

Advertisements.

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COLD FORGED PRODUCT.

Forged Wood Screw

Patented May 10, July 19, 1887; Oct 23, 1889; Aug. 19, Oct. 21, 1890; April 7 May 12, 1891; July 19, 1892.

Its Advantages are:

1. Stronger than a common screw.
2. Uniform and wide slot.
3. Requires the use of but one bit in hard wood.
4. Inserted easier.
5. Centralized point.
6. Superior holding power.
7. The screw being Cold Forged, instead of Cut, leaves on its entire surface a metallic skin.

Send for samples to

AMERICAN SCREW CO.  
PROVIDENCE, R. I.

WELL DRILLING MACHINERY,

MANUFACTURED BY  
WILLIAMS BROTHERS,  
ITHACA, N. Y.,

Mounted and on Sills, for  
deep or shallow wells,  
with steam or horse  
power.

Send for  
Catalogue.

ADDRESS  
Williams Brothers  
ITHACA, N. Y.

ELECTRO MOTOR. SIMPLE. HOW TO  
make. By G. M. Hopkins.—Description of a small electro  
motor devised and constructed with a view to assisting  
amateurs to make a motor which might be driven with  
advantage by a current derived from a battery, and  
which would have sufficient power to operate a foot  
lath or any machine requiring not over one man power.  
With 11 figures. Contained in SCIENTIFIC AMERICAN  
SUPPLEMENT, No. 641. Price 10 cents. To be had at  
this office and from all newsdealers.

A GENTLEMAN'S LAUNCH



YOUR OWN ENGINEER.

Launches 19 to 60 feet in length, with automatic ma-  
chinery. No Smoke. No Engineer.  
No Danger. No Dirt.

PADDIE YOUR OWN CANOE.

Canoes, Family Row and Sail Boats. Fishing and Hunt-  
ing Boats. Manufactured by

THOMAS KANE & CO., Chicago, Ill.

Send for catalogue specifying line desired.

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is folly when you might do better.

What is the matter with your  
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Always a few minutes wrong?—  
Does your watch cost more to carry  
than it did to buy it? Repairs,  
regulating, cleaning; a dollar or  
two every time you bump it? You  
might save it over and over in a  
year; show just as much style and  
always be on time, too, with the  
new, quick-winding Waterbury.

Every jeweler keeps it. A jew-  
eled watch. All styles for  
everybody. \$4 to \$15 buys it.  
Ladies', gentlemen's or boy's  
watch; cased in nickel, coin-  
silver or filled gold (to to  
14-karat).

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MESSRS. MUNN & CO., in connection  
with the publication of the SCIENTIFIC  
AMERICAN, continue to examine improve-  
ments, and to act as Solicitors of Patents  
for inventors.  
In this line of business they have had forty-five years  
experience, and now have inaugurated facilities for  
the preparation of Patent Drawings, Specifications, and the  
prosecution of Applications for Patents in the United  
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Patents, etc.  
We also send, free of charge, a Synopsis of Foreign Pa-  
tent Laws, showing the cost and method of securing  
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MUNN & CO., Solicitors of Patents,  
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BRANCH OFFICES.—Nos. 62 and 64 F Street, Pa-  
cific Building, near 7th Street, Washington, D. C.

SINGLE CYLINDER AND COMPOUND  
HIGH SPEED  
ENGINES  
Watertown Steam Engine Co.  
WATERTOWN, N. Y.

SEND FOR OUR CIRCULAR  
**IN ONE MINUTE**  
IT WILL CONVINCED YOU OF OUR ABILITY TO SUPPLY  
TOILET PAPER FOR LESS MONEY THAN IT CAN BE OB-  
TAINED ELSEWHERE. A.P.W.PAPER CO. ALBANY, N.Y.

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Take one with You.  
to the World's Fair.

They're the only practical camera for the purpose.  
No bulky glass plates—no troublesome holders—no  
need of hunting up a dark room. With our special  
Columbian spools of film, containing 200 exposures  
you can have your Kodak loaded before leaving  
home and can then "press the button" as often as  
you like, while at the Fair without the necessity  
of reloading.

Eastman Kodak Co.,  
Rochester, N. Y.

4 to 50 H. P. THE Motor of 19th Century  
Can be used any place, to do any  
work, and by any one. No Boli-  
ver! No Fire! No Steam! No  
Ashes! No Gauges! No Engi-  
neer! A perfectly safe Motor  
for all pla sand purposes. Cost  
of operation about one cent an  
hour to each indicated horse pow-  
er. For circulars, etc., address  
CHARTER GAS ENGINE CO.  
P. O. BOX 148, Sterling, Ill.

SCIENTIFIC AMERICAN SUPPLE-  
MENT. Any desired back number of the SCIENTIFIC  
AMERICAN SUPPLEMENT can be had at this office for  
10 cents. Also to be had of newsdealers in all parts of  
the country.

OIL WELL SUPPLY CO.

91 & 92 WATER STREET,  
PITTSBURG, PA.  
Manufacturers of everything needed for  
ARTESIAN WELLS  
for either Gas, Oil, Water, or Mineral Tests  
Bollers, Engines, Pipe, Cordage,  
Drilling Tools, etc. Illustrated  
catalogue, price lists, and dis-  
count sheets on request.

AGENTS WANTED FOR FINE TOOLS IN EVERY SHOP.  
WRITE FOR CATALOGUE AND AGENCY.  
C.H. BESLY & CO.  
CHICAGO, ILL. U.S.A.

ELECTRIC SUPPLIES

MOTORS, and  
DYNAMOS,  
from 1-6 h. p. to 15 h. p.  
Bells, Annunciators, Batteries,  
etc. No Toys, but Standard  
Goods. Complete illustrated  
catalogue sent on receipt of  
30c. postage.  
The Holtzer-Cabot Electric Co  
84 Franklin St., BOSTON, MASS.

ZINC ETCHING  
HALFTONE PROCESS  
**Printer**  
OF  
**Engravings** MAGAZINES,  
BOOKS,  
CATALOGUE WORK \* SOUVENIRS.  
A SPECIALTY  
**A. H. KELLOGG**  
SCOTT & BOWNE BUILDING  
New York.

"IMPROVEMENT THE ORDER OF THE AGE."  
**The Smith Premier Typewriter**  
Embodies the most Progressive Mechanical Principles.  
All the Essential Features Greatly Perfected.  
Perfect and Permanent Alignment.  
Easiest Running, and Nearly Silent  
All type cleaned in Ten Seconds without Soiling the Hands.  
The Smith Premier Typewriter Co., Syracuse, N. Y., U. S. A.  
We have 20 branch offices in the principal cities throughout the United States.

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Celestial Handbook, just published.  
For descriptive circular address  
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Parsons Horological Institute.  
Learn the Watch Trade

Engraving and Jewelry Work.  
PARSONS, IDE & CO. Circular free.  
302 Bradley Ave., PEORIA, ILL.

"OTTO"  
GAS AND GASOLINE  
ENGINES.  
1/2 to 100 h. p. Can  
be used in cities or  
in country independ-  
ent of gas works or  
gas machines.  
No Boiler,  
No Danger,  
No Engineer.  
OVER  
30,000 SOLD.  
OTTO GAS ENGINE WORKS, PHILADELPHIA.

HARTFORD STEAM BOILER  
HARTFORD,  
CONN.  
INSPECTION AND INSURANCE CO.

THE LIQUEFACTION OF AIR.—A  
lecture delivered by Prof. James Dewar before the Roy-  
al Institution on the production of liquid common air in  
bulk. With 9 illustrations. Contained in SCIENTIFIC  
AMERICAN SUPPLEMENT, No. 806. Price 10 cents.  
To be had at this office and from all newsdealers.

DESIGNING AND BUILDING OF NEW MACHINERY.  
SUPPLY AND INSTALLATION OF  
STEAM ENGINES, PUMPS, ELECTRIC PLANTS.

COMPLETE ELECTRICAL EQUIPMENTS  
—FOR—  
ARC OR INCANDESCENT LIGHTING.  
Arc Lamps. Incandescent Lamps. House Wiring Appliances.  
MINIATURE LAMPS FOR DECORATIVE PURPOSES.  
GENERAL ELECTRIC COMPANY,  
DISTRICT OFFICES:  
44 Broad Street, New York. 820 Atlantic Avenue, Boston, Mass.  
115 and 117 Adams Street, Chicago, Ill. 509 Arch Street, Philadelphia, Pa.  
Fifth and Race Streets, St. Louis, Mo. 62-67 Bibles Street, St. Paul, Minn.  
Wiggins Building, St. Paul, Minn. 1227 F Street, N. W., Washington, D. C.  
15 First Street, San Francisco, Cal. Mackay Temple, Denver, Colo.  
All business outside the U. S. transacted by Thomson-Houston International Electric Co. 44 Broad St. New York

ENGINES, BOILERS & MACHINE TOOLS.

Complete outfits furnished. Send for prices and 300 p. catalogue. W. P. DAVIS, Rochester, N. Y.

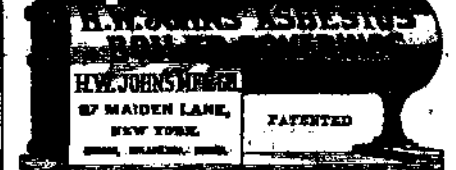
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Columbia Bicycles are fitted with the  
**COLUMBIA**  
**PNEUMATIC**  
**TIRE**  
The Columbia catalogue is the most readable book of its class—beautifully illustrated—free at Columbia agencies—by mail for two 2-cent stamps.  
Guaranteed against puncture.  
Fastest and most resilient.  
Built to last.  
POPE MFG. CO.,  
Boston. New York. Chicago. Hartford.

PATENT JACKET KETTLES

Plain or Porcelain Lined.  
Tested to 100 lb. pressure. Send for Lists.  
BARROWS-SAVERY CO.  
S. Front & Reed Streets, Philadelphia, Pa.

Scientific Book Catalogue

RECENTLY PUBLISHED.  
Our new catalogue containing over 100 pages, includ-  
ing works on more than fifty different subjects. Will be  
mailed free to any address on application.  
MUNN & CO., Publishers Scientific American,  
361 Broadway, New York.



The American Bell Telephone Company

125 MILK ST., BOSTON, MASS.  
This Company owns the Letters Patent  
No. 186,787, granted to Alexander Graham  
Bell, January 30, 1877, the scope of which  
has been defined by the Supreme Court of  
the United States in the following terms:  
"The patent itself is for the mechan-  
ical structure of an electric telephone to  
be used to produce the electrical action  
on which the first patent rests. The third  
claim is for the use in such instruments  
of a diaphragm, made of a plate of iron  
or steel, or other material capable of in-  
ductive action; the fifth, of a permanent  
magnet constructed as described, with a  
coil upon the end or ends nearest the  
plate; the sixth, of a sounding box as de-  
scribed; the seventh, of a speaking or  
hearing tube as described for conveying  
the sounds; and the eighth, of a perma-  
nent magnet and plate combined. The  
claim is not for these several things in  
and of themselves, but for an electric tel-  
ephone in the construction of which these  
things or any of them are used."

This Company also owns Letters Pa-  
tent No. 463,569, granted to Emile Ber-  
liner, November 17, 1891, for a Combined  
Telegraph and Telephone; and controls  
Letters Patent No. 474,231, granted to  
Thomas A. Edison, May 3, 1892, for a  
Speaking Telegraph, which cover funda-  
mental inventions and embrace all forms  
of microphone transmitters and of car-  
bon telephones.

VED CHARTER  
GAS ENGINES  
RELIABLE  
H.W. CALDWELL & SON  
WASHINGTON & UNION STS. WASHINGTON, D.C.

PRINTING INKS.

The Scientific American is printed with CHAB.  
ENBU JOHNSON & CO.'S INK, Fourth and Lombard  
Sts., Philadelphia, and 47 Rose St., opp. Deane, New York