

— Barnicott & Son, Taunton, England, have issued another edition of their useful "Country Gentleman's Reference Catalogue to the Best Works on Agriculture, Botany, Natural History, Sporting, Recreations, Domestic Management, and Kindred Subjects."

— Sir Morell Mackenzie, in the *Contemporary Review*, in writing of stimulants and the voice, says, "Tobacco, alcohol, and fiery condiments of all kinds are best avoided by those who have to speak much, or at least they should be used in strict moderation. I feel bound to warn speakers addicted to the 'herb nicotian' against cigarettes. Like tippling, the effect of cigarette-smoking is cumulative, and the slight but constant absorption of tobacco juice and smoke makes the practice far more noxious, in the long-run, than any other form of smoking. Our forefathers, who used regularly to end their evenings under the table, seem to have suffered little of the well-known effects of alcohol on the nerves; while the modern tippler, who is never intoxicated, is a being whose whole nervous system may be said to be in a state of chronic inflammation. In like manner cigarette-smokers (those, at least, who inhale the smoke, and do not merely puff it 'from the lips outward,' as Carlyle would say) are often in a state of chronic narcotic poisoning. The

old jest about the slowness of the poison may seem applicable here; but, though the process may be slow, there can be little doubt that it is sure. Even if it does not kill the body, it too often kills or greatly impairs the victim's working efficiency and usefulness in life. The local effects of cigarettes in the mouth must also be taken into account by those whose work lies in the direction of public speech. The white spots on the tongue and insides of the cheeks, known as 'smoker's patches,' are believed by some doctors with special experience to be more common in devotees of the cigarette than in other smokers. This unhealthy condition of the mouth may not only make speaking troublesome, or even painful, but it is now proved to be a predisposing cause of cancer. All fiery or pungent foods, condiments, or drinks tend to cause congestion of the throat; and, if this condition becomes chronic, it may lead to impairment, if not complete loss, of voice. The supposed miraculous virtues of the mysterious possets and draughts on which some orators pin their faith exists mainly in the imagination of those who use them: at best, they do nothing more than lubricate the joints of the vocal machine, so as to make it work more smoothly."

**Publications received at Editor's Office,
June 10-15.**

BALZAC, H. de. *Seraphita*. Tr. by Katharine Prescott Wormeley. Boston, Roberts. 275 p. \$1.50.
COCKSHOTT, A., and Walters, F. B. *A Treatise on Geometrical Conics*. London and New York, Macmillan. 205 p. 12°. \$1.25.
CRANE, T. F. *La Société française au Dix-Septième Siècle*. London and New York, Putnam. 342 p. 24°. \$1.50.
HELPS, A. *Essays written in the Intervals of Business*. London and New York, Macmillan. 130 p. 16°. 60 cents.
PAUL, H. *Principles of the History of Language*. Tr. by H. A. Strong. New York, Macmillan. 512 p. 8°. \$3.

WALLACE, A. R. *Darwinism: an Exposition of the Theory of Natural Selection with Some of its Applications*. London and New York, Macmillan. 494 p. 12°. \$1.75.

WRIGHT, G. F. *The Ice Age in North America and its Bearings upon the Antiquity of Man*. New York, Appleton. 622 p. 8°. \$5.

FOR SALE.

Three original drawings by Baron Cuvier. No. 1, in pencil, *The Anatomy of a Snail*. No. 2, in water-colors, *Kingfisher and Insects*. No. 3, in water-colors, *Insects*. The two last were drawn when Cuvier, a lad of sixteen, was at the University of Stuttgart. Price £50. Apply to T. H. H., Office of "Science," 47 Lafayette Place, New York.

Schools.

CONNECTICUT, NEW HAVEN,

MRS. CADY'S SCHOOL FOR YOUNG LADIES. Prepares for Smith and Wellesley, and admits to Vassar by Certificate. Circulars. Early application necessary.

NEW JERSEY, PLAINFIELD.

THE CHESTNUTS.—Parents with daughters to educate, or orphan girls with companion, may find a comfortable home, with school instruction by applying to Miss E. E. Kenyon.

NO. 1. NOW READY.
THE NEW REVIEW.

Edited by Archibald Grove.

CONTENTS FOR JUNE 1889.

GENERAL BOULANGER:—

I. His Case (Written with his authority). By Alfred Naquet (Member of the French Senate).

II. His Impeachment. By Camille Pelletan (Member of the French Chamber).

After the Play. By Henry James.

The Homes of the People. By Earl Compton, M.P.

National Muscle. By Lord Charles Beresford.

The Religion of Self-Respect. By Mrs. Lynn-Linton.

The Unionist Policy for Ireland. By J. W. Russell, M.P.

A Month in Russia. By Lady Randolph Churchill.

Published monthly 15 cents. Yearly Subscription \$1.75.

LONGMANS, GREEN & CO.,
15 EAST SIXTEENTH ST.,
NEW YORK.

Old and Rare Books.

One Million Magazines. Back numbers, vols. and sets—old and new, Foreign and American. CATALOGUE UPON APPLICATION.

A. S. CLARK,
34 Park Row, New York City.

BACK NUMBERS and complete sets of leading Magazines. *Rates low.* AM. MAG. EXCHANGE, Schoharie, N.Y.

Houghton, Mifflin & Co.'s New Books.

Emerson in Concord.

By EDWARD WALDO EMERSON. With a new Portrait. Crown 8vo, gilt top, \$1.75.

A charming book, portraying Mr. Emerson in private life, as "the citizen and villager and householder, the friend and neighbor."

George Washington.

In the Series of American Statesmen. By HENRY CABOT LODGE, author of "Alexander Hamilton" and "Daniel Webster" in this series. 2 volumes, 16mo, gilt top, \$2.50.

Thackeray's Works.

New Illustrated Library Edition.

VANITY FAIR and LOVEL THE WIDOWER. 2 volumes.

THE HISTORY OF PENDENNIS. 2 volumes.

MEMOIRS OF YELLOWPLUSH.

BURLESQUES, etc. 2 volumes.

The first volumes of a very desirable Illustrated Library Edition of Thackeray's Works, to be made more complete than any existing edition, in 22 volumes, with biographical and bibliographical introductory essays.

Crown 8vo, gilt top, \$1.50 a volume.

The Beginnings of New England.

The Puritan Theocracy in its Relations to Civil and Religious Liberty. By JOHN FISKE. With maps. Crown 8vo, gilt top, \$2.00.

Mr. Fiske has here produced a book of equal interest and importance. His conscientious thoroughness of research, his marvellous candor, and the unsurpassed clearness of his style are conspicuous in this work.

Indoor Studies.

By JOHN BURROUGHS. 16mo, gilt top, \$1.25.

CONTENTS: Thoreau—Science and Literature—Science and the Poets—Matthew Arnold's Criticism—Arnold's View of Emerson and Carlyle—Gilbert White's Book—A Malformed Giant—and several briefer essays.

N. B.—The price of Mr. Burroughs's other books, heretofore \$1.50 each, is now \$1.25.

Riverside Library for Young People.

Sterling and interesting books of history, biography, travel, natural history, adventure, etc., written by authors specially qualified, for boys and girls forming private libraries.

1. THE WAR OF INDEPENDENCE. By JOHN FISKE.

2. GEORGE WASHINGTON; An Historical Biography. By HORACE E. SCUDDER.

3. BIRDS THROUGH AN OPERA-GLASS. By FLORENCE A. MERRIAM.

4. UP AND DOWN THE BROOKS. By MARK E. BAMFORD.

With Illustrations. 16mo, 75 cents each.

Picturesque Alaska.

By ABBY JOHNSON WOODMAN. With an Introduction by J. G. WHITTIER, and Illustrations. 16mo, \$1.00.

Mrs. Woodman tells in an entertaining way her experiences and observations during a recent visit to Alaska, and gives no little information which will be useful to Alaska tourists.

HOUGHTON, MIFFLIN, & CO., Boston.

11 East Seventeenth Street, New York.

GUARANTY INVESTMENT COMPANY

CAPITAL \$250,000.

Offices: Atchison, Kan. 191 Broadway, New York. 222 Walnut St., Phila.

Hon. ALBERT H. HORTON (Chief Justice, Kansas Supreme Court), Topeka, Kan., Pres't.

7% Guaranteed Farm Mortgages 7%

The Guarantee Investment Company makes loans upon fertile farms in the choicest portions of Kansas and Nebraska and has adopted the policy of sending a Committee of its Investors each year to examine its loans and methods of business.

The Committee this year consisted of PROF. A. H. BERLIN, Principal of the High School Montrose, Pa., and MAJ. THEODORE L. POOLE, Ex-U. S. Pension Agent, Syracuse, N. Y. Both of these gentlemen are persons of the highest character and have the confidence of the Communities in which they reside.

The Committee has recently returned and has made a very interesting Report upon the general development of Kansas and Nebraska as well as the business of the Company. The Company will be glad to send this Report to any address.

The following names are taken from the long list of Investors in our Mortgages:

(See if Some Friend of Yours is not in the List.)

William A. Cauldwell, 59 Liberty St., N.Y.
Palmer Cox, 658 Broadway, N.Y.
Rev. Jos. H. Rylance, D.D., 11 Livingston Place, N.Y.
Rev. Brady E. Backus, D.D., 360 West 28th St., N.Y.
Rev. R. M. Somerville, 126 West 45th St., N.Y.
Dr. Robert A. Murray, 235 West 23d St., N.Y.
Dr. James P. Tuttle, 136 West 41st St., N.Y.
H. Edwards Rowland, 218 Fulton St., N.Y.
Irving H. Tift, Esq., 271 Broadway, N.Y.
Prof. D. C. Eaton, 55 Pineapple St., Brooklyn, N.Y.
Dr. E. P. Thwing, 156 St. Marks Ave., Brooklyn, N.Y.
Dr. C. C. Miles, Greenport, N.Y.
John V. N. Bergen, Fort Jefferson, N.Y.
Benj. W. Stilwell, Yonkers, N.Y.

R. C. Coleman, Goshen, N.Y.
Mrs. Samuel Carlisle, Newburg, N.Y.
Dr. C. C. Bartholomew, Ogdensburg, N.Y.
Rev. Nelson Millard, D.D., Rochester, N.Y.
Rev. Horace G. Hinsdale, D.D., Princeton, N.J.
Dr. Charles M. Howe, Passaic, N.J.
George A. Skinner, 5 Railroad Place, Newark, N.J.
Dr. Edwin M. Howe, 85 Halsey St., Newark, N.J.
Dr. H. G. Buckingham, Clayton, N.J.
Dr. Martin Cole, Jr., Hainesville, N.J.
Mortgage Trust Co. of Pa., Philadelphia, Pa.
Miss Mary Miller, 1230 Spruce St., Philadelphia, Pa.
Henry D. Biddle, 311½ Walnut St., Philadelphia, Pa.

Dr. Calvin C. Halsey, Montrose, Pa.
Rev. William Baldwin, Great Bend, Pa.
Gen. William Lilly, Mauch Chunk, Pa.
Second Nat. Bank, Mauch Chunk, Pa.
Enos E. Thatcher, West Chester, Pa.
Mrs. Townsend Poore, Scranton, Pa.
Rev. Burdett Hart, D.D., New Haven, Conn.
Dr. Frank H. Wheeler, New Haven, Conn.
Charles R. Christy, Stamford, Conn.
Mrs. Catharine P. Fuller, Woodmont, Conn.
Miss Jessie Henderson, Lenox, Mass.
Dr. M. J. Halloran, Worcester, Mass.
Albert Walker, Bennington, Vt.

Address for Report and Monthly Bulletin

HENRY A. RILEY, General Eastern Manager, 191 Broadway, N.Y.

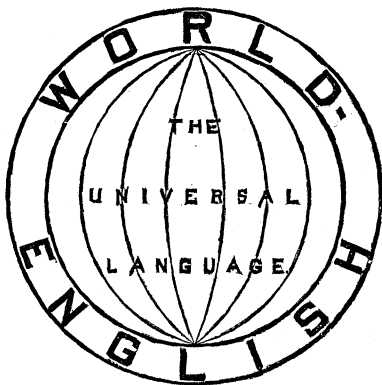
ONE LANGUAGE FOR THE WHOLE WORLD.

WORLD-ENGLISH:

THE UNIVERSAL LANGUAGE. 25 CENTS.

EVERY one has heard of the butcher who, after a long search for his knife, at last found it in his mouth: so speakers of English have been seeking for a universal language, when, lo! it is in their mouths. The intelligibility of English words has been obscured by a dense mist of letters. This is now dispersed by A. Melville Bell, who has already won a world-wide reputation through his invention of "Visible Speech," the great boon to deaf-mutes. Professor Bell calls this new discovery of his "World-English," and the result is a language which cannot fail to meet with acceptance, and at once supersede the supposed necessity for "Volapük," or any other artificial language. No language could be invented for international use that would surpass English in grammatical simplicity, and in general fitness to become the tongue of the world. It is already the mother-tongue of increasing millions in both hemispheres, and some knowledge of the language is demanded by all educated populations on the globe. Social and commercial necessities require that the acquisition of this knowledge shall be facilitated, and it is believed that Professor Bell's invention has removed the last impediment to English becoming the universal language, for which vague desires have long been entertained, although hitherto only futile efforts have been made.

Ex-President Andrew D. White, of Cornell University, says: "I believe that the highest interests of Christian civilization and of humanity would be served by its adoption. China and Japan would be made English-speaking peoples within fifty years, and so brought within the range of Christianizing and civilizing ideas, in the largest sense. All existing missionary work is trivial as compared with this. For your system would throw wide open those vast countries, as, indeed, all the countries of the world, to the whole current of English and American thought."



For Diffusion of English throughout the World

AS
THE UNIVERSAL LANGUAGE

This "Hand-Book of World-English" is the Complete, Simple, and Efficient Medium.

FOREIGNERS

Will Acquire, by Means of this Hand-Book, a
PERFECT PRONUNCIATION OF ENGLISH.

For Primary School Pupils and Illiterate Adults

World-English is a Royal Road to Reading.

To Teachers of English and Modern Languages

This Hand-Book will be of Primary Importance
as a Phonetic Directory.

DEFECTS OF SPEECH

Will be Readily Corrected by Means of the Articulative Directions in this Hand-Book.

HAND-BOOK OF WORLD-ENGLISH,

25 CENTS.

The plan of this little book is altogether new. Letters and sounds are so associated, in all the exercises, that from the mere knowledge of letters a learner cannot fail to pronounce words with certainty. English reading will thus be easily acquired, whether by natives or foreigners, children or adults.

The general resemblance of World-English to Literary English is such that any reader of the latter deciphers the former at sight, or, at most, after a few minutes' study of the new letters. A like result may be anticipated for those who shall learn to read from World-English. They will transfer their power of reading to the literary form of the language, almost without effort. The orthographic aspect of words will, besides, be so fixed in the eye, by contrast, that spelling will be remembered as — what it really is — a pictorial association with words.

No special training is required to qualify teachers for using this book. The subject can even be successfully introduced in the kindergarten and the nursery. This phonetic mode of initiation in reading cannot be too strongly urged on the attention of School Boards on both sides of the Atlantic.

The ordinary orthography of each word is interlined with the World-English version throughout the Exercises and Readings.

So set down, our tongue is the best for the world to unite upon.—*Brooklyn Eagle*.

The idea of Mr. Bell has much to recommend it, and the presentation is charmingly clear.—*American*, Phila.

The result is a language which cannot fail to meet with acceptance.—*Boston Traveller*.

Has the merit of great ingenuity.—*Railway Age*.

His treatise, as a study of English orthoepy, condenses the result of much thought and experience in small compass.—*The Critic*.

World-English deserves the careful consideration of all serious scholars.—*Modern Language Notes*.

World-English is the English language unburdened of its chaotic spelling.—*Popular Science Monthly*.

We commend it to the attention of teachers.—*Ottawa Globe*.

"World-English" and "Hand-Book of World-English" can be had of all booksellers, or will be sent for 50 cents, post free, by the publisher,

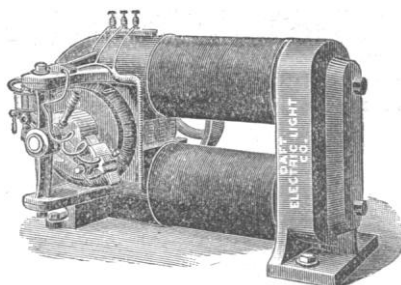
N. D. C. HODGES, 47 Lafayette Place, New York.

DAFT ELECTRIC LIGHT COMPANY.

Power Stations.

Stationary Motors

$1\frac{1}{2}$ to 100 H.P.



Electric Railways.

Car Motors 15 to 250 H.P.

Executive Office, 115 Broadway, N.Y.
FACTORY, JERSEY CITY, N. J. Please Mention "Science."

Any one who will have the following blank filled out by a responsible Newsdealer, and mailed to us, will be allowed a three months' subscription to *Science*.

N. D. C. HODGES,

47 LAFAYETTE PLACE, NEW YORK.

1889.

To the News Company.

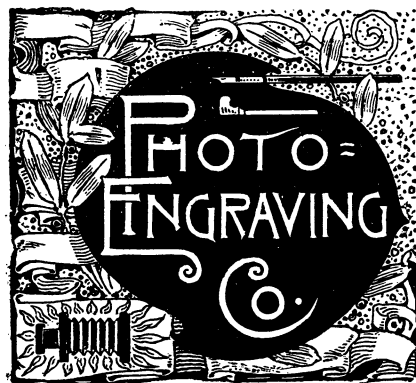
You may add to my regular order five copies of *SCIENCE* each week (returnable).

SCIENCE CLUBBING RATES.

10% DISCOUNT.

We will allow the above discount to any subscriber to *Science* or *The Swiss Cross* who will send us an order for periodicals exceeding \$10, counting each at its full price.

	Year's Subscription.	With Science.	With The Swiss Cross.
Agricultural Science.....	\$ 2.50	\$ 5.30	\$ 4.50
American Agriculturist.....	1.50	4.30	2.50
American Architect and Building News.....			
Imperial edition.....	10.00	12.80	11.00
Gelatine ".....	7.00	9.80	8.00
Regular ".....	6.00	8.80	7.00
American Garden.....	1.00	4.25	2.25
American Journal of Philology.....	3.00	6.25	4.25
American Machinist.....	2.50	5.30	4.50
American Naturalist.....	4.00	7.50	5.50
Andover Review.....	4.00	6.80	5.00
Atlantic.....	4.00	6.80	5.00
Babyhood.....	1.50	4.30	2.50
Bradstreet's.....	5.00	7.80	6.00
Brain.....	3.50	6.30	4.50
Building (weekly).....	6.00	8.80	7.00
Carpentry and Building.....	1.00	4.25	2.25
Century Magazine.....	4.00	6.80	5.00
Chautauquan, The.....	1.50	4.30	2.50
Christian Union, The.....	3.00	5.80	4.00
Cosmopolitan, The.....	2.00	4.80	3.00
Critic.....	3.00	5.80	4.00
Eclectic Magazine.....	5.00	7.80	6.00
Edinburgh Review.....	4.00	6.80	5.00
Electrical World.....	3.00	5.80	4.00
Electrician and Electrical Engineer.....	3.00	5.80	4.00
Electrical Review.....	3.00	5.80	4.00
Engineering and Mining Journal.....	4.00	6.80	5.00
English Illustrated Magazine.....	1.75	4.55	2.75
Forest and Stream.....	4.00	6.80	5.00
Forum, The.....	5.00	7.80	6.00
Harper's Bazar.....	4.00	6.80	5.00
Harper's Magazine.....	4.00	6.80	5.00
Harper's Weekly.....	4.00	6.80	5.00
Harper's Young People.....	2.00	4.80	3.00
Illustrated London News (Amer. reprint).....	4.00	6.80	5.00
Independent, The.....	3.00	5.80	4.00
Iron Age (weekly).....	4.50	7.30	5.50
Journal of Philology (Eng.).....	2.50	5.30	3.50
Judge.....	4.00	6.80	5.00
L'Art.....	12.00	14.80	13.00
Life.....	5.00	7.80	6.00
Lippincott's Magazine.....	3.00	5.80	4.00
Littell's Living Age.....	8.00	10.80	9.00
London Quarterly.....	4.00	6.80	5.00
Macmillan's Magazine.....	3.00	5.80	4.00
Magazine of American History.....	5.00	7.80	6.00
Medical and Surgical Journal.....	5.00	7.80	6.00
Mechanical Engineer.....	2.00	4.80	3.00
Metal Worker.....	1.00	4.25	2.25
Microscope, The.....	1.00	4.25	2.25
Nature.....	6.00	8.80	7.00
North American Review.....	5.00	7.80	6.00
Outing.....	3.00	5.80	4.00
Overland Monthly.....	4.00	6.80	5.00
Political Science Quarterly.....	3.00	5.80	4.00
Popular Science Monthly.....	5.00	7.80	6.00
Popular Science News.....	1.00	4.25	2.25
Portfolio, The.....	7.50	10.30	8.50
Practitioner.....	3.50	6.30	4.50
Public Opinion.....	3.00	5.80	4.00
Puck.....	5.00	7.80	6.00
Puck (German).....	5.00	7.80	6.00
Quarterly Review (London).....	4.00	6.80	5.00
Queries.....	1.00	4.25	2.25
St. Nicholas.....	3.00	5.80	4.00
Scientific American.....	3.00	5.80	4.00
Supplement.....	5.00	7.80	6.00
Architect and Builders' edition.....	2.50	5.30	3.50
Scribner's Magazine.....	3.00	5.80	4.00
Texas Siftings.....	4.00	6.80	5.00
Trained Nurse.....	1.50	4.30	2.50



BRANCH AT 728 CHESTNUT ST.
PHILADELPHIA, PA.

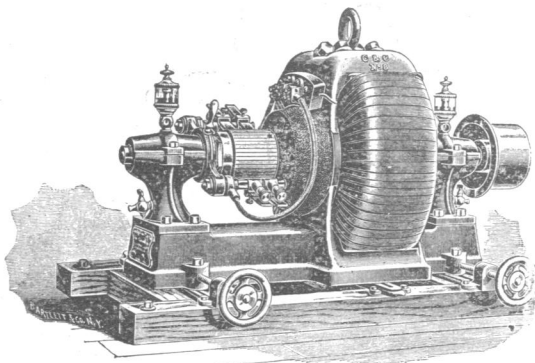
JOHN HASTINGS = Pres't.
A=R=HART = Gen-Manager
JOS=TRIPP = V-Pres't.

ENGRAVING FOR
ALL ILLUSTRATIVE
AND ADVERTISING
PURPOSES

67-71 PARK PLACE
NEW YORK

C. & C. ELECTRIC MOTOR COMPANY.

Electric Motors
FOR
Arc and Incandescent
Circuits, Most Eco-
nomical Motor on
the Market.
Regulation Perfect.
Motors Designed for all
Power Purposes.



OFFICE and MANUFACTORY:
402 and 404 Greenwich Street, New
York City.

New England Office, 19 Pearl St., Boston.

Philadelphia Office, 301 Arch St.

Western Office, 139-141 Adams Street,
Chicago.

Southern Office, 25 Carondelet Street,
New Orleans.

"The Week, one of the ablest papers on the con-
tinent."—*Descriptive America*.

ENLARGED AND IMPROVED.

THE WEEK:

*A Canadian Journal of Politics, Literature, Science
and Arts.*

PUBLISHED EVERY FRIDAY.

\$3.00 per Year.

\$1.00 for Four Months.

THE WEEK has entered on its SIXTH year of pub-
lication, greatly enlarged and improved in every re-
spect, rendering it still more worthy the cordial
support of every one interested in the maintenance
of a first-class literary journal.

The independence in politics and criticism which
has characterized THE WEEK ever since its first
issue will be rigidly maintained; and unceasing ef-
forts will be made to improve its literary character
and increase its value and attractiveness as a jour-
nal for the cultured home. Many new and able
writers are now, or have promised to become, con-
tributors to its columns, and the constant aim of the
Publisher will be to make THE WEEK fully equal to
the best literary journals in Britain and the United
States.

As heretofore, PROF. GOLDWIN SMITH will, from
time to time, contribute articles. London, Paris,
Washington and Montreal letters from accomplished
correspondents will appear at regular intervals.
Special Ottawa Letters will appear during the ses-
sions of Parliament.

THE WEEK in its enlarged form will be the same
size as "Harpers' Weekly," and the largest paper
of its class on the continent.

SEND FOR FREE SAMPLE COPY.

C. BLACKETT ROBINSON, Publisher,
5 Jordan St., Toronto.

A NEW MAGAZINE—THE SWISS CROSS

Devoted to spreading a love of
nature among the people. Edited
by HARLAN H. BALLARD, President of the Agassiz Asso-
ciation, and succeeding *St. Nicholas* as the official maga-
zine of that body. \$1.50 a year. Sample copy 10 cents, or 25
cents for trial subscription for 3 months.

N. D. C. HODGES, PUBLISHER.
Mention this magazine 47 Lafayette Place, New York.

Wants.

A YOUNG MAN can have lucrative engage-
ment, not only a fixed salary, but accord-
ing to his work accomplished in travelling for
SCIENCE. A personal interview invited.

N. D. C. HODGES,

47 Lafayette Place, New York.

MECHANICIAN.—An optician and maker
of instruments of precision of experience
would be glad of a position where his skill
would be valued in connection with some higher
educational institution. Address G. J., care of
SCIENCE, 47 Lafayette Place, New York.

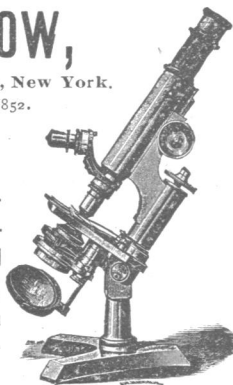
Scientific Apparatus.

J. GRUNOW,

621 Sixth Avenue, New York.
Established 1852.

MAKER OF

Microscope Stands,
Oil Immersion Object-
ives and Abbe Con-
densers for Bacterial
and Histological work,
of Objectives, Camera
Lucida and other ac-
cessory apparatus.



IMPROVED OIL LIGHT MAGIC LANTERNS.

Also Lime and Electric Light Apparatus, and
mechanical, plain, and fine colored views.

J. B. COLT & CO., Manufacturers,
No. 16 BEEKMAN STREET, NEW YORK.

MORRIS EARLE & CO.

SUCCESSORS TO

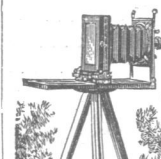
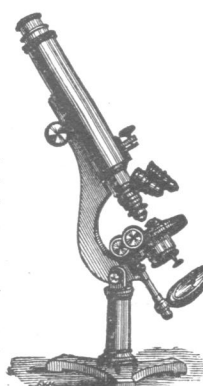
R. & J. BECK,

1016 Chestnut Street, Phila.

Microscopes and all
Accessories and Ap-
paratus. Photograph-
ic and Photo-Micro-
graphic Apparatus and
Outfits.

Spectacles, Eye
Glasses, Opera and
Marine Glasses, etc.

Illustrated Price List
mailed free to any ad-
dress. Mention SCIENCE
in corresponding with us.



E. & H. T. ANTHONY & CO.

591 Broadway, N.Y.

Manufacturers and Importers of

PHOTOGRAPHIC INSTRUMENTS,

Apparatus and Supplies of every

description. Sole proprietors of

the Patent Detective, Fairy Nov-
el, and Bicycle Cameras, and the

Celebrated Stanley Dry Plates.

Amateur outfits in great variety, from \$5.00 upward.
Send for Catalogue or call and examine. More
than 40 years established in this line of business.

Readers of Science

Corresponding with or visiting Advertisers,
will confer a great favor by mentioning this paper.

A few of the earlier bound volumes of "Science" (slightly
"shop-worn") for sale at \$1.25 per volume. Mailed post-paid
within the United States on receipt of price.

N. D. C. HODGES, 47 Lafayette Place, New York.

ELECTRICAL TESTING BUREAU,

Johns Hopkins University, Baltimore, Md.
Resistance Coils and Boxes Compared.
Am meters and Volt meters calibrated.
Condensers standardized.
Primary and Secondary Batteries Tested.
Efficiency of Dynamos and Motors Determined.
Insulation of Cables and Wires Tested.
Etc., Etc.
Circulars describing Methods Used, Prices,
Etc., sent on Application.
Address as above.

A TEMPORARY BINDER

for *Science* is now ready, and will be mailed
postpaid on receipt of price.

Half Morocco - 75 cents.



This binder is strong, durable and
elegant, has gilt side-title, and allows
the opening of the pages perfectly
flat. Any number can be taken out
or replaced without disturbing the
others, and the papers are not mutu-
ated for subsequent permanent bind-
ing. Filed in this binder, *Science* is
always convenient for reference.

N. D. C. HODGES,

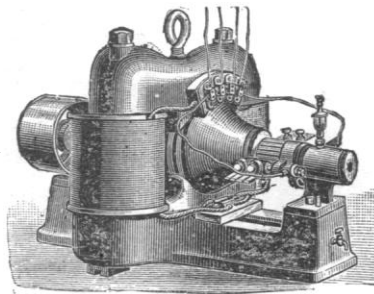
47 Lafayette Place, New York.

Sprague Electric Railway and Motor Company.

Lightest Weight Consistent with
Highest Efficiency.

SIMPLE IN CONSTRUCTION.

Not Liable to get out of Order.



Bearings Self Oiling.

NON-SPARKING IN OPERATION.

Commutator Wear Reduced
to a Minimum.

16 and 18 BROAD STREET, NEW YORK.

The Mutual Life Insurance Company

OF NEW YORK.

RICHARD A. McCURDY, PRESIDENT.

ASSETS - - - \$126,082,153 56

The Largest and best Life Insurance Company in the World.

The New Business of the Mutual Life Insurance Company in 1888

Exceeded \$103,000,000.

Its Business shows the Greatest Comparative Gain made by
any Company during the past year including

A gain in assets of.....	\$ 7,275,301 68
A gain in income of.....	3,096,010 06
A gain in new premiums of.....	2,333,406 00
A gain in surplus of.....	1,645,622 11
A gain in new business of.....	33,756,792 85
A gain of risks in force.....	54,496,251 85

The Mutual Life Insurance Company

Has Paid to Policy-holders since Organization \$272,481,839 82.



KIMBALL'S STRAIGHT CUT CIGARETTES.

Unsurpassed in quality.
Used by people of refined taste.
Highest award at Brussels, 1888.
The finest smoking mixtures are of
our manufacture.
Fifteen First Prize Medals.
WM. S. KIMBALL & CO.
Rochester, N.Y.

IMPROVING THE MEMORY PICK

and facilitating the acquirement of knowledge by
lectures and correspondence. Classes forming.
"MEMORY and its Doctors," from Simonides to
"Loisette," mailed for 25 cents (New Edition).

DR. PICK, 24 Union Square, N. Y. City.



GOOD NEWS TO LADIES.

Greatest inducements ever offered. Now's your time to get up orders for our celebrated Teas and Coffees, and secure a beautiful Gold Band or Moss Rose China Tea Set, Dinner Set, or Webster's Dictionary. For full particulars address
THE GREAT AMERICAN TEA CO.,
P. O. Box 289. 31 and 33 Vesey St., New York.

OUR 75 CENT COLORED SILK.

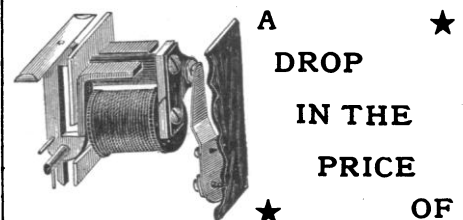
We have had unusual success
with this line of Gros Grains.

They are 19 1-2 inches wide, have
a fine cord weave, and are in 40
different, excellent shades. Under
ordinary circumstances they would
sell for \$1 per yard.

Send for samples; they will surely
please you.

JAMES McCREERY & CO.

BROADWAY AND ELEVENTH STREET,
NEW YORK.



GRAVITY DROP ANNUNCIATORS.

DON'T FORGET THE
DUST-PROOF BELLS.

HAZAZER & STANLEY,

32 Frankfort Street, N. Y.



**FOOD
ADULTERATION**
And its Detection. With photomicrographic plates and
a bibliographical appendix. By J. P. Battershall. 328
pages, 8vo, cloth. Price, \$3.50. Circulars and Catalogues
on application. E. & F. N. SPON,
12 Cortlandt St., New York.