March 8, 1879.

Scientific American. ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT NO. 37 PARK ROW, NEW YORK.

A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN, .. \$3 20 One copy, one year, postage included One copy, six months, postage included 1 60

Clubs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five-subscribers at \$3.20 each; additional copies at

same proportionate rate. Postage prepaid. IF Single copies of any desired number of the SUPPLEMENT sent to one address on receipt of 10 cents.

Remit by postal order. Addres

O. D. MUNN.

MUNN & CO., 37 Park Row, New York.

The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLE IENT is issued weekly. Every number contains 16 octavo bages, with handsome cover, uniform in sizewith SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, \$5.00 a year, postage paid, to subscribers. Single copies 10 cents. Sold by all news dealers throughout the country.

Combined Rates. - The SCIENTIFIC AMERICAN and SUPPLEMENT will he sent for one year, postage free, on receipt of seven dollars. Both papers to one address or different addresses, as desired. The safest way to remit is by draft, Postal order, or registered letter

Address MUNN & CO., 37 Park Row, N. Y.

Scientific American Export Edition.

The SCIENTIFIC AMERICAN Export Edition is a large and splendid per-odical, issued once a month. Each number contains about one hundred iodical, issued once a month. large quarto pages, profusely illustrated, embracing: (1.) Most of the plates and pages of the four preceding weekly issues of the SCIENTIFIC AMERICAN, with its splendid engravings and valuable information; (2.) Commercial, trade, and manufacturing announcements of leading house Terms for Export Edition, \$5.00 a year, sent prepaid to any part of the world. Singlecopies 50 cents. 17 Manufacturers and others who desire to secure foreign trade may have large, and handsomely displayed announcements published in this edition at a very moderate cost.

The SCIENTIFIC AMERICAN Export Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN & CO.. S7 Park Row, New York.

VOL.	XL.	No. 10	. [New	SERIES.	Thirty-fo	urth Ye	ar.
N	VEW	YORK	, SATU	RDAY,	MARCH	8, 1879.	
Contents,							
	(I1)	ustrated a	rticles are	marked w	ith an asteri:	sk.)	
Arsenic, Astronor Australia Axles, bu Battery, Binders, Carbon, a Dock, flo Diphther: Educatio Exhibitio Exhibitio Experimc Electric I Fire, was Forests. Honey, w Inventior Inventior Inventior Inventior Inventior	effect on nical no nical no nical no nical no kgy, s Leclan wire, tr tating, of ating, of	of on the lotes. rs. rs. rouble within the fill rouble within the fill ro	5 15 14 14 14 14 14 15 15 15 15 15 15 15 15 15 15	 Magneti 2 Mattress Mattress Monitor Manufaa Motor, n Machine Mctals, 2 Metals, 3 Motor, 6 Neptune Patent b Reportir Rubsor, 4 Rubsor, 4 Stubsor, 4 Stubsor, 4 Stubsor, 5 Testing 	New York C c-motor dece ses, life-savit, threast threast threast tarers' trouble tarers' trouble threast threast threast threast threast threast threast threast watcher, sw till No, 300 ig machine notes threast threast stubus [22] ooden, how r educated machine, granite f steam [2]	ption, Gary ag tes in Engl' y's" Engl' y's" engl' p'e mode o w temp.	7. 14 14. 14 15. 15 15. 15 15. 15 15. 15 15. 14 14. 14 15. 15 15. 14 15. 15 15. 1

TABLE OF CONTENTS OF THE SCIENTIFIC AMERICAN SUPPLEMENT No. 166,

For the Week ending March 8, 1879. Price 10 cents. For sale by all newsdealers.

Price 10 cents. For Sale by an newsaceners.
I. ENGINEERING AND MECHANICS, The Wonderful Railways of Peru. Lima and Callao Railway. The Callao Lima, and Oroya Railroad. Lima and Pisco Railroad. Pisco and Ica Railway. Mollendo and Arequipa Railway. Juliaca and Cuzo Railroad. Ico and Moguegua Railroad. Arica and Tacaar Railroad. Iquique anna Ia Noria Railroad. Arica and Lamas Railroad. Cost. condition. and other particulars of these Railways, with Interesting Descriptions of the Country through which they run. New French Tank Jacomotice. Particulars and Full Dimensions, with Elevation to Scale. – Influence of Railways.

Reilways, tan Fine Booles, and Anartment House. With one

11. 111

of Muchinery. ARCHITECTURE — Drainage of an Apartment House. With one figure, showing the Entire System. . TECHNOLOGY. — An Australian Wheat-stack of thirty-five thousand Bags, with an illustration from a photograph. The Sugar-beet Industry. From an address by EnNEST TH GEN-NERT. before the State Agricultural Society of New York. The great fault of American Farming 3000 from one acre of beets. Success of the Maine Beet-Sugar (ompany. The American Beet richer than the European. Process of Drying Beets, as practiced by the Maine Beet Sugar (ompany. Protits of Beet-raising in Europe. Holler Mills. With 3 figures. Explosions from Combinstible Dust. By Prof. V. W. PECK. A Lee-

Explosions from Combustible Dust. By Prof. L. W. PECK. ure before the Millers of Minneapolis. Combustion and E recisely the same theorem. A Lecly the same phenomenon. Experiments on the Explosion ly the same phenomenon. Experiments on the Explosion of Starch, and Mill Dust. The Dynamic Energy of Mill Dust. 4

s. rrard-Parfaite's Improved Wool ('arding Machine. 2 engravings sibilities in Gas Lighting.—Beet-Root Photographs.

GARY'S MOTOR

contained in an article in the March number of Harper's tion of the force of magnetism in the invention of Mr. Gary." Magazine, can readily believe in the wonders of that division outshines the sun, and the cats have the power of clephants. Hc can, moreover, add to this belief a feeling of utter conished by the simplest use of tenpenny nails and a few magnets combined with the use of a piece of sheet iron.

by one whose own statements show that he has no knowledge of the subject of which he speaks.

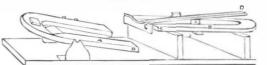
Mr. Gary's discovery of the neutral line is not a discovery.

as to take advantage of the attracting force of gravitation. Hold a horseshoe magnet in a vertical position, and move a piece of sheet iron with an attached nail to and from the poles of the magnet. It will be found that there is no neutral line where the nail drops off. Vary the experiment by substituting an iron wire for the piece of sheet iron, and with an attached nail explore the space in front and beside the poles, and it will be found that the nail shows

no evidence of a neutral line. Slip a small coil of wire wire away from complete contact with the poles; no such change of deviation will be perceived.

In Fig. 2 the magnets arc set in motion by vibrating, with the aid of a lever, a piece of sheet iron, so that it may "move





on the neutral line," as the writer in Harper expresses it. This acts as a cut-off, and one of the two opposing horseshoe compass needle directly in front of one of the poles of the noted for hasty and ill-considered legislation. horseshoe magnet. The compass needle will be strongly at-

these well known facts; for it may be said, "Explain the He who credits the statements concerning Gary's motor, neutral line as you may, there is still an important applica-It is said that this little motor requires a careful adjustment of China where the rivers run up the mountains, the moon of the fine pivots upon which the movable magnet turns, and particles of dust are sufficient to bring it to rest. The excursions of the so-called cut-off are limited to the one twenticth tempt for scientific men. Faraday, Rumford, Joule, and or one thirtieth of an inch, and a fine adjustment is also Helmholtz have lived in vain. Their work can be demol- needed here. This is the motor which is to produce the electric light and to drive locomotives across the continent. The line of argument of the inventor's friends is very strik-It would be difficult to find such utter ignorance of the ing, and deserves notice. In the article in Harper, which first principles of science as is contained in this article on we have taken as our text, the writer says: "To gain a large Gary's motor; it encourages men to spend time and money amount of power the inventor would place groups of comin fruitless effort, and at the same time to despise all train- pound stationary magnets above and below the beam at each ing. The allegation is made that scientific men are slower side, and the soft iron induced magnets, in this case four in than the general public to acknowledge a new step in ad- number, connected by rods passing down between the poles vance; and the discovery of the neutral line, the principle of the stationary magnets. A 'pitman' connecting the beam of Mr. Gary's motor, together with the near possibilities of with a flywheel to change the reciprocating into a rotary mothe grand discovery, are affirmed in an ex cathedra manner tion would be the means of transmitting the power. With magnets of great size an enormous power, he claims, could be obtained in this way."

This is the old, old fallacy; and is always stated in this There is no neutral line in the sense that the polarity changes way: "A small magnetic motor will run and produce a when Mr. Gary moves his piece of sheet iron with its at- comparatively great result, a large one will necessarily give tached shingle nall across the pole or near the pole of a mag- a corresponding increase of power." This is not true; there nct. The most delicate instruments fail to detect such a is a limit beyond which one cannot pass. One can see this change of polarity. Mr. Gary is perfectly right in his de- even in magnetizing pieces of steel of various sizes and in scription of the behavior of the nail: at a certain point it the construction of dynamo-electric machines. In regard to leaves the sheet iron and falls to the ground, simply because, the use of Mr. Gary's motor in producing the electric light by reason of its approach to the attracting pole, it tends to we have no hesitation in pronouncing upon its utter incomfly to it; but in leaving the piece of sheet iron, the force petency for such a purpose. It is in the discussion of the of gravitation acts more strongly than the force of attraction possibilities of the new motor that the writer in *Harper* is of the pole of the magnet, and the nail consequently falls to 'most eloquent, and we do not know which to wonder at most, the ground. It is well known that the force of magnetic at- the exuberance of his imagination, his moral courage in the traction decreases very rapidly with the distance. A small contempt of the authority of science, or the naïveté of his nail can fall across the pole of a very strong magnet within a utter ignorance. He says, speaking of the electric light quarter of an inch of the pole, and yet the force of gravita- which is produced by this motor: "An enormous volume tion asserts its stronger claim and the nail will not be diverted can be secured with an expenditure of force so diminutive to the magnet. It will be noticed that Mr. Gary's models, that a caged squirrel might furnish it. With the employwhich are figured in the article in Harper, are so arranged ment of one of the smallest of the magnetic motors, power may be supplied and electricity generated at no expense beyond the cost of the machine." This statement requires no comment. The writer further says: "Professors from Harvard and from the Massachusetts Institute of Technology called, examined, and were impressed." It is true that only one professor from Harvard called, examined, and was not impressed: for the motor had just been taken to pieces and was not in a condition to run; moreover the professor does not believe that it willrun except for a short space of time. The only way that it could run would be by weakening it or using up the potential energy of the permanent magnets, and allowing the earth's magnetism to replace it. If such a toy could be made it would have great scientific interest; it would not contain the idea of perpetual motion, for it would be the employment of the magnetism of the along the wire or sheet iron, and connect its terminals with earth, just as we employ the force of the winds. We should a delicate galvanometer; if there is any change of polarity, be delighted if Mr. Gary has done this; and a scientific the galvanometer needle should be diverted first in one di-reputation would be within his grasp. There is no evirection, then in another, as you move the sheet iron or the dence, however, that he has really made such a toy. We have called it a toy; for as a motor it could not do any apprecia-

SENATE PATENT BILL NO. 300.-SHALL IT PASS THE **HOUSE OF REPRESENTATIVES?**

ble amount of work except in a romance of Jules Verne.

The term of the present Congress is rapidly drawing to a close, and little time is left for the friends of industrial progress and the rights of inventors to express their disapprobation of the obnoxious clauses of the new Patent Bill (Senate Bill 300).

We are informed, by parties whose knowledge and integrity cannot be questioned, that the concerted plan of the promoters of the bill is to allow no further discussion magnets drops from its former position, where it was held of it, but to await a favorable moment for their scheme, and by mutual attraction. Let us see what is the cause of this rush it through during the last days of the session in the action. Place a horseshoe magnet on the table, and bring a hurry and excitement preceding adjournment-a period

We are confident that, were time enough allowed for all tracted to the neighboring pole. Now bring a thin piece of the members to become thoroughly informed in regard to iron in front of the poles of the horseshoe magnet and be- the mischievous tendency of several of its provisions, tween them and the compass needle; the latter will immedi- the bill would be overwhelmingly defeated; but there would ately dip, and will have its attraction for the pole of the seem to be no time for that now. It is too late for extended horseshoe magnet diminished, not because the sheet iron acts arguments against the impolicy of crippling and discouragas a cut-off for magnetism, but because the poles formed by ing the class of men who (as all parties acknowledge) have induction in the thin sheet iron are nearer the end of the been and are one of the great motive forces of national compass needle, and accordingly exert their influence. Here progress: too late for elaborate protests against the threatwe see again the effect of proximity. Magnetic action acts ened invasion of the constitutional rights of inventors, and through very short distances, and the nearest magnetic mass the disorganization of our industries by the legalizing of exerts more influence than a remoter one, which may never- infringements. But it is not too late, we trust, for an effective exprestheless be the stronger magnetic body. Mr. Gary experiments with a box compass. The indications obtained in this sion of popular disfavor-by telegraph. Disregarding the way are apt to be very misleading, and the use of such a slow formalities of memorials and like communications by method was abandoned by scientific men more than forty mail, all who regard the inventor as more worthy of enyears ago. The friends of the new magnetic motor have only couragement and protection than the infringer, should to consult the experiments of Jamin, of Dub, and a host of promptly avail themselves of the means which invention others to discover that what are claimed to be new facts have has provided for such emergencies, and telegraph their long been known and discussed under the head of distribu- disapproval of Senate Bill 300. No member not already tion and redistribution of magnetism caused by armatures to known to be opposed to the bill should be left a moment in magnets and the presence of iron in the neighborhood of doubt as to the feeling of his constituents. The changes magnets. Abundance of time and patience to look up the which the bill would make in the spirit and the ruling of the subject will be needed, for the literature of the subject is im- patent system, should it become a law, are fatal; and no surer means could be devised for preventing its passage mense

Fig. 1.

n

144

- Possibilities in Gas Lighting.—Beet-Root Photographs.
 IV. ELECTRICITY, LIGHT, HEAT, ETC.—A Few Experiments with the Induction Coll. By GEO. M. HOPKINS. With Hafgures. Path of the electric spark intermica. Electric discharge over mica. Experiments with a Rotating Disk; the Leyden jar: and a Pulminating Pane. Gas Platol. Stateham's Fuse. A series of simple and brilliant experiments. Apparatus for Decomposing Water. Numerous forms of Geissler's Tubes. Gassiot's cascade. Electric eggs.—A Simple Electric Pen. 1 figure.— Autographic Telegraphy. M. D'Arlincourt's Apparatus. 1 igure.— / engraving
- heuro-Autographic Telegraphy. A. D'Annuelle applications engraving. MEDICINE AND HYGIENE-The Pathology of Typhoid.-Notes on Peroxide of Iron as a Disinfectant and Deoidorant. By John DAY. M. D. A paper read before the l'harmaceutical Society of Victoria.-The Ear in Italita in Disease. Curable and Preventable Deafness. W. S. BOWAY, M. D. Apatomy of the ear The external. Middle. and internal ear. The coorlies and the arches of Corti.-Waxin the Fars. On the Cerebral Symptoms Produced by Impacted Cermen, By WILLIA A. ANNOND, M. A paper read before the New York Neurological Society. Three interesting cases of patients who were treated for mental hallucinations, and were finally cured by the re-moval of cerumen. 'ure of Symblepharon. By A. W. CALHOUN, M. D.-Feeding by the Nose. By T. NEWINGTON, M. D. 1 figure.-Obesity. How caused. How Cured.-The Poison Glands of the Centipede.
- How caused. 'How cured.-The Poisson Glands of the Centipede. A GRI('ULTURE, HORTICULTURE, ETC.-Farm Law. Address of Hon. EDMUND H. BENNET before the Massachusetts State Board of Arriculture. How Juy a farm. How far the farm extends. Im-ponds and lakes. 'The boundary is in streams. farm includes. Rights boundary on the sea-shore. What a deed of a farm includes. Rights in the road. Farm fences. Stray cattle. Fences malls. Dogs. 'Impounding cattle, The farmer's liability for his anl-ground water. 'Increasing on the farm. Hunting and fishing. Fruit water culture informany. Crops grown from chemicals.' How culti-tores the fertility. How to fid what kine of fertilizer your farm needs. Experiments.-Destruction of Insects. 'Market Law. Experiments. The formes to Crack. Ry P. H. Watt. 'Market Law. Experiments. The State. Ry P. H. Watt. VI.

VII. MISCELLANEOUS.-A Nut for Congress to Crack. By P. H. WAIT. -Effect of Ocean Currents.

Let us now consider the possibilities of the application of . than an electric expression of popular will against it.