

## The Handling and Storage of Our Huge Grain Crop.

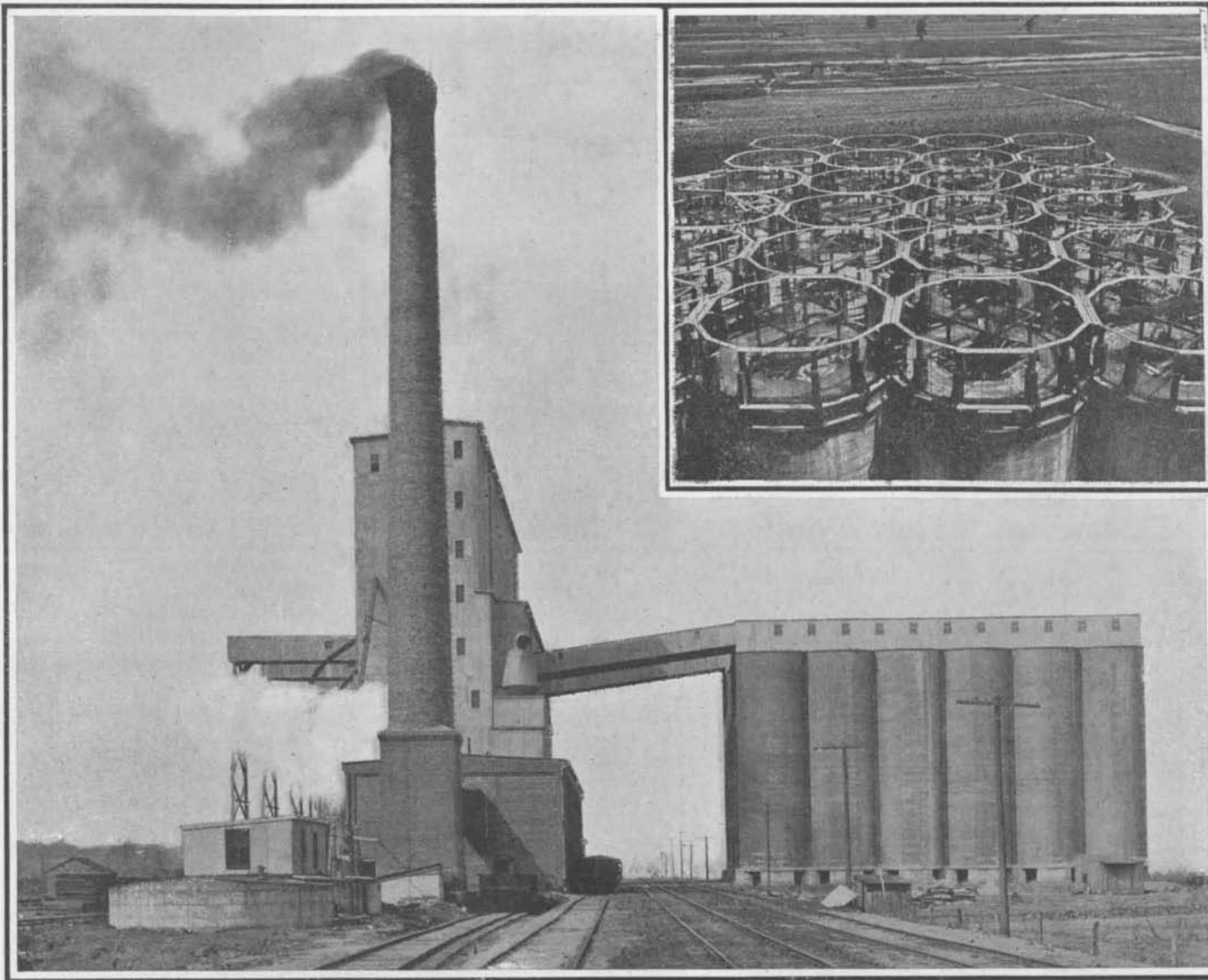
Few people outside of those who are connected with the garnering, handling, transportation, and distribution of our grain crop, appreciate either its magnitude or the wonderful plant and organization which are required for its transfer from the farm to the consumer's table. The latest available statistics are those for the year 1908; and they give the crop return as follows: corn, 2,642,687,000 bushels; spring and winter wheat, 659,030,000 bushels; oats, 789,161,000 bushels. Adding to these totals, those for barley, rye, and buckwheat, we get as grand total for the year 4,304,689,000 bushels.

In view of these figures, one can readily understand that the acreage in

determined by the systematic skill and suitable machinery and plant employed for such a colossal task. The solution of the problem has been found in the American elevator and the distinctively American system of freight transportation by railroad. Both of

some forty-five feet into the air. This building is the primitive grain elevator, known as the "receiving house." He has no sooner halted his wagon than the fore wheels are raised and the hinder ones depressed, so that his load falls through a trap door into a cleaner, where the wheat is relieved of foreign matter—leaves, bits of straw, twigs, etc.—and then is emptied into the boot of an elevator leg. The leg, which is essentially the same for all elevators, large or small, consists of an endless rubber belt running over two pulleys, one in the boot at the bottom, and the other in the head. Upon the belt are fastened at regular intervals small metal cups facing in the direction in which the belt travels. As the pulleys revolve, the cups scoop up the grain from the boot, carry it to the head, and as the cups are inverted in passing over the strap pulley, empty it into a spout placed there to receive it. The legs of these small country elevators can lift a thousand bushels an hour; the legs in the huge elevators at Chicago, Buffalo, or other great elevator centers, can lift as much as ten thousand bushels an hour. As the grain is delivered from the head of the elevator, it descends through wooden spouts into four grain bins from ten to twelve feet in depth, which form the main part of the building.

The next step is to load the wheat into the freight cars, which are shunted upon a siding adjoining the elevator. The operation is simple. The grain is drawn from the bottom of the bin into the boot of the elevator, lifted to the top of the house, weighed in hoppers, and then allowed to flow by gravity through a spout into the cars. These are the essential operations of all grain elevators, big or small, whether the building is built to accommodate five thousand bushels or two millions. From the receiving house the cars are hauled to one of our great Middle West cities, such as Kansas City, St. Louis, or, as would probably be the case, Chicago. In conjunction with other trainloads of wheat they will finally be rolled alongside of, or into a covered way beneath, a huge structure 300 to 500 feet in length, 250 to 400 feet in width, and towering 150 feet



The working house.

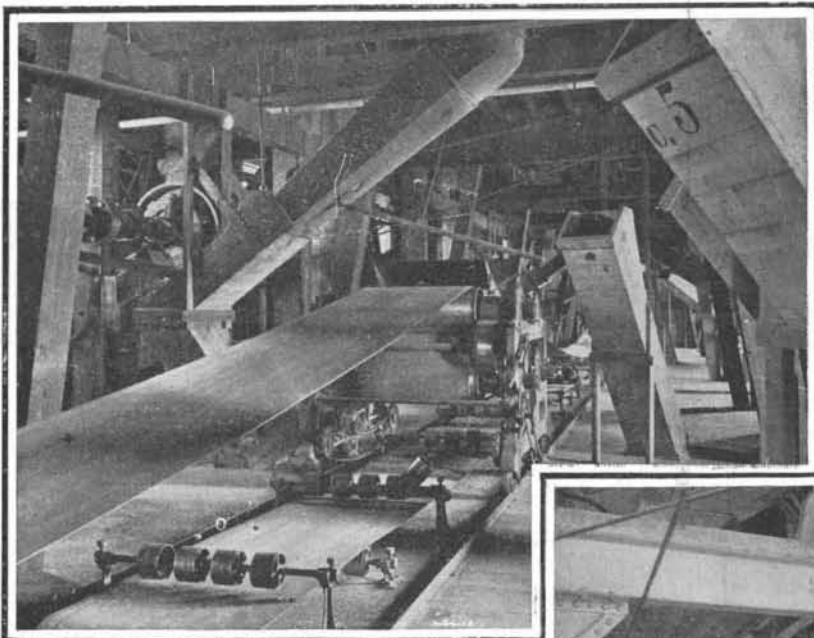
Upper view shows building of the concrete bins.

**SANTA FE ELEVATOR AT ARGENTINE, KANSAS. CAPACITY, 1,000,000 BUSHEL.**

these have been developed along lines which have enabled the United States to handle wheat with an economy and dispatch which is not to be matched in any part of the world.

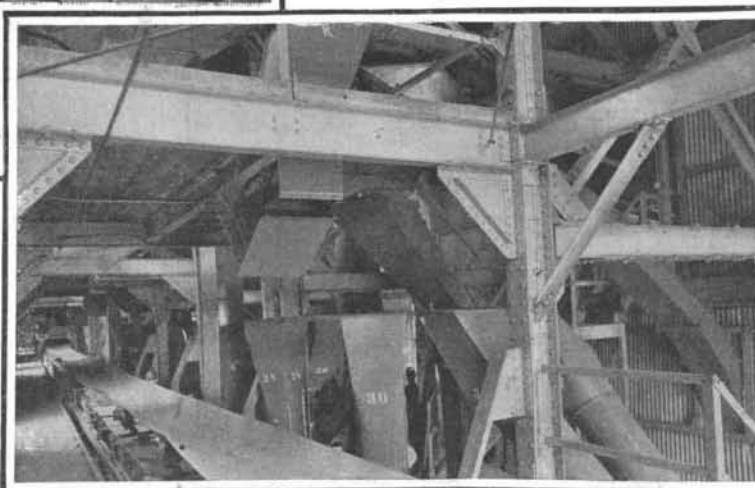
By way of illustrating the methods by which our grain crop is handled, we will follow the course of a consignment of grain from a farm on the western prairies, across the broad American continent and out to sea.

In the description which follows we wish to express our indebtedness to the John S. Met-



**BELT CONVEYER AND TRIPPING MACHINES FOR DISCHARGING WHEAT FROM BELT.**

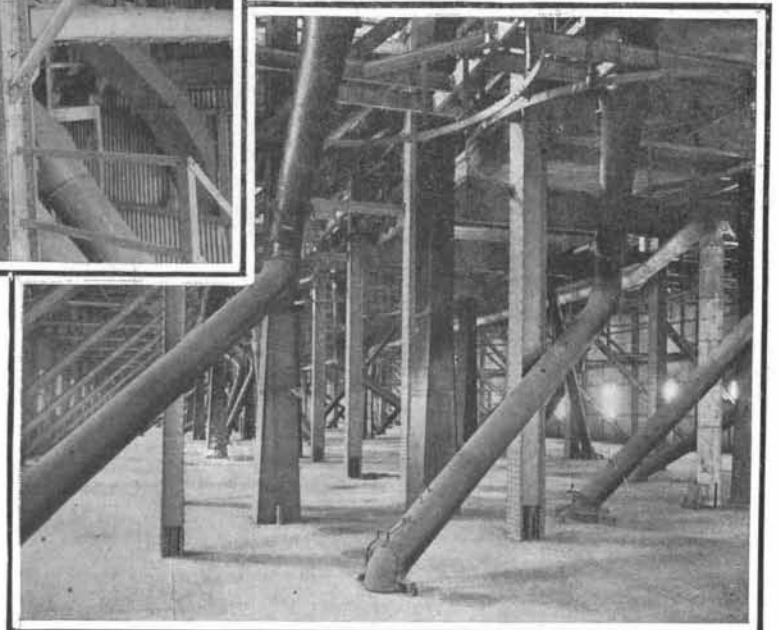
the United States which is devoted to the raising of maize, wheat, etc., has about trebled during the past thirty years. The increment has taken place chiefly in the great Middle West, and more particularly to the west of the Mississippi River; in the Dakotas, in western Kansas, and in California, Oregon, and Washington. The section of the United States which includes these new farm lands is one of magnificent distances. The fields of golden grain are scattered over an area that is measured by square miles in the hundreds of thousands. When the fostering care of the farmer has brought the grain to its full maturity, he is confronted with the tremendous problem of finding not only a market but one in which the price will be amply remunerative for his twelve months of labor. These four billion bushels of grain must be gathered together to certain distributing centers and thence sent out to the millions of consumers who are scattered throughout the habitable globe. It is evident at a glance that in this, as in every problem of a commercial character involving the handling of a vast tonnage made up of widely scattered units, the question of profits will be directly



**THE SPOUTS ARE NUMBERED TO CORRESPOND WITH DIFFERENT BINS.**

calf Company, engineers, of Chicago, for photographs and descriptive matter of several of the huge elevators which they have built for various companies.

The first step in the journey is seen in the farmer's wagon jolting with its load of wheat along a country road, let us say in Dakota, to the nearest railway siding. Here the wagon is driven up an incline leading into a plain wooden structure measuring twenty by twenty-four feet and extending



**SPOUTS FOR DISTRIBUTING GRAIN TO THE BINS.**



into the air. If it be one of the older buildings of its kind, it will be built of timber; but if it be of the latest construction, such as that shown in our illustration of the 2,000,000-bushel elevator for the Grand Trunk Railway at Tiffin, Ontario, or the Santa Fé elevator at Chicago, Ill., of 1,500,000 bushels capacity, it will be built of brick, or tile, or reinforced concrete, this last being the material employed in the two elevators referred to. An elevator of this character is actually a huge warehouse for grain, which is designated by a registered title, is inspected and licensed by the State, and is under the close supervision of the city Board of Trade. Before admission into its bins, the grain must be carefully weighed and classified; and when it has once been placed there, the warehouse receipt becomes to all intents and purposes in the money market, the grain itself. It is as easy to deal in it in the market as it is to transfer money in a bank from one account to another. Although the length of time that the five thousand bushels which once filled the little receiving elevator will lie in these bins at the great warehouse depends upon circumstances, the period of its sojourn is a very restless one—restless not for the grain itself, but for that negotiable slip of paper which stands for its sign manual in the market. This may journey hither and thither from seller to buyer, until in a short space of time it may happen that

our five thousand bushels have been sold and bought, and sold yet again, and that by the mere flick of a man's finger.

Arrived at the great city elevator, the car doors are rolled back and our five thousand bushels of grain are immediately attacked by what is known as the "power

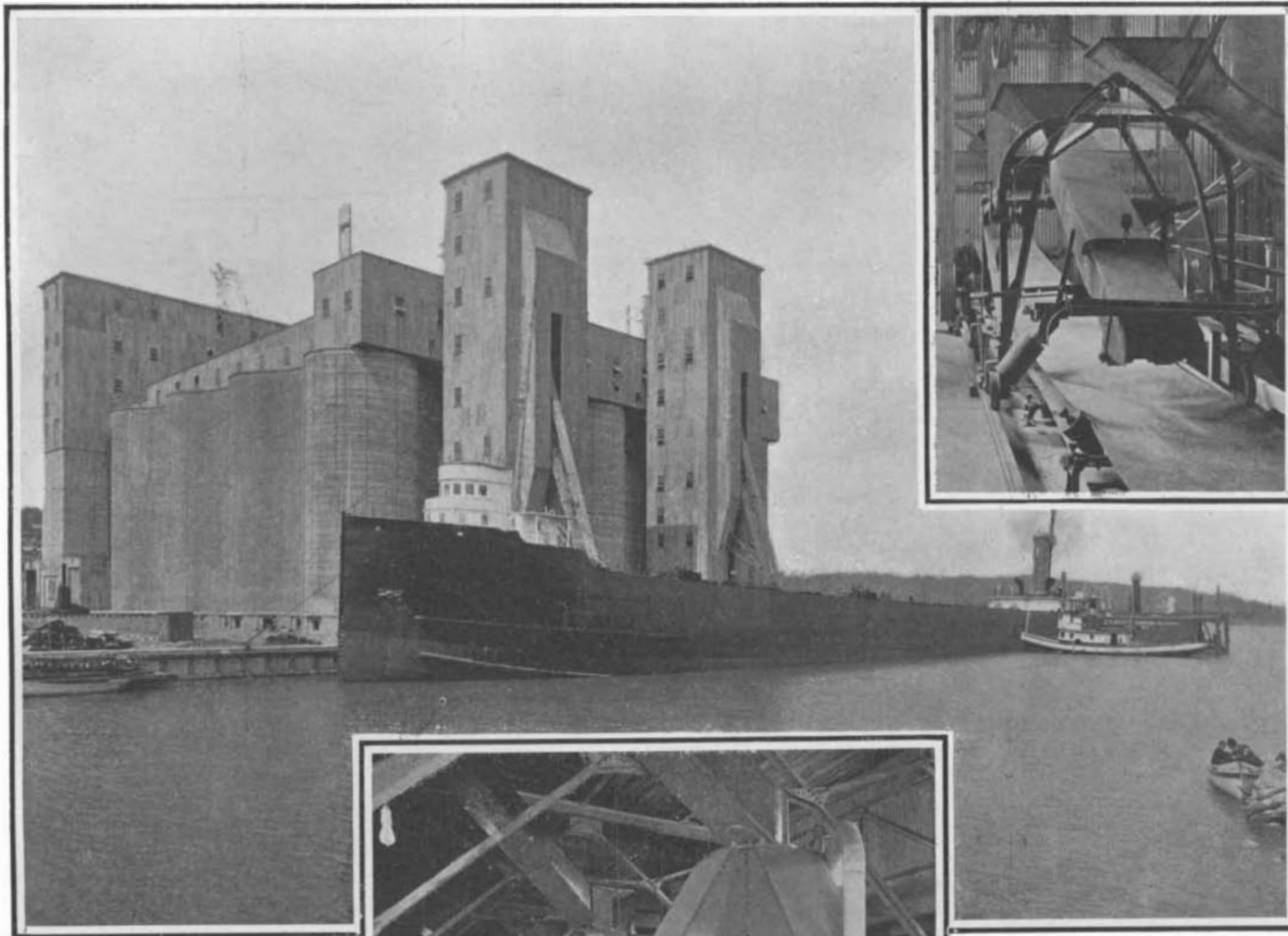
shovel." This consists of a large two-handled scoop, to which is attached a rope that is wound upon a rotating drum.

The drum is so fixed upon its shaft that when the man at the shovel walks away with the latter the drum readily unwinds, but as soon as he stops the drum commences winding up the rope and hauls the scoop back to the point at which it started. There are a pair of these shovels to each car and they carry the scoop back, bury it in the wheat, and guide it as it is pulled forward out of the door of the car and discharges its contents into a hopper that leads to the boot of a huge elevator leg. Two of these shovels can unload from the cars thirty thousand bushels of grain in a single day.

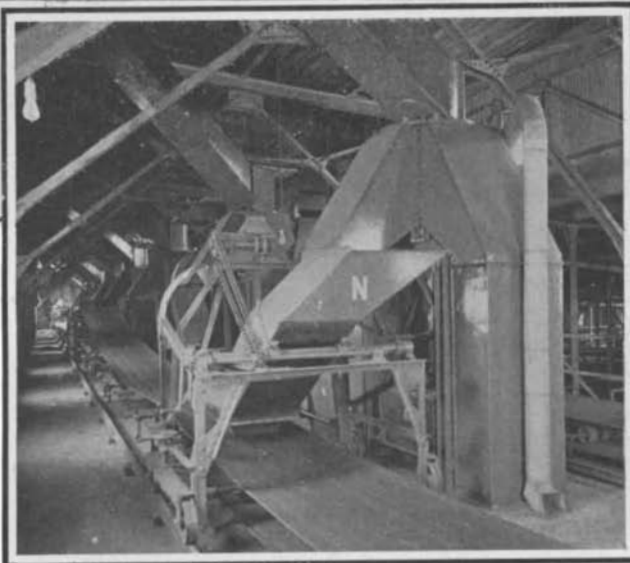
Now, although we have stated that the little receiving house contains all the essential principles of construction and operation of the big city elevator, the likeness is only a general one. The latter are

enormous affairs, the greater part of whose bulk is taken up by the grain bins. These in the older elevators were always square in section and some sixty feet in depth. A typical one of this kind is one belonging to the Armour Elevator Company at Chicago which receives grain from the Milwaukee road. It is 550 feet in length and 156 feet high. It can unload 500 cars of wheat per day, and can deliver 100,000 bush-

(Continued on page 451.)



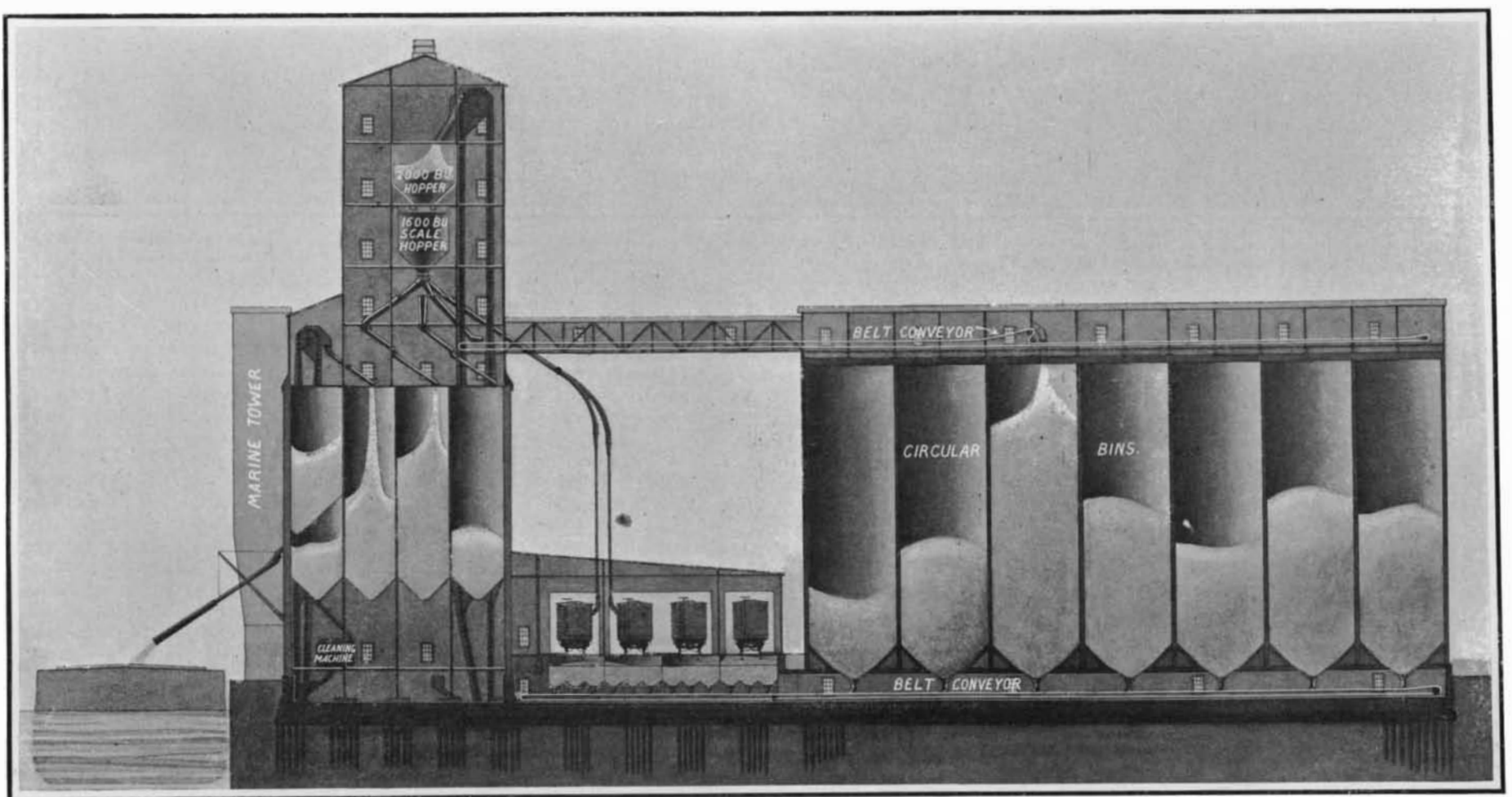
The steamship is being  
TWO MILLION BUSHEL CONCRETE  
RAIL



SPOUTING AND BELT CONVEYER ABOVE STORAGE BINS.

unloaded by tower legs.

ELEVATOR OF GRAND TRUNK  
ROAD.



Steamer unloading at  
wharf.

Working house where wheat  
is distributed.

Tracks for loading and  
unloading cars.

Circular bins for storing the wheat, served by belt conveyers above and  
below bins.

SECTIONAL VIEW OF THE SANTA FÉ ELEVATOR AT CHICAGO.



gine is of 2,000 horse-power and runs at a speed of 60 revolutions per minute, and each delivers 32,000 cubic feet of free air per minute at a normal pressure of 18 pounds per square inch. The gas engines were built by the Allis-Chalmers Company and the Westinghouse Machine Company. When the plant of sixteen furnaces is completed there will be no less than thirty-two of these engines with a total horse-power of 64,000.

#### GAS-DRIVEN ELECTRIC POWER PLANT.

The most interesting feature of the whole establishment at Gary is the huge power house, 105 feet wide and 966 feet long, which provides the electric current for one-half of the complete plant. It is the largest gas-power plant in the world and contains seventeen horizontal twin-tandem double-acting Allis-Chalmers gas engines of 3,500 horse-power, each directly connected to a 2,500-kilowatt generator, fifteen of which are 6,600-volt alternating-current machines and the other two 250-volt direct-current machines. These huge engines are the largest ever constructed for the use of blast-furnace gas. Their cylinders are 44 inches in diameter by 54 inches stroke. Each twin unit carries on a 30-inch shaft a 23-foot 100-ton fly-wheel. The plant also contains two Curtis steam turbine generators for starting and for auxiliary service in case of necessity. Additional gas-electric engines will be provided in two separate buildings, aggregating 60,000 horse-power. Thus the ultimate capacity of the electric power plant will be 120,000 horse-power.

Limitations of space prevent any more detailed description of the many features of interest which are found at Gary. The combined steel plant and city of Gary are the most noticeable instance in America of the rapidity with which a large area of apparently valueless land may, at comparatively short notice, be transformed into a huge center of industrial activity. Not only is about one-half of the plant in operation, but the adjoining city already has a population of 15,000 souls. Four years ago the site was a wind-blown waste of sand on the shores of Lake Michigan.

#### THE HANDLING AND STORAGE OF OUR HUGE GRAIN CROP.

(Continued from page 445.)

els per hour to cars or boats. It has a rated storage capacity of 2,500,000 bushels; and it may be mentioned here that the elevators of the Armour Company alone are capable of storing 13,500,000 bushels a day. This elevator is constructed entirely of wood, and the square bins, which range in size from 500 to 7,000 bushels capacity, are built of spruce planks, 2 x 4 inches at the top of the bin and 2 x 10 inches at the bottom, laid lengthwise upon each other, and each spiked to the layer below. The whole interior of the main body of the building is built up of a perfect honey-comb of these bins. The bottoms are tapered and finished in spouts to insure a free delivery of the grain in unloading.

The more modern elevators, such, for instance, as those designed by the Metcalf Company and shown in our illustrations, are built of reinforced concrete, the bins being circular in form; are of great strength, and of thoroughly fire-proof construction. The square tower-like building contains the elevating, cleaning, weighing, and conveying machinery. At about the middle height of this building horizontal covered passageways serve to contain conveyor belts, by which the cleaned and weighed grain is transferred to the top of the bins and loaded into the particular bin desired.

The annual shipment of grain to Europe is about 150,000,000 bushels, and as our five thousand bushels from the Dakota farm are destined to cross the ocean, we will trace its course from the Chicago elevator in which it is reposing to its final stowage in the hold of an ocean cargo steamer. At the end of its railway journey to Chicago, the grain passes through similar experiences to those it

(Continued on page 452.)

## THE SOUTHWEST LIMITED TO EXCELSIOR SPRINGS

TAKE THE SOUTHWEST LIMITED to Excelsior Springs, Missouri, and enjoy a visit there now—the most delightful season of the year.

With its improved hotel accommodations Excelsior Springs has become an ideal health resort.

The curative powers of the waters of its various springs have been a great boon to thousands of sufferers from kidney diseases, rheumatism and stomach troubles.

Excelsior Springs is one night's ride from Chicago, on the

## Chicago Milwaukee & St. Paul Railway

THE SOUTHWEST LIMITED leaves Union Station, Chicago, 6.00 p. m.; arrives Excelsior Springs 6.50 a. m. the next day. Returning, leaves Excelsior Springs 7.16 p. m.; arrives Chicago, 8.20 a. m.

THE SOUTHWEST LIMITED carries electric-lighted compartment, observation and standard sleepers, chair cars, coaches and dining car, serving table d'hôte dinner and a la carte breakfast.

*Descriptive book free.*

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General Passenger Agent  
CHICAGO

**GEO. A. BLAIR**

General Eastern Agent  
381 Broadway, NEW YORK CITY



#### NEW BOOKS, ETC.

NELSON'S PERPETUAL LOOSE LEAF ENCYCLOPEDIA. Editor in Chief, John H. Finley, LL.D., President of the College of the City of New York. Associate Editors, William Peterson, LL.D., C.M.G., Principal of McGill University, Montreal, Canada, and George Sandeman, M.A., Edinburgh, Scotland. New York: Thomas Nelson & Sons, 1909. Twelve royal octavo loose-leaf volumes, illustrated with colored plates, plans, and engravings.

In these days, when history is making so rapidly as to call for daily and even hourly editions of newspapers, and science is advancing at such a pace that new periodicals are constantly cropping up to announce developments in specialized branches, the mere task of collecting this mass of material, condensing it, classifying it, sifting out the errors, and finally putting it in such a form as to be of value as a record for the well informed man, is in itself stupendous; but it is disheartening to know, as all makers of encyclopedias do know, that the very day after publication, the work is beginning to grow old and out of date. The mass of information which is crammed between the covers of an encyclopedia is living material, matter that is as alive as the age in which we live. Hence, it is inconstant. Part of it is aging and dying, much of it is developing and expanding and is giving birth to new ideas, and the effort to keep all this material in alphabetical order and keep it abreast of the times has always been a serious problem, which the publication of annual volumes has not solved for the reason that the additional matter published contains only the new facts, while leaving the old and worn-out ideas in the original encyclopedia, where they are liable to mislead the reader. A new departure in this line has just been made in the Nelson Loose-Leaf Encyclopedia, which is so arranged that any facts which may become out of date can be taken out of the very heart of the volume and replaced with new material without in the least affecting the alphabetical order or destroying the arrangement as a book of ready reference. The loose-leaf binding is ingeniously contrived to give the volume the appearance of being permanently bound. Nelson's Encyclopedia was first prepared in permanent binding in 1907. When a year later the loose-leaf edition was published, it was found necessary to make 600 changes in order to bring the encyclopedia up to date. A large staff of editors is employed to keep the present encyclopedia up to the hour, and from time to time new leaves are issued and sent to the subscribers, furnishing them with authoritative information on current topics, and informing them where to insert the matter in the encyclopedia. As an illustration of the up-to-dateness of this system, a set of leaves was issued last month on the death of Governor Johnson and on the Cook-Pearcy controversy. These leaves are temporary, and in March of each year a complete set of leaves of about 500 will be sent to each subscriber to add to his encyclopedia and to replace matter that is out of date. Formerly, a man could obtain better information on the occurrences of the previous decade than those of the current year. With the advent of Nelson's Encyclopedia such is no longer the case. The subjects covered in this work are many, probably a greater variety than is to be found in any other encyclopedia of the same number of volumes. The articles are, therefore, short and concise. The aim of the encyclopedia appears to be to provide general information and to avoid technical language as far as possible, to furnish not merely a record of events, but to give instructions wherever possible that will be of practical value to the reader. Take, for example, the entry "Cycle." Not only is a brief history of the bicycle given, but also instructions to the prospective buyer of a wheel which will enable him to choose the best machine, and hints on the care of a wheel. This strikes us as a rather unique feature, but one that will doubtless be appreciated by many subscribers to this work. The articles are a trifle more brief than one would like to have them, but they are accompanied by carefully selected bibliographies for those who desire to study the subject further. The encyclopedia appears to be an exceptionally good gazetteer, containing many geographical names that do not appear in other works of this kind. A pronouncing dictionary is placed at the end of each volume, so that if a person is in doubt as to the pronunciation of a certain word he can look it up very quickly and without having to wade through the body of the book, where his attention is liable to be diverted by the many interesting subjects which the volume contains.

WILD FLOWERS AND TREES OF COLORADO. By Francis Ramaley, Ph.D. Boulder, Colo.: University Book Store, 1909. 8vo.; 78 pp.

This little volume is intended as an introduction to Colorado plants. It is not a result of book study, but of many summers' work on Alpine heights and on the plains. It will prove of interest to all students of botany, particularly if they live in the State of Colorado.

TABLES AND OTHER DATA FOR ENGINEERS AND OTHER BUSINESS MEN. By Charles B. Ferris, B.S. Knoxville, Tenn.: Published by the University Press. Price, 50 cents.

(Continued from page 451.)

had at the receiving house. It is discharged into the boot, carried up the leg, and spouted into the bins. This time, however, instead of one leg, there may be from sixteen to twenty; and the four bins will have increased to over one hundred. Our five thousand bushels of grain, then, are discharged by gravity from the bottom of the bin to the boot of an elevator, are lifted and discharged again into a big spout, through which they flow directly down into the hold of a lake cargo vessel moored alongside the elevator.

This vessel is of a special type which has been developed for the lake trade. Although she may be capable of carrying over ten thousand tons of cargo, she is nothing more nor less than a huge barge with straight, parallel sides; blunt of bow and stern; with accommodations for the seamen at the bow, and with engine, boilers, and captain's accommodations at the stern. The main body of the ship consists of one vast hold, access to which is gained by a long line of hatches. Our 5,000 bushels of grain together with hundreds of thousands of bushels that may have been gathered from half a dozen different centers in the wheat-growing districts of the West, now start on their long journey at ten or twelve knots an hour to Buffalo, being consigned to one of the great waterside elevators in that city. The vessel is moored alongside the elevator, with its hatches opposite a huge tower-like structure built against its side and extending a story higher than the rest of the building. Inside of the tower and swinging from a hinge at its top is a huge steel-and-timber structure, which is nothing more nor less than our old friend the belt elevator grown to Brodingtonian proportions. Almost before the ship is alongside and the hatch covers are off, this swinging elevator is moved until its boot hangs directly over the opening into the hold. The boot is extended until it enters the hold and is buried deep in the mass of grain. The elevator leg is some 90 feet in length and it can be raised or lowered some 50 feet if necessary. In a single hour it can lift 15,000 bushels out of the hold and into the elevator.

As the grain reaches the head of the tower leg, it is shot directly into a receiving bin. Beneath this bin is a weighing scale with a hopper of 200 bushels capacity. The scales are set for a certain weight, and the weighing hopper is filled by pulling a lever which moves a slide in the bottom of the receiving bin above. The man who does the weighing is so expert that he can fill the scale hopper with the exact amount, no more nor less, once in every fifty seconds; which he must needs do when the huge marine leg is pumping grain out of the hold at the rate of 15,000 bushels per hour. From the weighing hopper the grain is delivered direct to the storage bin; or if, like our 5,000 bushels, it be destined for transportation across the sea, it will be carried across the building and out again as fast as the railway cars can be found to accommodate it. The cars will carry the grain direct to one of the great grain-exporting seaports, Portland, Boston, Newport News, or New York.

The method of operation at the seaport elevators is similar to that of the Chicago warehouse. The main difference is that, whereas at Chicago the barge steamer lay against the side of the elevator and the grain was delivered directly to the hold through the spout below the open door, it will frequently happen that the grain must be carried several hundred feet out over a pier and there discharged into the hold of the ocean-going steamship. This is done by means of a belt conveyer.

Now, this is not by any means the first time that our consignment of grain has made its acquaintance with the belt conveyer, which has been aptly described as the elevator leg belt stripped of its metal cups and lying upon its side. The belt conveyer is extensively used in the vari-

(Concluded on page 453.)

## Chicago & North Western Ry.



NEW PASSENGER TERMINAL, CHICAGO—Madison Street Entrance

### THE PORTAL OF THE WEST

**T**HE New Passenger Terminal of the Chicago and North Western Railway at Chicago is to be one of the finest monuments ever erected to the commercial life and spirit of the West.

It is to be located between Canal and Clinton Streets, extending from the main entrance fronting on Madison Street, over Washington and Randolph Streets to Lake Street.

More than \$20,000,000 is to be expended to provide a railway entrance to the city through which passenger traffic to and from the territory that has made Chicago powerful and rich is to move in ceaseless activity.

Work upon the new station is proceeding with all the rapidity that skill and liberal expenditure can command.

The new station will have a capacity for handling a quarter-million patrons daily.

It is confidently asserted that its provisions for doing this expeditiously and with the greatest comfort will excel anything ever known to the traveling public.

Almost 10,000 miles of railway are included in the marvelous system of the North Western Line. It reaches 2,000 active Western cities, towns and villages included in nine Western States, which are thus placed in immediate and vital touch with Chicago, the Great Central Market.

By traffic arrangements with its connecting lines practically every point west and northwest of Chicago is placed in direct touch with the city, by through passenger train service, and freight shipments are handled with precision and dispatch, consigned through to any one of 9,500 stations, located on 62,000 miles of railway, about one-eighth of the entire railway mileage of the whole world and one-fourth of the railway mileage of the United States.

The North Western Line is the pioneer line west and northwest of Chicago and the Only Double Track Railway between Chicago and the Missouri River. Its service includes

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Passenger Traffic Manager, Chicago, Ill.

### RECENTLY PATENTED INVENTIONS.

#### Pertaining to Apparel.

**WAIST AND SKIRT SUPPORTER.**—A. M. PRESTON, Broxton, Ga. The objects here are: to provide a supporter which is at once simple in construction, durable and certain in operation: to provide a device which will lie closely and snugly to the form; and to provide a device which is neat and presentable in appearance.

**SELF-SUPPORTING STOCKING.**—G. GRAHAM, New York, N. Y. The invention relates more particularly to the means employed for supporting a stocking. The upper portion of the stocking is so formed that it in itself constitutes a garter, so that no separate supporting means need be employed. The invention covers any fabric foot covering, as for instance, socks, hose, half-hose, etc.

#### Electrical Devices.

**TROLLEY-POLE CATCHER.**—J. H. WALKER, Lexington, Ky. The purpose in this case is to provide a construction in connection with the pole and a lower connection, whereby the pole may be prevented from rising to a perpendicular position when the trolley wheel jumps the wire, and whereby the pole may be held in any intermediate position and may be permitted to freely move in contact with the wire in the operation.

#### Of Interest to Farmers.

**JOURNAL FOR AGRICULTURAL IMPLEMENTS.**—A. C. DITMAR, Davenport, Wash. An efficient journal is provided which can be attached to a plow beam or the like for the purpose of revolvably mounting a colter disk or other part, in which the disk can be set at any angle, which will fit any kind of plow, in which the spindle is in a dust-proof boxing, and in which the wearing parts are supplied with lubricant.

**ANIMAL COVER.**—C. L. HASTINGS, Fond du Lac, Wis. The aim in this invention is to provide a durable cover, which is particularly useful for cattle, by means of which the animal can be well covered, when necessary, which thoroughly envelops the body, leaving the head, neck, and legs free, and in which means are provided to prevent the displacement of the blanket from the rear of the body.

#### Machines and Mechanical Devices.

**FILLING DEVICE.**—J. PAPISH, 605 Freeman Street, Valparaiso, Ind. The aim is to provide in this invention, a device by means of which powders, crystals or other granular material can be expeditiously and easily introduced into small-necked bottles and the like, which requires little effort to operate it, and which fills the receptacles without spilling any of the material which is being introduced into the receptacle.

#### Railways and Their Accessories.

**DOOR.**—C. B. WHITMAN, Watervliet, N. Y. This improvement in doors is especially designed to be used in connection with street railway cars, and has for its purpose to automatically register the number of passengers entering, and which will permit of the exit without operating the registering mechanism. The movements of the motorman on the platform will not be more restricted than when the usual type of door is employed.

**NOTE.**—Copies of any of these patents will be furnished by Munn & Co. for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.

### INDEX OF INVENTIONS

For which Letters Patent of the  
United States were Issued  
for the Week Ending  
November 30, 1909,

AND EACH BEARING THAT DATE

[See note at end of list about copies of these patents.]

Accumulator, hydraulic, A. W. French.....	941,867
Adjustable bracket, J. Knappe.....	941,682
Advertising apparatus, A. Weissmann.....	942,021
Aerial vessel, J. E. Suter.....	941,896
Agricultural machine, L. E. Roby.....	941,465
Air compressor, Olsen & Schroeder.....	941,646
Air compressor or pump, J. Delbridge.....	941,627
Air conveyer, fresh, E. E. Lamb.....	941,370
Air heater, G. L. Bryant.....	941,756
Alloys, producing low carbon, low silicon titanium, F. M. Becket.....	941,553
Alumina, manufacture of, G. McCulloch.....	941,799
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Amusement device, R. H. Alexander.....	941,902
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Armor plate, treating, S. S. Wales.....	941,477
Auto propeller, E. E. Wilson.....	941,970
Automatic alarm, W. H. Reiff.....	941,950
Automatic switch, J. Ma Goody.....	942,033
Automobile buffer bar, J. H. Sager.....	941,654
Axle boxes, means for attaching, E. J. Spahr.....	941,882
Bag holding device, H. Ihme.....	941,578
Bag tie, W. H. Morrill.....	942,007
Bait, artificial, M. A. Burthe.....	941,911
Bar. See Automobile buffer bar.	
Bar fixture, Schneider & Zeibn.....	942,014
Barrel heads in place, means for holding, W. H. Decker.....	941,562
Barrel making machine, E. F. Bengler.....	941,404
Basin, wash, J. W. Sharp, Jr.....	941,540
Bath tub seat, J. A. Skogberg.....	941,544
Battery jars, lining for storage, A. J. Meier.....	941,720

(Continued on page 453.)



(Concluded from page 452.)

ous inland and Great Lake grain warehouses for transporting the grain horizontally from one part of the warehouse to the other. Thus, when the wheat is shoveled out of the railway car into a spout below the open door, it will frequently happen that the transfer takes place at some distance from the particular one of the twenty elevator legs by which the grain is to be lifted to the top of the bin. In this case it will be allowed to fall through onto a broad traveling belt of the kind shown in our illustration, upon which it will move swiftly until it reaches the spot at which it is to be delivered or "tripped." Here the belt will pass over a set of pulleys arranged above one another in such a way that the grain can be shot off the belt for such further handling as may be desired. In this particular case it will be delivered to the boot of the elevator, carried up, and discharged to its own particular bin.

Time saving is a great consideration in these huge warehouses, and one of the most interesting features is the system of swinging distributing spouts, intervening between the receiving and weighing bins at the head of the elevators and the huge honeycomb of storage bins below. One of our views shows these spouts, hinged below the floor of the top story of the building and capable of being swung around and over the top of the particular bin to which the grain is to be delivered. This arrangement is one of many ingenious arrangements by which the enormous mass and weight of grain can be received, weighed, placed in its own particular bin, drawn away therefrom, lifted, transported horizontally, and finally delivered to car or steamship in the least possible time, with unfailing accuracy, and at the minimum of cost.

In the above description we have traced the grain from a farm in the Middle West to the hold of the steamship that would carry it to Europe. As regards the general system of receiving, selling, and distributing the grain, the same methods apply to the wheat which is consigned to the great flour mills, say, of Minneapolis, or to any of the centers in which it is prepared for the consumption of the masses.

#### CHICAGO AND THE RAILROAD SYSTEM OF THE MIDDLE WEST.

(Continued from page 447.)

000 passenger station, that will be ready for occupation early in 1910. With one exception it will be the largest passenger terminal in the United States. Over thirteen acres of ground will be occupied by the station and station tracks. The approaches cover thirty additional acres, fifteen acres being used for the north and the west approaches. The present station, with capacity for handling fifty thousand passengers per day, is now overtaxed; the new terminal will be capable of taking care of a quarter of a million people every twenty-four hours.

The plans call for an elevated terminal, reached by two elevated approaches of four tracks each, and a train shed 800 feet long and 320 feet wide, that will contain sixteen tracks, each with a capacity of fifteen cars. The area of the basement is over two acres; the street floor of the station building covers one and three-quarters acres; the train shed, six acres. Altogether there will be practically ten acres of floor space devoted to public use. One of the most important features is the treatment of the train shed. This structure will not have the usual long black expanse of sooty roof that offends the eye. The sixteen long tracks which will occupy the shed will be covered by what is known as the "Bush roof," in which the curve of the roof over each pair of tracks is broken by a concrete slot or duct, running the length of each track, and so placed that the locomotive funnels will discharge through it into the open air.

The electrification of Chicago steam railways inside of the city limits is at

(Continued on page 454.)

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(Continued on page 454.)

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