=

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

NO. 361 BI	KUADWAY,	NEW	IOKK.
	<u> </u>		<u>.</u>

A. E. BEACH.

	υ.	D. MUNN.	
_			 2

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, six months, for the U.S. or Canada.... 1 50 One copy, one year, to any foreign countrybelonging to Postal Union, 4 00 Remit by postal or express money order.

Australia and New Zealand .- Those who desire to receive the SCIENTIFIC AMERICAN, for a little over one year, may remit \$1 in current Colonial bank notes. Address

MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, \$5.00 a year, for U. S. and Canada. \$6.00 a year to foreign countries belong. ing to the Postal Union. Single copies, 10 cents. Sold by all newsdealers

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, to any address in U.S. or Canada, on receipt of

The safest way to remit is by draft, postal order, express money order, or registered letter

Australia and New Zealand,-The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for a little over one year on receipt of \$2 current Colonial bank notes.

Address MUNN & CO., 361 Broadway, corner of Franklin Street, New York

NEW YORK, SATURDAY, APRIL 14, 1888.

Contents.

(Illustrated articles are n	narked with an asterisk.)
Air pump governor, improved* 233	Life saving apparatus fo
Anoys, facts relative to, curious 202	Tools and plane combine
Aqueduct, Roman, at Mines 201	LOCK and alarm. combina
Balance piston ring packing, im-	Man, coming, educate th
Proved*	Mortar, materials for, te
Bale ejecting attachment for	Motor, electric
presses	Notes and queries
Beit tightener, improved* 220	Paint brushes, clamp o
Books and publications, new 234	IOr"
Breato, the numan	Photographic notes
Bridge 2,000 years old*	Pigeons, carrier, naval.
Brighton Beach Hoter moving	Finter, centenarian
the*	Quieting waves in storm
Business and personal 234	10r*
Car coupling, improved* 228	Rabbits, Australian, and
Celestial world, the	Railway, ship, Venetian.
City of Nimes, ancient* 231	Rat plague in China
Correspondence	Renovating garments,
Corrosion of ships' bottoms 232	for, improved*
Draught attachment for plows,	Safes, unsafe
improved* 227	Sculptor's casts at auction
Dynamo, principle of, experi-	Sleigh knee, improved*
ments illustrating* 233	Spring for side bar vehi
Guns, internal strains of 229	proved*
Harra, costly, in New York	Steamship City of New
howses 232	Steel. manufacture of
Horses, wild, of Nevada 227	Telephone, Reis
Hot water, Boston 230	Telephoning, long distar
Inventions, engineering	Tension device for loo
Inventions, index of	proved*
Inventions, mascellaneous 234	Typewriter of 1829
Inventor, the professional	Wates, non-magnetic, W
Ivy poisoning, hot water for 229	Watches, testing*
Jewels, rendering phosphores-	Women, successful
cent 233	-

Life saving apparatus for use at for*..... tographic notes..... eons, carrier, naval... nter, centenarian 227 225 230 228 Quieting waves in storms, device

PAGE

TABLE OF CONTENTS OF SCIENTIFIC AMERICAN SUPPLEMENT

No. 641,

For the Week Ending April 14, 1888.

Price 10 cents. For sale by all newsdealers

. 10244

. 1024

1023

engines. Triple Thermic Motor. By CHARLES H. HASWELL. Descrip-tion, operation, and results of a single expansion, non-condensing steam engine, supplemented by evaporation of bisulphide of car-bon. 10236

Scientific American.

A VENETIAN SHIP RAILWAY.

An interesting achievement of the fifteenth century was recently described by Mr. E. L. Corthell before the Engineers' Club of Philadelphia. Brescia, an inland city of immense strength, was besieged by the Milanese. Upon Lake Garda near it were the fleets of the besieging forces. About a hundred miles distant was Venice, apparently unable to cope with the problem of relieving Brescia. An engineer named Sorbolo proposed to the Doge and Senate to take a fleet of warships up the Adige to the limit of navigation and thence to transport them overland to Lake Garda. By exhibiting a model of his proposed apparatus, he succeeded in ing the star as he passes. The following is the order inducing them to try his project. A fleet of two first- of position of the eight planets and stars that shine class and four second-class galleys and of twenty-five like golden beads on and near the ecliptic : Antares, light barques was prepared, armed, and provisioned. They were taken up the Adige against its impetuous and Saturn. current until the point nearest the lake was reached. to effect this for each galley, but once on the level half that number could draw the largest ship. The ground was frozen hard, and for thirty miles was level, and the galleys were drawn in an imposing procession by nearly three thousand oxen over the thirty miles until Mount Pineda was reached. The army accompanying the ships were provided with tools, crowbars, shovels, and the like, so as to remove obstructions. When Mount Pineda was reached, a roadway was made over it, and by windlasses the ships were hauled up on one side and lowered down the other, only one coming to grief. As they ascended they were wedged foot by foot to prevent an escape. On the descent the one unfortunate vessel broke loose and was dasned to pieces. The other vessels accomplished the descent in safety and crossed the remaining space of 12 miles, and in February, 1439, the entire fleet was afloat on the waters of Lake Garda. A second fleet was successfully sent there by the same route a year later. The work was done under the superintendence of Sorbolo, the originator of the scheme.

The vessels were of no inconsiderable size. The largest were nearly 150 feet long and about 40 feet wide. is only slightly elliptical, but the orbit of Mars is The success of such an operation before the days of more elliptical than that of any of the planets exceptsteam and railroads is an augury for the success of ing Mercury. It will readily be seen that when the ship railways. In the four and a half centuries that earth is at or near aphelion, or the greatest distance have elapsed since then, the size of ships has not in- from the sun, and Mars, at the same time, is at or creased so rapidly as have the resources at the disposal near perihelion, or the least distance from the sun, of engineers for their land transportation.

THE CELESTIAL WORLD.

STARS NOW VISIBLE -Four planets and four bright observation. stars may now be seen near the ecliptic or sun's path in the heavens, the broad curve almost spanning the sky. The planets are Jupiter, Mars, Uranus, and Saturn. The stars are Antares, Beta Scorpii, Spica, and Regulus. Observers may easily trace these shining mysteries for themselves on clear, starlit nights, for they are all, with the exception of Uranus, easy to find, and, when once learned their names and traced out their position in the heavens. They will appear to rise about four minutes her orbit, so that by the middle of May the starry circlet may be seen as soon as it is dark enough for the stars to come out.

An observer who would see the celestial exhibition must command an unobstructed view of the sky from the southeast to the northwest horizon. If he commences his observations about the middle of April, at Beta Scorpii form a group of surpassing brilliancy.

first group, near the meridian, he will see a large white covering a couple of satellites.

farther northwest. Saturn will set in the middle of the month about half past 1 o'clock in the morning, and until that time the eight stars and planets will remain an unbroken curve. The order of observation may be reversed, beginning with Saturn and ending with Antares. The fixed stars apparently never change their places. The planets are always on the move, thus adding variety to the celestial pictures that on clear nights reward the upturned gaze. Planets and stars retain the same order during April, but in May a change comes, Mars overtakes and passes Uranus, and Jupiter overtakes and passes Beta Scorpii, almost graz-Jupiter, Beta Scorpii, Spica, Mars, Uranus, Regulus,

THE OPPOSITION OF MARS .--- On the 11th of April, at Here they were placed on cradles while afloat, and by 1 o'clock in the morning, Mars is in opposition with the power of a regiment of oxen were drawn up the in- the sun, "opposite" to him in the heavens, rising at cline to the plain. Six hundred oxen were required sunset, and is in a straight line with the earth and sun, the earth being in the middle. The epoch is most interesting to terrestrial observers, for, if anything of importance is learned about our brother planet, the discovery will probably be made when he is in opposition, or nearest to the earth. These epochs in Martian history do not occur as often as might be desired, for 780 days, or 2 years and 50 days, must elapse before Mars, having passed one opposition, comes round to another, and 15 years must intervene between the oppositions when Mars is seen under the most favorable conditions. The opposition of 1877 will long be memorable for the discovery of the two tiny moons of Mars, made by Professor Hall with the Washington telescope, at that time one of the largest refractors in the world.

An opposition under similar favorable conditions will occur in 1892, when Mars may be said to have completed a 15 year cycle, and come round to a point where he is about as near to us as possible, or 35,000,000 miles distant. The ellipticity of the orbits of the earth and Mars accounts for the varying distance of the planets at different oppositions. The earth's orbit the planets will be at their nearest point of approach. This combination of aspects occurs at the end of every 15 years, and the year 1892 will bring our ruddy neigh-A NOTEWORTHY COLLECTION OF PLANETS AND bor to view under the best conditions for terrestrial

> Meantime the opposition of 1888, if not the best, is better than that of 1886. Mars is near enough for us to see his moons, his divisions of land and water, the clouds that float in his atmosphere, his snowy pole, his curious double canals, and bright spots.

A somewhat startling coincidence has been noticed by a correspondent of L'Astronomie between the found, will be a source of satisfaction to those who have Martian canals and the lunar circle of Plato. The writer says a marked resemblance exists between the drawing of the canals of Mars made by Schiaparelli, of earlier every night, on account of the earth's motion in Milan, and the drawings of the lunar circle of Plato made by Stanley Williams, of England. The mysterious duplication of the canals is almost exactly reproduced, as well as the brilliant spots that have so puzzled astronomers. If farther investigation confirms this observation, it is possible that the inhabitants of this planet may watch the progress of inevitable decay on our smaller outside neighbor, as well as the progress of half-past nine o'clock in the evening on a clear night, development on Jupiter, the giant of the system, before he will find a radiant star looming above the south- the period of terrestrial culmination has passed, and eastern horizon. This is Jupiter, the prince of planets, the earth's cooling process has perceptibly advanced. the largest and brightest of the 3,000 stars visible in the ! Mars in decadence, Jupiter in development, and the firmament. He will be closely followed by a red star, earth in the perfection of animate life are but three Antares, the leading brilliant of Scorpio, while near on phases of the physical history of the material universe. the northwest shines a yellow star of the second magni- | We trust the great eye of the Lick telescope will scan the tude known as Beta Scorpii. Jupiter, Antares, and round, red face of the planet Mars at the present opposition, and win immortal fame by solving the problem If now the observer glance to the northwest of the of the double canals and bright spots; or, at least, dis-

V. GEOLOGYThe Petroleum Deposits of GaliciaAccount of	star with a silvery tint. This is Spica, the leading	
theselittleknown petroleum fields.—1 illustration 10245	brilliant of Virgo, while northwest of Spica and near to	The Human Breath.
by Injection of Gutta Percha SolutionBy D. R. JENNINGS,	it gleams the red planet Mars, superb in tone, tint, and	Professor Brown-Sequard has recently been making
D.D.S.—An interesting operation for curing these annoying ab- scesses	martial aspect, having just passed opposition. A prac-	experiments to determine whether the human breath
The Management of Simple Constipation.—Simple, practical, and concise rules for treatment of this complaint as formulated	ticed eye will be required to detect the planet Uranus	was capable of producing any poisonous effects. From
by Sir Andrew Clark	about 4° west of Mars and 1° southwest of Theta	the condensed watery vapor of the expired air he ob-
NEWTH, M.DA suggestion for treatment of rabies	Virginis. Uranus shines as a star of the sixth magni-	tained a poisonous liquid, which, when injected under
VII. METALLURGY.—Pig Iron–Including the Relation between its Physical Properties and its Chemical Constituents.—By ALEX. E.	tude, and is barely visible to the naked eye. A tele-	the skin of rabbits, produced almost immediate death.
OUTERBRIDGE.—Report of a Franklin Institutelecture of interest, both scientific and popular.—4 illustrations	scope will quickly bring him to view as a tiny sphere	He ascertained that this poison was an alkaloid, and
VIII. MISCELLANEOUSHudson River Ice YachtsA table of	of a delicate green tint.	not a microbe. The rabbits thus injected died without
dimensions and rigs of the North River ice boats	If the eve be turned still farther to the northwest,	convulsions, the heart and large blood vessels being en-
Metallic BedsteadsMetallic bedsteads of simple design and	beyond the meridian. Regulus will be seen, the next	gorged with blood. Brown-Sequard considers it fully
The Argentine Republic as a Wheat Field.—A review of the	star in the curve or arc and close to the ecliptic. He	proved that the expired air, both of man and animals,
ities	will readily be recognized as the bright star in the	contains a volatile poisonous principle which is much
IX. NAVAL ENGINEERINGThe Inman Steamer City of New	handle of the Sickle.	more deleterious than carbonic acid.
culiarities, and comparison with her principal competitors4 il-	The planet Saturn forms the eighth and last star in	
X ORDNANCE H M S Edipburgh at Tornedo Practice - A sham	the curve. He is the first bright star northwest of	SQUIRE WHIPPLE, the well known civil engineer and
battle on the Mediterranean.—The ship and her armament.—1 il-	Regulus shining with a soft, serene light that distin-	authority on iron bridge construction, died on the 15th
YI TECHNOLOGY - An End of the Alkali Waste - A highlyinge.	guishes him from a fixed star, and following in the	of March, at his residence in Albany, after a brief ill-
nious way of disposing of the sulphide of calcium waste from soda	wake of the twin stars Castor and Pollux, who are still	ness, in the 84th year of his age.
DI FINS		• • 5