thus forming a deep cornice with ornamental brackets underneath. The metallic structure is of the American pin-connection type, all parts being designed for mild steel or wrought iron. Cast iron is used only for cornices and ornaments.

The chords of the arches are made of steel plates and angles; they are 2 feet deep, latticed top and bottom. The web system of the arches consists of radial iron struts, made of 12 inch channels latticed and diagonal tension bars. All pins are of steel. The end pins which form the hinges are 20 inches diameter, and are supported on a steel pedestal. These pedestals rest on steel bed plates on the masonry skew-backs, and are adjustable by means of keys. The bed plates and pedestals are anchored to the masonry by heavy steel bolts. The vertical posts which carry the floor system consist of 12 inch iron channels, latticed; they are hinged to the pins of the upper chords of the arches, and stiffened by longitudinal struts and braced transversely by struts and sway rods. Laterally, the arches are connected by a strut at each panel point, attached to the main pins and braced transversely and laterally by iron rods. The lateral struts are composed of two 7 inch channels, latticed.

The roadway consists of corrugated iron plates ½ inch thick, resting upon the floor girders, covered with concrete shaped to the transverse form of the roadway. On top of the concrete there is a layer of Trinidad asphalt, and above that blocks of granite, 7 inches thick, set in asphalt.

The footwalks are paved with diagonal tiles of bluestone with a row on each side of tiles of white marble, with a cut granite curb.

The footwalk pavement rests on a layer of concrete or corrugated iron plates, the same as the roadway.

The foundations for the piers are intended to be carried to the solid rock.

The masonry will be faced with granite, laid in courses of 20 to 30 inches thick. The interior stone is to be of good quality of durable limestone, or such other stone as may be approved by the engineer of the commission.

All masonry will be first-class rock-faced work, with beds and joints dressed to a quarter inch. Copings, cornices, and parapets will be of cut stone.

The structure is designed strictly in accordance with the requirements of the specifications, and the construction details are all so arranged as to be accessible for cleaning and painting. This is a very important consideration in metallic structures, as the endurance of the iron and steel in works of this kind depends upon how they are protected from corrosion.

The structure, as designed by C. C. Schneider, is well proportioned in all its parts and details, and conveys the impression of strength and durability; it is symmetrical in appearance, and in harmony with the picturesque surroundings. The estimated cost of the whole structure is $2,075,000.

In Mr. Hildenbrand's design, shown in the upper view, which we take from *Engineering News*, the two center spans are each 540 feet, and the clear height of the arches above high water is 135 feet. The arches are to be constructed with three hinges. There are five arches in the entire width of the bridge, which is 80 feet. The center depth of the arches is 16 feet, increasing toward the abutments to 18½ feet. The main floor beams are supported upon latticed columns placed on these arches, 16 feet apart. The floor beams are 42 inches deep, and carry a series of longitudinal girders 20 inches high and spaced 10 feet apart. On the girders are placed 9 inch I beams 2½ feet apart, which support a corrugated iron floor covered with concrete and Belgian pavement for the roadway and marble tiles for the sidewalks. The chords of the arches are box-shape and composed of channels and plates.

The main bridge approaches consist of a number of stone arches, each 32 feet span, with two large stone arches over the Boulevard and Boscobel Avenue. The approaches are carried on earth filling, confined by retaining walls from the avenues to the termini. The total length of the bridge is 2,105 feet, the main arches with their abutments occupying 1,180 feet, the avenue arches 160 feet, the fillings 390, and the stone viaduct 395. The estimated cost of this structure is $2,250,000.

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NEW YORK, SATURDAY, MARCH 6, 1886.


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## No. 531

**For the Week Ending March 6, 1886.**

Price 10 cents. For sale by all newsdealers.



### A REMARKABLE SNOW PLOW.

Much interest has been excited in railway circles at the West during the past few weeks by the performances of the new Leslie rotary steam snow shovel, on the Chicago and Northwestern Railroad Co.'s lines. The head of this machine is provided with angular cutting blades, which rotate with enormous velocity and cut and loosen the snow, which then passes behind the blades, where it is received on the flat spokes of another wheel, turning in a contrary direction, and is thereby thrown out sidewise from the machine with tremendous power. The snow is delivered in the form of a great stream, forming an arch through the air, and strikes the ground at a distance of from one to two hundred feet from the track. The machine, when in operation, is said to be a wonderful sight to behold. It is mounted on a special car, which also carries an engine for driving the mechanism. During the late heavy snow storms, when tracks were blockaded with from 3 to 10 feet of snow, packed so hard that the ordinary slow plows would make no impression on it, and could not have been cleared except by hand shoveling, involving several days' delay, this machine went through some of the worst drifts at the rate of a mile an hour, and through the lesser drifts at much faster speed.

### PAINT, FINISH, AND POLISH.

The improvement in fit and accurate workmanship on machine tools and other productions of the machine shop is being fitly supplemented by finer finish and other exterior decoration, so that, properly enough, taste and utility, beauty and durability, are combined.

For many years, one fashion has prevailed in the painting of cast iron and of the unfinished portions of wrought iron; all being of one uniform lead color, or the color of blue slate. No difference was made on account of the weight or the contour of the pieces, and there was absolutely no relief from the depressing dullness of the leaden paint.

But on recent visits to shops where the best work is done, it was an agreeable surprise to see glossy black on the castings, complementing the sheen of the polished work. On some of the lighter machines the black itself was relieved by fine hair stripes of chrome green and Scheele's green, not brilliant and bold enough for contrast, but just enough to relieve the plain black and to define corners and curves.

An excellent effect is produced by rubbing faced castings with old files, washing with lye or soda, drying, and going over the surface with a swab dipped in dilute sulphuric acid, only strong enough to make a coat of rust, which will form in two or three hours. Then wipe with clean waste. The result is fine, the surface being of a warm russet tinge, closely mottled by the varying effects of the acid on the filed or brightened parts and the untouched skin of the casting. Treating the bed of a lathe or planer in this way, and painting the legs black, make a very satisfactory combination with the polished work. As a general rule, only the moving parts of machinery should be bright finished.

Finishing or polishing are matters of taste and choice; some mechanics are rigid in admiring nothing but a finish; a polish to them is a finical whimsey. But these effects may be judiciously combined in the same machine. Thus, a draw file finish may offset shining rouge polish, the draw file for straight surfaces or planes and the polish for curves and mouldings. Draw file finish is very satisfactory to the eye of the practical mechanic, as it denotes skill of hand and exact work; if it is the least bit wavy, or slanted, or crossed, the effect is spoiled; the marks of the file must be parallel. Some prefer a dead smooth cross cut finish file for this work, but the result is excellent with a fine cut float file, half worn, and used with plenty of oil, enough to "float." For this purpose, ordinary kerosene oil is better than the thicker lubricating oils.

Stoning for ornamentation is common, but it is not generally used judiciously; there is usually too much stoning. The work is very inviting, as it will readily half conceal the lack of file or scraper finish. For stoning, only small slips should be used or the points of larger ones; broad smutches of stone rubbing are coarse and crude. Let the work to be stoned be well surfaced with file, scraper, or, where permissible, with emery, before the stone is used—and better work can be done with water than with oil. The stone makes a nice ornament rubbed in straight lines and angles—better than curves. The writer saw a pattern known as Grecian border put around the sides of a lathe apron with stone on an emery and rouge ground of shining polish. It was rich, consisting solely of straight lines and right angles.

Stone in powder is excellent for a plane surface of considerable extent where shining polish is not desired. The stone used is preferably the yellow, not the white, oil stone, and the powder is of a fineness almost impalpable to the fingers, but showing grit when placed on the tongue and lips. This is applied with water and a stick of soft white pine, or white-

wood, or cucumber tree, or poplar—any wood that is soft on end, or brooms slightly, and contains no pitch or gum. A fine dead surface can be got thus with powdered oil stone, and the stick may be whittled to work in curves and channels.

Scraping for ornament is quite common, but as usually practiced it is as objectionable as stoning—there is too much of it. The flat scraper should never be used for ornament—only the round nose and the "bagnet" scrapers. And for this purpose the scraper should never be used in right lines, only in curves, making "curly-cues." The surface to be scraped for ornament should be filed or emery rubbed to take out all turning marks and planed ridges; no suggestion of the lathe or the planer tool should be left. Stoning looks well on either a dead smooth surface or on one of high polish. Scraping over a planed surface, left as it came from the planer, only serves to show, with more distinctness, the furrows and ridges inseparable from planing, even with a finish tool. And the scraping should be done with a very light hand, so that its effect on the surface could not be detected by the finger ends.

Some very unique work, partaking of the scraping process, was noticed lately in a shop where fine machine tools are made. The scraper was formed with very fine teeth. It was forged from a three-eighths square bar of fine steel of the proper length for use, the end flattened slightly and turned at right angles, the angular portion projecting perhaps one-eighth of an inch. This portion was ground, milled, or filed to an edge, and then was chased on a "hob," or master tap of fine thread, from a pitch of 60 to one of 100 to the inch. The tool was then hardened and drawn to a straw color. The size here designated may be varied at will; indeed, to do the best work several sizes are necessary. Following graceful curves, these tools will produce a series of fine parallel lines suggesting the engine turning on the backs of watches. The surface for this work should be finely finished and polished.

Some acids judiciously applied produce fine effects. Etching in patterns ought to be confined to finished steel, wrought iron, copper, brass, and bronze; when used on cast iron for pattern work, the acid will not leave clean lines. Ordinary etching in pattern is done by cleaning the surface with lye, then covering it with engravers' etching ground, made of Venice turpentine, Burgundy pitch, and spirits of turpentine. It may be obtained ready prepared at supply stores for engravers and for calico printers. Or a coat of common beeswax melted and rubbed on with a cloth or applied on the heated work, if heating is feasible. The pattern is made through the resistant etching ground by means of suitably shaped steel points, hard enough to scratch the metal. Then equal parts of sulphuric and nitric acids, with twice their combined volume of water, or more, if the metal is soft like copper, are mixed and applied to the work. The pattern will be etched after an hour's exposure, the resistant defending the finished portions.

Lemon juice is very effective on a surface of cast iron, and its result is quite elegant. It turns the portion of polished cast iron to which it is applied to a bronze black, and when touched over with shellac will absorb a sufficient amount of the varnish to preserve it. To many, lemon juice would seem to be a weak and ineffective acid for metal; but every one knows how quickly a knife blade of steel will blacken when used to cut a lemon. The writer has a lemon squeezer made of cast iron, zincked, which with use has a hole eaten through it half an inch diameter, by the action of the acid. The darkening of polished iron by this citric acid is very beautiful.

THE first shipment of Alabama coal to a foreign port was made from Mobile to Cuba last week by schooner.

### The Patent Office Business of 1885.

According to the recently submitted report of the Commissioner, covering the business of the Patent Office for the last calendar year, it appears that there were 24,233 patents and reissues granted in 1885, as against 20,413 in 1884, and 22,383 in 1883. The States represented by more than 1,000 patents each were New York, 4,532; Pennsylvania, 2,454; Massachusetts, 2,243; Illinois, 1,907; Ohio, 1,837; New Jersey, 1,115; and Connecticut, 1,011. The patents issued to citizens of foreign countries numbered 1,549. The total expenditures on account of the office were $1,024,378.85, and the receipts were $1,188,089.15, or a surplus for the year of $163,710.30. The accumulated surplus in the treasury of the United States on account of the Patent fund amounted, Jan. 1, to $2,945,405.58, there having been but seven years since 1838 which failed to add to the accumulation.

The Commissioner again points out the great need that there is for more room and a larger force for the proper transaction and prompt disposal of the work of the Patent Office—matters which have been repeatedly brought to the attention of Congress. It is extremely hard to understand the hesitation and apparent reluctance of that body to make the needful provisions for the growing business of the office, while its receipts have been so steadily in excess of the expenditures; and, as this is a long session, it is to be hoped that more careful consideration will be given the subject than it received in the last Congress. The Commissioner further suggests an increase in the price of the *Official Gazette*, which is now twice as large as it was when it was started for $5 a year, and also recommends that the Patent Office itself be intrusted with the photo-lithographic work of printing it, which is now done under contract by outside parties. A laboratory for the special testing of electrical apparatus is likewise suggested as a desirable addition that should be made to the facilities of the office. The inventions coming into the office were, thirty years ago, divided into but thirteen classes, whereas they now comprise 177 distinct classes, and the distinctions which are constantly required to be made have become so nice that the greatest care and skill are necessary to determine accurately what is new and what is old. Congress should no longer trifle with the needs of this important and always self-sustaining department of the Government, and it is hoped the Commissioner's suggestions will be heeded before the session closes.

IN packing bottles in cases for transportation, India rubber bands slipped over them will prevent breakage.

### NIGHT SKY—FEBRUARY AND MARCH.

BY RICHARD A. PROCTOR.

The Great Bear (*Ursa Major*), with its Dipper and Pointers, is now high up in the northeastern sky. The Pointers direct us to the Pole Star, $\alpha$ of the Little Bear (*Ursa Minor*). A line from the Pole Star to the Guardians of the Pole ($\beta$ and $\gamma$) lies in the position of the minute hand of a clock 18 minutes after the hour. The Dragon (*Draco*) extends from between the Bears to the horizon—east of north—where its head with its two bright eyes can be seen.

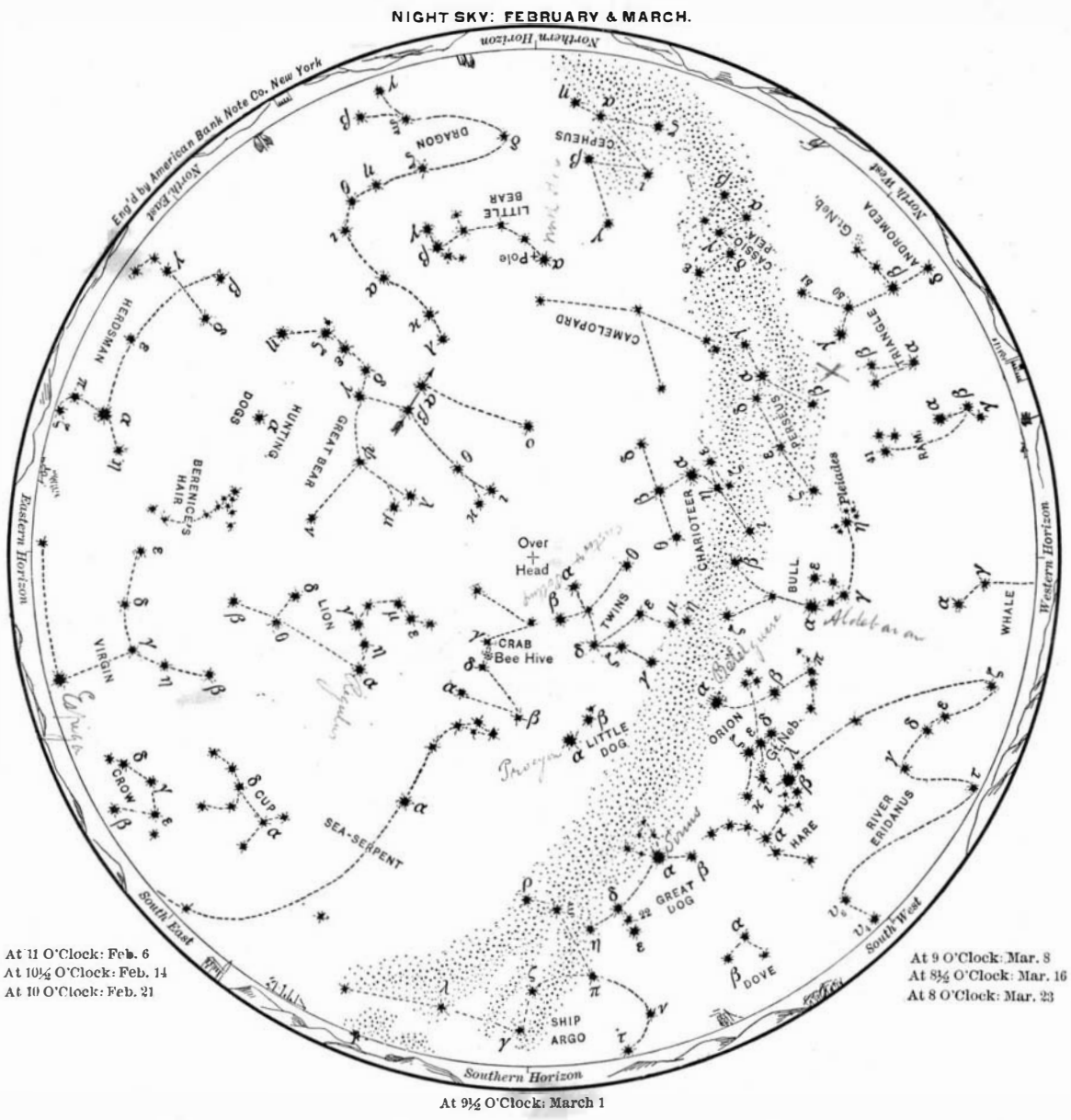
*Cepheus* is low down, somewhat to the west of north; his Queen (*Cassiopeia*), the Seated Lady, beside him ($\alpha$ and $\beta$ mark the top rail of her chair's back); while above her lies the poor constellation *Camelopardus*, the Giraffe.

*Andromeda*, the Chained Lady, is in the northwest, low down—in fact, partly set; the Triangle, and next the Ram (*Aries*), beside her, toward the west. Above them is *Perseus*, the Rescuing Knight; and above him, somewhat to the west, the Charioteer (*Auriga*). The Bull (*Taurus*), with the Pleiades and the bright Aldebaran, is in the mid-heaven, due east; *Gemini*, the Twins, higher, and toward the southwest. Orion, below them, is already slanting toward his grave, low down in the west; beneath him the Hare, and in the southwest a part of the River (*Eridanus*).

Due south is a part of the Star Ship (*Argo*), beside which, low down, is the foolish Dove (*Columba*), while above leaps the Great Dog (*Canis Major*), with the splendid Sirius, chief of all the stars in the sky, marking his mouth. High up, a little west of north, is the Little Dog (*Canis Minor*), and higher, a little east of north, the Crab (*Cancer*), the dark constellation, as it was called of old, with the pretty cluster, *Prosepe*, or the Beehive.

The Sea Serpent (*Hydra*) is rearing his long neck high above the horizon, bearing, absurdly enough, on his back Noah's Cup (*Crater*) and Noah's Raven or Crow (*Corvus*).

Nearly due east, the Virgin (*Virgo*) has risen, Spica shining brightly just above the horizon. The Lion (*Leo*) occupies the midspace above; the "Sickle in the Lion"—its handle marked by $\eta$ and $\alpha$, its curved blade by $\gamma$, $\mu$, and $\epsilon$—will at once be recognized. The Hair of Queen Berenice (*Coma Berenices*) is nearly due east, and fairly high. Between this small but remarkable group and the Great Bear lies Hevelius' foolish constellation, the Hunting Dogs (*Canes Venatici*). Lastly, in the northeast, the Herdsman (*Bootes*), with the orange-yellow brilliant Arcturus, is rising, though at present, paradoxical as it may seem, he lies on his back.




In the map, stars of the first magnitude are eight-pointed; second magnitude, six-pointed; third magnitude, five-pointed; fourth magnitude (a few), four-pointed; fifth magnitude (very few), three-pointed; counting the points only as shown in the solid outline, without the intermediate lines signifying star rays.

### A Georgia Willow Farm.

About a mile below the city of Macon is the osier willow farm of Mr. I. C. Plant, which has been visited by a correspondent of the *American Druggist.* The willow switches, at the end of two years, are from four to seven feet long, and are cut and gathered into bunches like sheaves of wheat. In the stripping building they are steeped in water, and the bark at the larger end loosened for a couple of inches by machinery. The leaves and bark are then removed by a little machine devised by Mr. Plant. One by one the switches are placed in the mechanical stripper, and with a pair of pliers are pulled through with a sudden jerk. They are then wiped off with a woolen cloth, bundled, and laid away to dry.

All the leaves and bark are dried and baled. They are used for medicinal purposes, and command a price of twenty-five cents a pound. There are at present 400,000 willows growing on the farm, and 80,000 additional slips have recently been set out. The entire levee is to be eventually covered with them, when sixty acres will be devoted to this single crop. The average yield is a ton to the acre. When dried, the willows command $200 per ton, and find a ready market.