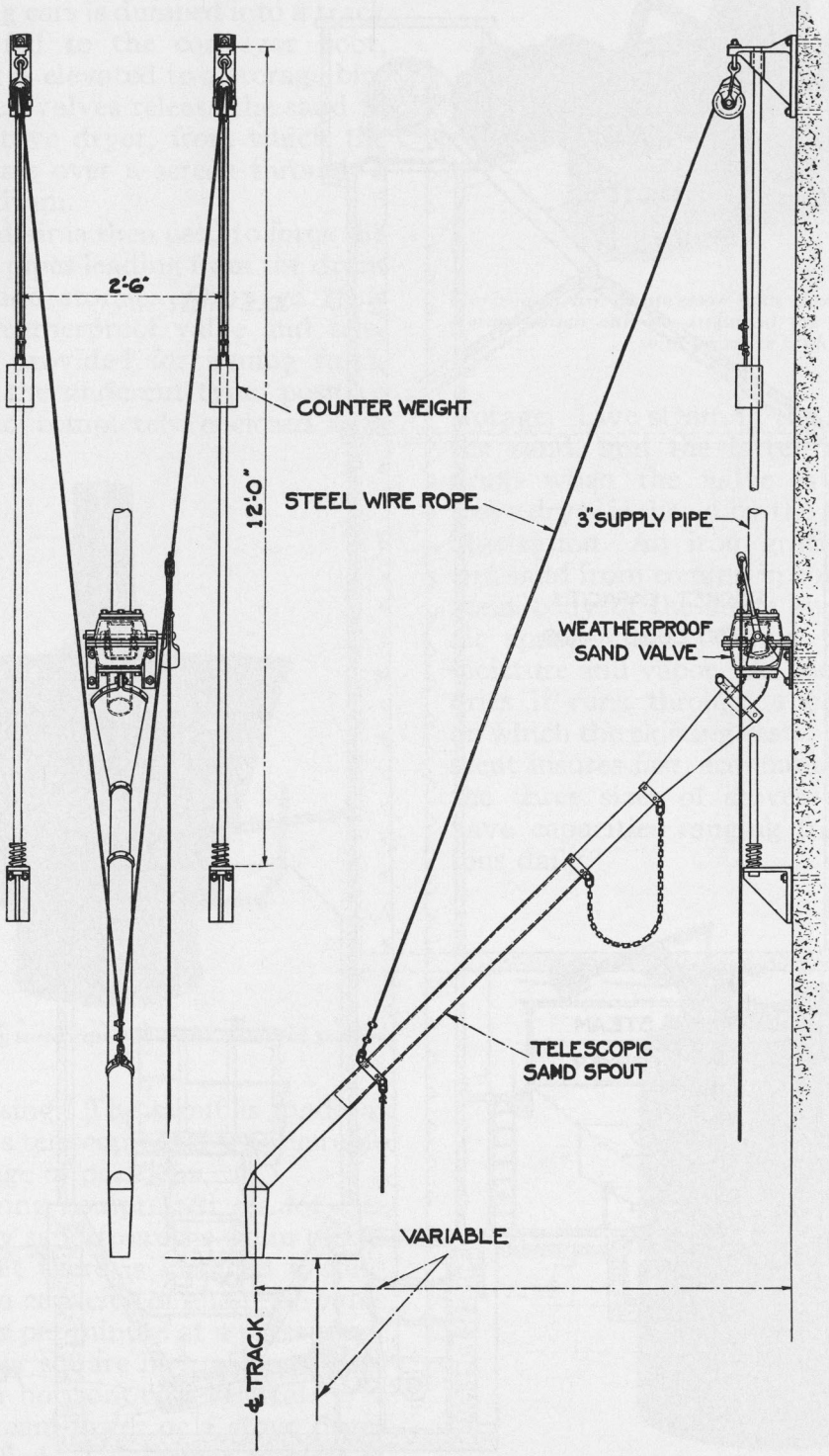


Horizontal air compressor with short belt drive from motor, which can be arranged for automatic control with pressure tank

Drum used for elevating dry sand, showing valve for admitting sand and connection for pipe through which dry sand is elevated by compressed air



Cross-sectional drawing showing general arrangement for handling and storing wet sand and for drying and storing sand to be issued to locomotives



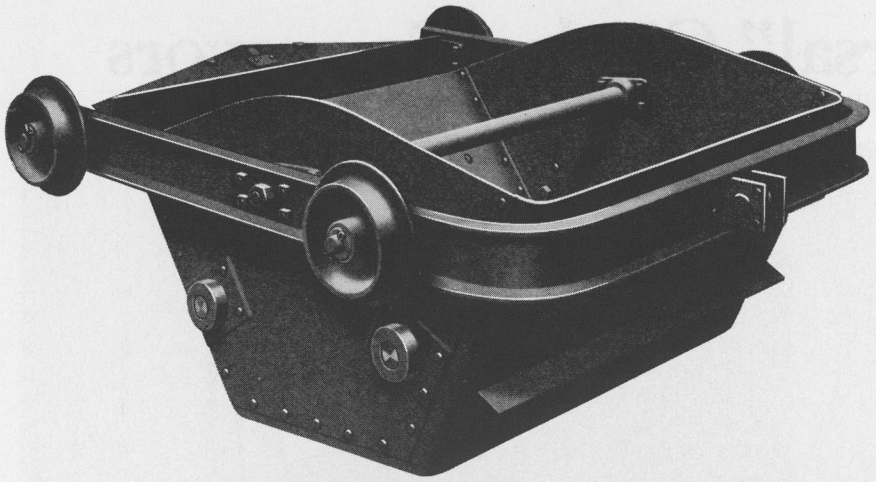
Front and side views of dry-sand outlet fixture with weatherproof sand valve and adjustable counter-weighted telescopic spout

"Universal" Cinder Conveyors

Mellin Patent No. 1,446,313; William F. Lee, Licensee

Cinder conveyor at Pratt, Kan., one of ten units installed for the Chicago, Rock Island & Pacific Railway. This conveyor is electrically operated and serves two tracks. It is controlled from the push-button station located on the side of the tower

THERE are innumerable advantages to be gained by the installation of "Universal" patented cinder conveyors. They require small ground space, simplify the layout and operation of terminal yard facilities, can be arranged for decindering locomotives from one or several tracks, are adaptable to any clearance require-



Bucket for "Universal" cinder conveyor, showing pivot suspension, sturdy construction and four bronze-bushed carrier wheels

ments, and, in addition, are comparatively low in initial cost.

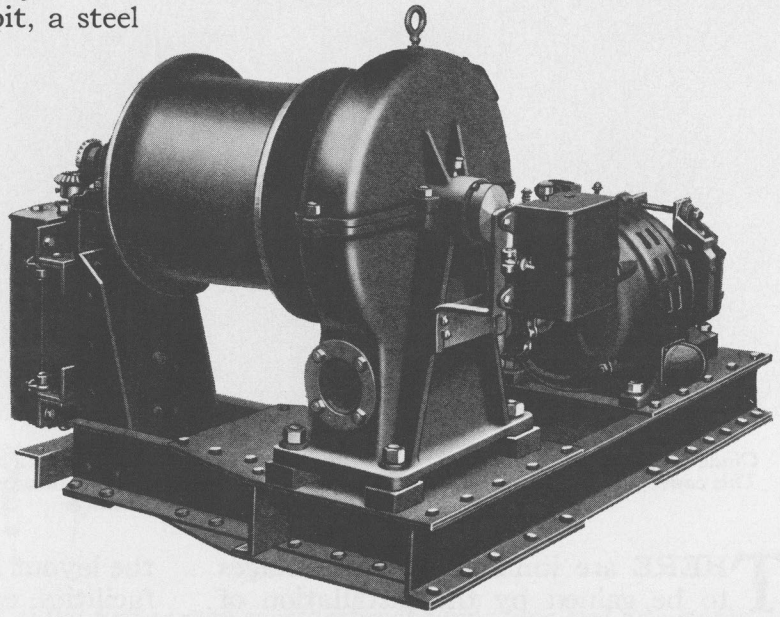
Economical Operation

From the standpoint of operation, they offer savings in time and labor. The simplicity and small number of working parts, together with semi-automatic operation, has made it possible for many railroads to effect substantial economies in the disposal of cinders.

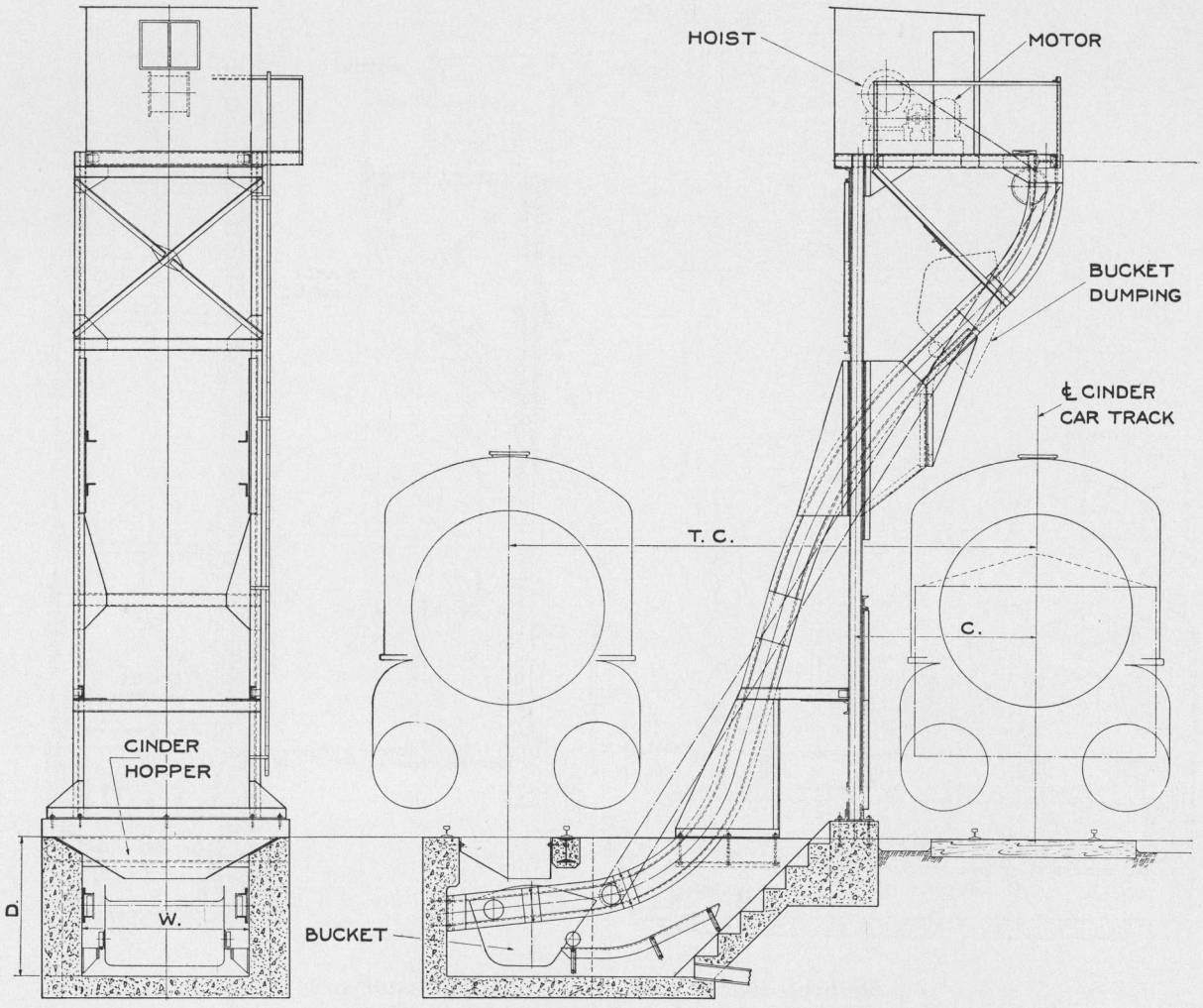
Equipment for a single conveyor consists essentially of a concrete pit, a steel hopper approximately 10 feet long and 4 feet wide, a bucket and the hoisting apparatus. A coil of pipe with holes for spraying is provided around the rim of the hopper and is connected to the water line for quenching the cinders. Buckets are made with capacities of either 40, 60 or 80 cubic feet, and small holes in the bottom allow the quenching water to pass through to the drain. The bucket is mounted on four cast-steel wheels, and is pivotally suspended so that it can be loaded to full capacity without leakage or spill. Structural steel runways support the bucket for the entire travel from the loading position to the dumping position on the tower. The latter also is used for mounting the hoisting apparatus, which consists of power unit, winding drum, cable and sheaves.

When more than one track is to be served, each hopper may be provided with a radial gate so that locomotives can decinder on any track without delay and without regard for the position of the conveyor bucket. These gates are lever operated and manually controlled from one position. They are self-locking when closed, and are arranged so that they can be opened only when the bucket is directly under the hopper.

"Universal" conveyors can be arranged for operation by electric motors or by compressed air.



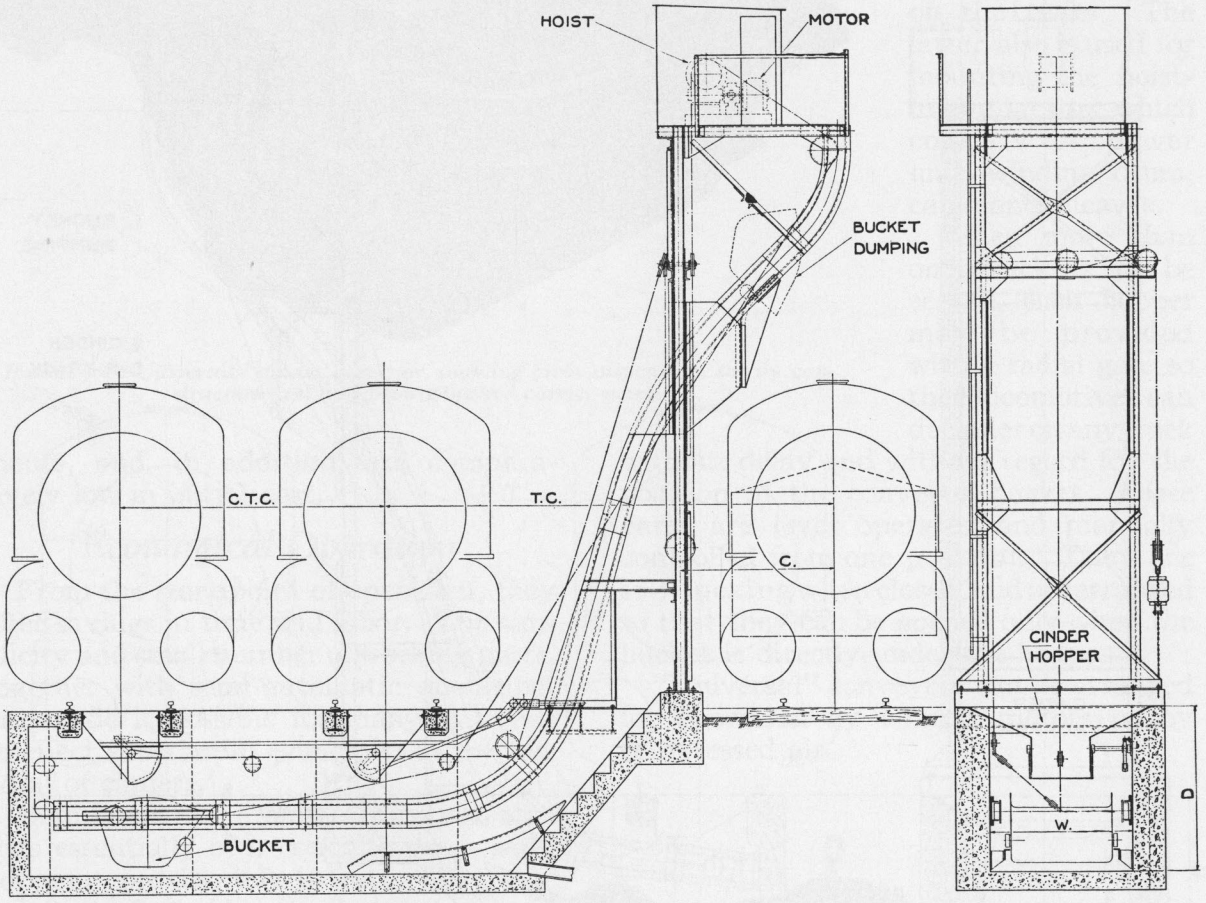
Motor-driven hoist for "Universal" cinder conveyor, equipped with solenoid brake and automatic control



Single-track "Universal" Cinder Conveyor

Pit depth (D) varies from 5 feet 3 inches to 7 feet 6 inches depending on the size of bucket. Pit width (W) is 6 feet 5 inches, 7 feet and 7 feet 8 inches for buckets with capacities of 40, 60 and 80 cubic feet, respectively. Minimum track centers (TC) are 21, 22 and 24 feet for buckets with capacities of 40, 60 and 80 cubic feet, respectively. Distance (C) is 7 feet 6 inches as a minimum

When operated by electric power, the conveyor is equipped with a self-contained motor-driven hoist mounted in the tower. The motor is worm-geared to the hoisting-drum shaft, and is equipped with a solenoid brake which stops and holds the hoist when the motor is de-energized. The controller is of the traveling-cam type and is geared directly to the drum shaft for terminal stops and for over-travel protection in the hoisting direction. Push-button stations mounted conveniently on the side of the tower are arranged so that when the operator presses the "Start" button the bucket is hoisted to the "Dump" position and stopped, and then automatically lowered to the loading position, where it remains until the button is pressed to repeat the same cycle. For control of several loading positions, push-button "Call" stations are provided, and when the "Start" button and a "Call" button



Multiple-track "Universal" Cinder Conveyor

Pit depth (D) varies from 7 feet 3 inches to 10 feet 3 inches depending on the size of bucket and type of gate. Pit width (W) is 6 feet 5 inches, 7 feet and 7 feet 8 inches for buckets with capacities of 40, 60 and 80 cubic feet, respectively. Minimum track centers (TC) are 21, 22 and 24 feet for buckets with capacities of 40, 60 and 80 cubic feet, respectively. Distance (CTC) between locomotive tracks can be made to suit yard conditions. Distance (C) is 7 feet 6 inches as a minimum

are operated the bucket stops at the selected loading position.

When operated by compressed air, a cylinder with double-acting piston is mounted on the tower. The piston rod has a yoke at the upper end for two hoisting sheaves. The valve is equipped with hand chains for convenient operation of the conveyor.

Some features of decided merit which operators will appreciate are found in "Universal" cinder conveyors. Bucket guides, which are continuous for the full travel of the bucket, are arranged so that the bucket cannot fall outside the guides in case of rope failure. The bucket being pivoted and hung in the bale allows the guides to be raised several feet above the floor of the pit and to be attached to the side walls, thereby keeping the flanged wheels above water, ice and cinders which might collect in the pit.

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Fairbanks, Morse & Co.

Manufacturers

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