Prof. Barnard's Comet.

Prof. Lewis Boss, of the Dudley Observatory, has completed calculations of the orbit of the new comet discovered by Prof. Barnard at the Lick Observatory, September 2. Having remained nearly stationary, the determination of its path has been a work of great difficulty, and results attained can be regarded as merely approximate. According to these the comet is twice as far away from the earth as the sun is, or about 190,000,000 miles, and is about 170,000,000 miles from the sun. It is moving toward its perihelion, and indications are that this will be reached December 10. As the earth and comet are moving toward each other from opposite directions. the velocity of approach toward us is something unusual, about 3,000,000 miles a day. The comet will consequently increase in brightness, and by the middle of November will be sixty times as bright as at its discovery. Subsequent calculations will determine whether it will become visible to the unassisted eye. It came into our solar system with the small inclination of fifteen degrees to the plane in which the planetary orbits lie, and in such a way as to move in a direction contrary to that of the planets. The comet cannot readily be seen much earlier than 1 o'clock in the morning, but within a month it will be visible in the early evening hours, and in November will rise before sunset. The physical appearance indicates that it is intrinsically bright and that it will develop a large tail. Calculations indicate its nearest distance to the sun at 125,000,000 miles. Should it fall below this, the comet will be a brilliant object in November.

The Mexican National Railroad.

Rapid progress has been made this summer toward the completion of the Mexican National Railroad Company's "International" line, and President Raoul informs us that it is expected to open it for traffic before November 1, and possibly by October 15. This will make a second independent all-rail route from the Rio Grande to the city of Mexico. The Mexican Central road, from El Paso south, was opened in the spring of 1884.

At the close of 1883 the Mexican National Company had in operation 444 miles of track in northern Mexico and Texas, and 356 miles extending west and north from the city of Mexico. Owing to financial difficulties construction had been suspended, with a gap of 352 miles, lying between Saltillo, in the southern part of the State of Coahuila, and San Miguel, in the State of Guanajuato, to be finished in order to complete the connection between the capital of Mexico and the United States. In 1884 the original Mexican National Railway Company defaulted on its first mortgage bonds, and, pending a reorganization, no further building was possible. Toward the close of 1886 an agreement was entered into by the leading representatives of the first mortgage bondholders on the one hand and the Mexican National Construction Company and other creditors on the other, in accordance with which the present Mexican National Railroad Company was formed.

By the terms of the new agreement the Interoceanic line, running from the city of Mexico directly west 274 miles to the present terminus at Patzcuaro, and the International line, completed and uncompleted, from Acambaro on the former, 177 miles west of Mexico, north to Laredo, together with some minor pieces of track, were turned over to the new corporation. Possession was taken in July, 1887, and during the next month contracts were executed for the completion of the missing link in the International division. Work began at the northern end in October and at the southern end in December, and the builders are obligated to finish their task by October 1. Extensive machine shops are to be put up at Laredo, the Pullman Company has supplied a lot of sleeping and dining cars, and the new route will open with fair prospects for both passenger and freight traffic.

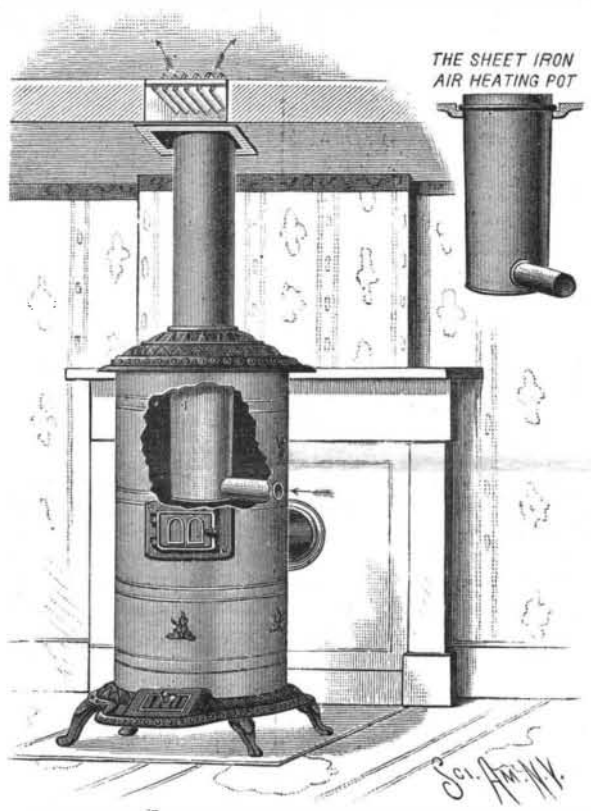
Taking St. Louis for the starting point, the distance from the principal cities of the United States to the city of Mexico by way of Laredo and the Mexican National route will be 1,905 miles, as against 2,585 miles via El Paso and the Mexican Central Railroad. The distance from St. Louis to Laredo is about 1,080 miles, from Laredo to Mexico 825 miles. From St. Louis to El Paso it is 1,360 miles, and from El Paso to Mexico 1,225 miles. The saving of 680 miles by the new line is equivalent to nearly thirty hours' time for passenger travel and the mails. The route offers superior attractions for tourists, crossing the Sierra Madre Mountains west of the city of Mexico at an elevation of 10,180 feet, or little less than two miles above the sea. The vertical ascent from the capital is 2,700 feet, most of it in a distance of sixteen miles. That part of northern Mexico traversed by the National road also compares favorably in interest with the Mexican Central's unattractive territory. The Central route, however, possesses an advantage in that it passes through half a dozen interesting cities, while the only cities of importance on the National road are Monterey, San Luis Potosi, and Toluca. The National is a narrow gauge, and the Central a broad gauge road.

The new line going south from Laredo crosses the northeast corner of the State of Coahuila, the western part of Nuevo Leon, the southeast corner of Coahuila, the center of San Luis Potosi, the center of Guanajuato, the northeast corner of Michoacan, and the northern part of Mexico. The ascent from the Rio Grande to the table land occurs principally between Monterey and Saltillo, the latter place having an elevation of 5,240, and San Luis Potosi of 6,090 feet. The route lies through or near one or two important mining districts.

All of the railroads in Mexico are likely to find their permanent profit chiefly in local traffic. The Mexican Central Company's domestic freight business has increased during the last four years beyond the most sanguine anticipations. The National road so far has been operated at a disadvantage, consisting of several disjointed sections and confined to local traffic exclusively. President Raoul looks for a considerable development of earnings after the line from the United States gets into operation. The new company's expenses so far have been heavy on account of needed betterments with a view to through business. Other narrow gauge enterprises to connect with the Mexican National are under way. All things considered, the outlook for this and the various other Mexican railroads appears to be brighter than at any time within the last four or five years.—*Bradstreet's.*

SIMPLE ATTACHMENT FOR STOVES.

A simple device for heating two rooms by means of a single stove has been devised by Mr. Henry Mead, of this city. As this idea is very simple, and is unpatented,



SIMPLE ATTACHMENT FOR STOVES.

it may be applied very easily to any stove in use. The purpose of the device illustrated is to utilize the heat space in stoves, which in ordinary cases is devoid of any use other than furthering the general exterior design and increasing the exterior heating surface, it not altering the outside appearance.

To accomplish this, the cover of the stove is removed, and a metal air heating chamber, having a slight flange near its upper edge, and a gas-tight bottom, is introduced. This pot or chamber should be so deep as to extend downward as far as can be done without interfering with the operations of feeding the coal to the fire. At or near the bottom of the chamber an air pipe of convenient size is fitted, and this extends to and through the side of the stove. Connection by pipe from the top of the pot to the register in the floor above completes the arrangement. Without additional fuel this plan has been found to furnish warmth enough in cold days to render needless any stove in the upper room.

The Herreshoffs as Ship Builders.

Charles Frederick Herreshoff, of Bristol, R. I., died of pulmonary disease at his home in that city, September 8, in the eightieth year of his age. Mr. Herreshoff was the father of the famous Herreshoffs, the boat builders, whose works, as a writer in the New York *Sun* shows, are about the most conspicuous thing left to remind Bristol of her trading days. The Herreshoff children played about the old ship yards. The Herreshoffs took to boats. Boats got into their blood more or less from both sides of the house. It wasn't strange, therefore, that John Herreshoff began whittling out boats as soon as he was old enough to manage a jackknife. In his fifteenth year he built a good sized craft for sailing on the bay.

Then he lost his sight. Gradually a film came over his eyes, and finally shut off forever the last dim glimpse of Bristol and her boats.

But he went on building boats just the same—not, of course, as if nothing had happened, for his methods of perception had to be radically changed. He had the task before him of carrying in his mind the models he worked upon. The objects he had seen with his eyes in the first fifteen years of his life he could summon up into his mind again.

Under the enforced habit of mental activity, without the interruption and suggestion of outside objects, his mind grew to be one of remarkable concentration and acuteness. He became able, for instance, to set up before himself, from a careful description, a piece of machinery, and to explain its workings and its faults. His sense of touch developed to a wonderful sensitiveness, too. He learned to recognize the power of lines by rubbing his fingers slowly over a marble, and how well he succeeded in finding the good and discarding the bad has been shown by many a craft.

But this was when Herreshoff was building only sailing vessels. It was not until after 1873, when Nathaniel Herreshoff became interested with his brother, that the Herreshoff steam vessels made their appearance. Mr. John Herreshoff had been thinking over the coil boiler idea for some time, and when it was applied to steam craft it was so successful that the building of sailing vessels was at once abandoned. The industry at once jumped into prominence, and the shops were used for making every part of the vessel.

The average individual who has heard of Herreshoff would very likely expect to find him industriously at work upon a model or laying down the lines in some ingenious way for a new boat. He will be found usually in business hours sitting behind a little railing in one of the rooms of the office, quietly resting one arm on a desk at his side. He is very busy—just as busy as if his eyesight were as good as an eagle's. Secretary Young is sitting at the desk by his side and reading letters, bills, orders, all kinds of business communications. Herreshoff carries them swiftly along in his mind, one after the other. If you should happen to drop into the office about noon, say, you would see him get up, unlatch the gate to the railing with perfect ease, walk to the hat rack where his hat is hanging, with two or three more, and take his down without a fumble.

Mr. Nathaniel G. Herreshoff, who is not blind like Mr. John and others in his family, is the designer. He works out the models, makes his calculations, etc. Mr. John may run his hands over the models, hear the measurements read, and make suggestions. The beauty and effectiveness of the Herreshoff models are thus due, in their conception, almost wholly to the two brothers. But there are experienced men in every branch of the business to take them up and develop them into the much admired Herreshoff yachts.

The steel yacht which the Herreshoffs are now building will be looked for with considerable interest. Her plates have been fitted to each other as smoothly as the tiles in a floor. She is 148 feet in length, with 18 foot breadth of beam, and a 7 foot draught. Her engines, also built by the Herreshoffs, are of quadruple expansion type, and are beauties of simplicity and strength, capable of 800 horse power. Her contract calls for 17 miles an hour. The interior will be a model of beauty and safety. The woodwork is of highly polished quartered oak, and there are five watertight bulkheads. She will cost Mr. Brown about $70,000 as she comes from the Herreshoff's hands.

Curious Minerals of Utah.

Included in the mineral resources of Utah, apart from its precious metals, are deposits of alum, some recently discovered veins of which are eighteen inches thick and several hundred feet in length, of dazzling whiteness and great purity. Beds of niter are also found sufficiently pure to readily fuse when thrown on hot coals.

Ozokerite or natural mineral wax, a rarity elsewhere, is here found in large quantities. It is air, acid, and water proof, and can be used for imparting these qualities to other substances. As an insulator it is said to be perfect, and would doubtless be found a superior insulating material for electrical appliances. It could also be adapted as the base of a cheap yet desirable paving material and for indurating piles and posts to prevent decay.

A somewhat similar discovery is gilsonite, found, on analysis, to contain about eighty per cent of carbon or asphalt in pure form.

Of the latter a vein has been discovered three feet wide and over a mile in length—a supply that, if worked, would be found almost inexhaustible.

As is now well known, the Great Salt Lake is an immense, limitless magazine of salt, that can be readily obtained in any desired quantity by the simple process of evaporation.

From this lake vast quantities of sulphate of soda are also secured, blown on shore at certain temperatures by the winds, where hundreds of tons are often piled up in a single night, that can be utilized in the cheap production of sal soda and carbonate of soda.

Stray Railroad Cars and How they are Recovered.

The way in which railroad officials keep track of their freight cars, which are run thousands of miles over other railroad lines, has, no doubt, excited the wonder of many, and were it not for the constant vigilance of the great railroad companies in keeping watch of their freight cars, the loss of rolling stock and damage resulting from delays and mistakes would prove a source of serious financial loss to all concerned.

Nearly all the great roads employ a corps of what are known as "lost car searchers" or "tracers." Every freight car is numbered and used for a certain purpose, and whether it be a "gondola" or flat open car, or a box car, it can be traced from one end of the country to the other. The "searchers" will follow a clew to San Francisco if necessary, and see that the car is returned to its proper station. The "car searcher" has been a most active agent of the railroads for many years past, but, as in every other business, improved methods are constantly introduced.

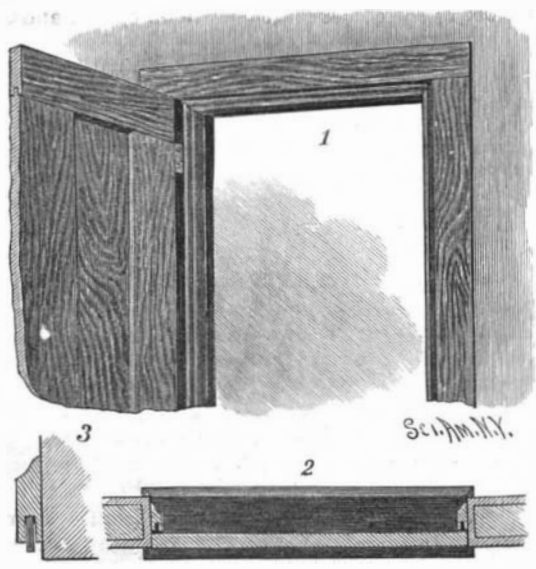
At last our great trunk line road, according to the *Evening Telegram*, has dispensed with the car searcher in favor of a large force of responsible clerks, with the telegraph and telephone as auxiliaries. So systematically is their work done that, if the conductor of a freight train were to make the slightest error in the numbers of the cars in his train or a description of them, it would be detected and the conductor called on to rectify it. If a car is reported missing in any part of the country, one of these clerks, by referring to his books, can tell at what point the particular car should be at the time and when it should be returned.

Artesian Well Boring in Nevada.

We learn from the *Mining Industry*, of Denver, that artesian well boring is now a sort of mania in parts of Nevada, and some of the borings are proving successful. A fine flowing well was struck a few days ago in Douglas County, Carson Valley, at a depth of only 310 feet, and without encountering rock of any kind. Improved boring machinery has been ordered from the East, and we may expect to see the experience gained in the Comstock mines, in "feeling ahead" for water, brought into play. By tunneling into the mountain that forms the rim of the basin of Lake Tahoe, a very large supply of water might be obtained, and as the diamond drill will easily bore ahead 1,000 feet or more, it would be an excellent tool for use in tunneling for water. In case of striking a strong flow, several holes could be sent into the source, thus saving the cost of driving forward a large tunnel. Many great bodies of water have been thus tapped and drawn off in the deep workings of the Comstock. In the Union Consolidated mine, cocks were fitted into the diamond drill holes and the water drawn off as it could be taken by the pumps. In running the Sutro tunnel the diamond drill was sent ahead to tap shafts in which water had accumulated to the depth of several hundred feet. Good hits were nearly always made with the drill, though it was sent ahead a great distance.

AN IMPROVED DOOR OR WINDOW STOP.

A stop to be used in the construction of door and window frames as an abutment for the door or window, while serving also to cover the crack between the door or window and the jambs, is illustrated herewith, and has been patented by Mr. Noah Van Allen, of No. 149 West Monroe Street, Chicago, Ill. The stop has a

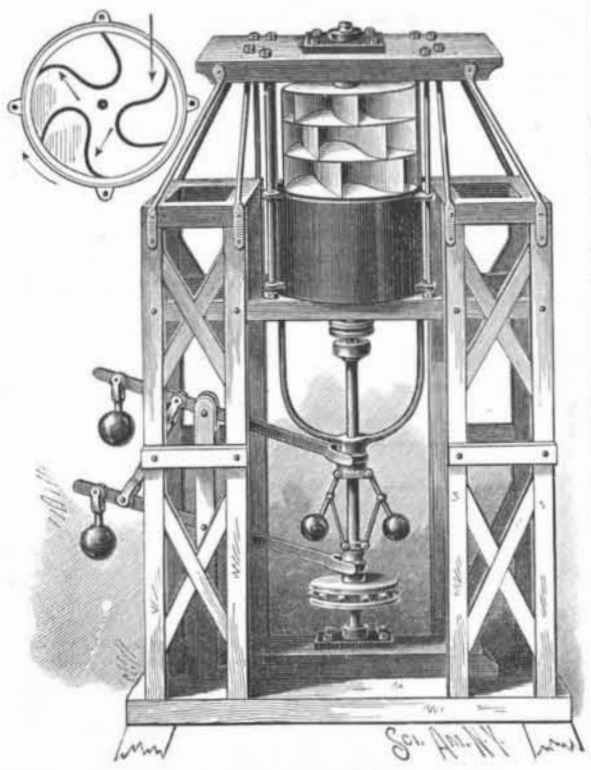


VAN ALLEN'S DOOR OR WINDOW STOP.

longitudinal groove, in which is arranged a packing strip of elastic material, the strip being of less thickness than the groove and secured in the groove at its inner edge only, so that it can be retracted to permit the door to have a full bearing on the stop. Fig. 3 shows an enlarged cross section of the jamb and attached stop, Fig. 2 being a sectional plan view of a portal provided with the stops when the door is closed. With this construction a weather-tight joint is made, obviating the necessity of using weather strips.

AN IMPROVED WINDMILL.

A windmill designed to regulate automatically the speed of the main driving shaft, and which will always act, from whatever direction the wind blows, without the shifting of vanes and other devices, has been patented by Mr. Marcus J. S. Soli, and is illustrated herewith. The windwheel consists of one or more turbines, one above the other, secured near the upper end of the vertical driving shaft, each wheel having top and bottom disks, between which are held curved blades form-



SOLI'S WINDMILL.

ing orifices for the entrance and exit of the wind, and channels through the wheel, as shown in the sectional view, the turbines being arranged so that the outer edges of each blade break joints, that the wind may act from whatever direction it comes, and on leaving as well as on entering the wheel, as indicated by the arrows. The windwheel is designed to be wholly or partly covered up by a casing, to the lower end of which is secured a U-shaped downwardly extending rod, having a collar in its middle fitting loosely around the vertical driving shaft. The forked ends of a weighted lever, fulcrumed on the main frame, extend beneath the collar, a link connecting this lever with a lower similar one, the forks of which engage a collar on the lower end of a governor secured to the main shaft. When the shaft runs beyond the normal speed the governor balls fly outward, raising the collar on the lower end of the governor, when the lower lever operates to pull down the outer end of the upper lever, thereby raising the casing to fully or partially inclose the windwheel, according to the movement of the governor balls.

For further information relative to this invention address Mr. B. H. Lien or Mr. M. J. S. Soli, Brookings, Dakota.

Habits of the Blacksnake.

Blacksnakes always feed on live prey, and possess a power over their prey that is truly wonderful, and I think that birds, old and young, are their main dependence for food—old birds are captured by them with ease. I captured a snake nearly 5 feet long that had a full-fledged song sparrow in its body about 6 inches from its head. They feed on any kind of live prey within their capacity, and have been caught with a young rabbit in their body. They also are successful hunters of birds' nests for the young, and will climb trees in their search. I was once near an orchard when I heard robins making a great outcry, evidently disturbed by something. I went to see the cause, and discovered a large blacksnake at their nest in an apple tree about 15 feet from the ground. The tree was about 1 foot in diameter and 7 or 8 feet up to the branches. The branch on which the nest was, stood off at an angle of about forty-five degrees. When the snake saw me, he glided down on the top side of the branch, and when he reached the trunk he slid off and dropped to the ground. In his mouth was a young bird partly swallowed, which proved such a clog to him that he could not run rapidly in the grass, and I captured him.

Many stories are told of their chasing people. I have seen persons who claim to have been chased by them, and sometimes it was by a racer, a blacksnake with a white ring around its neck. I never saw a snake of that description, and I know of no authority claiming the existence of such a snake. A blacksnake five or six feet long can outrun a man. Their speed I have repeatedly witnessed, when they have escaped from me. Now, if they chase people, why do they not catch them, and if they should catch a person, what could they do with them? Certainly they could not use them as food. It is singular that so many persons have been chased by them, and yet no instance has been reported where they have been caught.

The racer, described as a blacksnake with a white ring around its neck, exists only in the imagination of frightened people. It has no place in natural history, and yet I have known several persons who claim to have been chased by them, and were just as sure of the white ring as they were of being chased.—*Forest and Stream.*

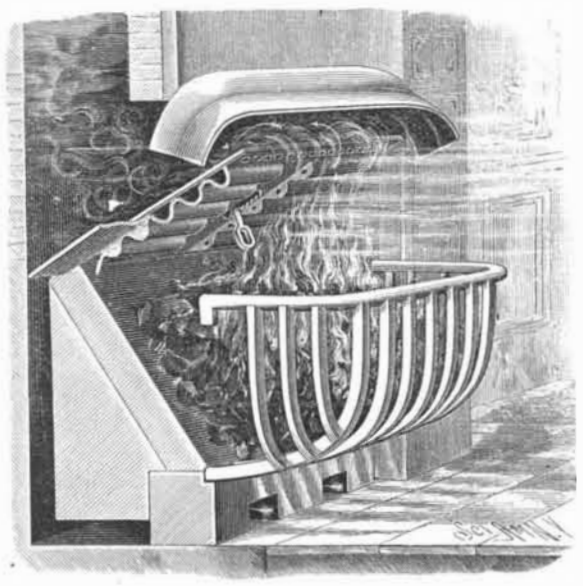
The Steel Ram of the War Ship San Francisco.

The ram for the San Francisco was cast at the Pacific Rolling Mills, San Francisco, last month. A pit shaped like the letter L was dug in the floor of the foundry. It was eight feet deep, twenty feet long in one direction and twenty-five in the other. In this pit was placed the mould. To this pit there was a tramway upon which the ladle, being mounted on wheels, traveled. When the pit was reached, the metal was allowed to flow into the mould in a stream six inches in diameter. When the mould was filled, there was still considerable of the liquid steel left in the ladle. The actual operation of casting the ram occupied but twenty seconds. Whether the results are satisfactory can only be told after the metal has cooled, and that will take several days. It took two months to get ready to perform this twenty-second operation. The operation of casting such a huge amount of metal is very interesting to those who have no knowledge of the process. To insure the complete filling of the mould there were placed two apertures, 18x24 inches in diameter and 4 feet long, called "rising heads," left in the top of the mould, into which the metal rises, and as the metal cools this allows for any shrinkage in the body of the metal. The weight of these two rising heads will approximate 9,500 pounds, the weight of the ram being 13,000 pounds—2,000 pounds heavier than that of the Charleston.

The general shape of the ram is that of a crescent, with one point a little shorter and more curved than the other. The shorter point will extend upward at the bow, and the lower point will run aft under the ship. The curve forms the ram. When in position it will be 20 feet 8 inches from its most forward point to the end of the longer point, and will have a height of 13 feet 10 inches. Where the curve is the thickest—that is, where the vessel would strike when ramming—there is a thickness of 2 feet 9 inches of solid steel.—*Pacific Contractor.*

AN IMPROVED FIREPLACE.

A fireplace designed to facilitate the ready regulation of the amount of draught necessary for free combustion, and with which the heat generated will be retained and directed into the apartment to be heated, is illustrated herewith, and has been patented by Mr. Robert B. Berrie, of Lexington, Mo. A corrugated plate with end flanges is set into the wall, upwardly inclined above the firepot of the grate, the plate having a flat middle part, through a slot in which passes a handle secured to a regulating plate sliding on the rear side of the corrugated plate, the slot having notches adapted to be engaged by the handle to hold the regulating plate at the desired height. The edges of the regulating plate have apertures, as have also the inner ends of the corruga-



BERRIE'S FIREPLACE

tions, to permit the free radiation of heat and prevent the corrugated plate from becoming too hot. Above the grate is held a hood, the moving forward or backward of the regulating plate decreasing or increasing the draught opening formed by the front end of the corrugated plate and the front end of the hood. Under the grate extend one or more channels leading to the chimney, indicated by the arrows, the inner openings of these channels being closed or opened by the lower end of the regulating plate.