#### Advertisements.

Back Page - - - - - \$1.00 a line, Inside Page - - - - 75 cents a line, Engravings may head advertisements at the same rate per ine, by measurement. as the letter press. Advertisements must be received at publication office as early as Friday morning to appear in next issue.



(OVER 20,000 IN USE)

A new and simple device for taking out knee forms and winkles from pantaloons. Every gentleman, with this article, can always have his pants smoothly pressed and in proper shape. No trouble, convenient, satisfactory, and neat. Liberal discount allowed to the trade, Great inducements to Agents. Circulars free. Enclose \$2 for sample.

P. DEL VALLE HALSEY, 122 Church St., New York.

New York, 30 Cold St. 13 & 15 Custom House St. 146 Lake St. HUSSEY, WELLS & CO., OFFICE AND WORKS, PENN AVENUE & 17TH ST.,

Manufacturers of all descriptions of CAST STEEL,
including the "Granite" brand for Edge Tools. Particular attention given to the manufacture of Cast Steel Teeth of any pattern for Horse Rakes, for which orders are soluted. All Rake Teeth will be manufactured under the Simonds and Ferson Patents, recently purchased, by which process perfect uniformity of shape and superior excellence of temper are attained.

# STEAM BOILER AND PIPE

### INDEPENDENT BOILER FEEDERS SEND FOR ILLUSTRATED CATALOGU COPE&MAXWELL MFG.CO HAMILTON. OHIO.

JIG SAWS, by the gross or dozen, made to order, by A. COATS, 108 Hester St., N. Y. Send for a dozen.



# GOTHIC Furnace,

For Warming Houses and Churches. Powerful-Economical-Free from Gas. 🧎 🕼 Send for Catalogue. A. M. LESLEY. 224 W. 23d St., New York.

# PORTLAND CEMENT



Machinists TOOLS,

OF ALL KINDS, N.Y.Steam Engine Co.

98 Chambers St. NEW YORK



The publishers of the Scientific American have acted as solicitors of patents in the United States and foreign countries for more than a quarter of a century. More than FIFTY THOUSAND inventors have availed themselves of their services. All patents secured through this agency receive a special notice in the Scientific American, which frequently attracts purchasers for the patent.

Inventions examined, and advice as to patentability free Patents obtained in the best manner, and with as little delay as possible.

Caveats prepared from either model or drawings, and filed in the Patent Office at short notice.

Special examinations as to the patentability of inven-tions made, at the Patent Office, on receipt of model or drawing and description; cost for this search and report, \$5.

Trade Marks.-The necessary papers for securing protection to manufacturers and merchants in this country and abroad are prepared at this office.

Design Patents, for protecting artists and designers

of any new ornamenta work, are quickly and cheaply obtained through this office. Copyrights obtained.

Foreign Patents are solicited in all countries where patent laws exist. Pamphlets, containing the cost and full particulars, mailed on application.

Canada Patents.—Canada is one of the best countries for patents. The cost depends upon the length of time for which a natent is desired. Full particulars by mail

We shall be happyto conferwith inventors, examine heir models and drawings, and advise with them as to obtaining patents without consultation fee. Every kind of information pertaining to patents, at home or abroad cheerfully given.

Send for pamphlet, 110pages, containing laws and full directions for obtaining patents. Address MUNN & CO.

Publishers SCIENTIFIC AMERICAN

BRANCH OFFICE-Corner F and 7th Streets, Weshington, D. C.

# Highest Premium (Medal) Awarded by AMERICAN INSTITUTE

BESTUS PAINTS, ROOF COATING, CEMENTS, BOILER FELTING, SHEATHING, and GENERAL MATE-RIALS FOR ROOFING, STRUCTURAL AND OTHER PURPOSES. These materials are prepared ready for use, can be easily applied by any one, and are put up for shipment to all parts of the world. LIBERAL INDUCEMENTS TO GENERAL MERCHANTS AND DEALERS

Send for descriptive Pamphlets, Price Lists, etc. Patentee and Sole Manufacturer, H. W. JOHNS, 87 Maiden Lane, N. Y

TANNATE OF SODA,

BOILER SCALE PREVENTIVE—Jos. G. ROCERS & Co., Madison, Ind. Agencies: R. H. Lee, Titusville, Fs. Owens, Lane & Diver Machine Co., St. Louis, Mo.; Whit man & Burrel, Little Falls, N. Y.; Warden, McLelland & Co., Cincinnati, O.; H. H. Harrison, Nashville, Tenn.; Sinzich, Rankin & Co., Eyansville, Ind.; H. Dudlsy Coleman, New Orlears, Ls.

SUPER-HEATERS Saye fuel, and supply DRY steam. Attached to boilers orset in separate furnace. H.W.BULK LEY Engineer, 98 Libert y St., New York.

Pyrometers. er flues, Blast furnaces.
Super-heated Steam, Oil Stills. &c.
HENRY W. BULKLEY,
98 Liberty St., New York.

IRON PLANERS,

Mill Furnishing Works are the largest in the United States. They make Burr Millstones, Portable Mills, Smut Machines, Packers, Mill Picks, Water Wheels, Pulleys and Gesting, specially adapted to flour mills. Send for catalogue.

J. T. NOYE & SON Buffale, N. Y.

PORTLAND CEMENT From the best London Manufacturers. For sale by JAMES BRAND, 55 Cliff St., N. Y A Practical Treatise on Cement furnished for 25 cen

CHASE'S Pipe-Cutting and Threading Machine.

This important tool is designed to fill a want long feit by STEAM AND GAS FITTERS, and MACHINISTS, for cutting and threading pipes rapidly and cheaply. An apprentice boy, with one of these, can do more work than two men with old appliances, under the old system. NO PIPES SPLITTING! NO BEYEL INSIDE OR OUT! It cuts threads and makes nipples for all sizes of pipes, from % to 2 inches. Weighs only 190 lbs. Stronger than any machine made. A full set of collars and lengths for making nipples goes with the machine. Address

THE CHASE MANNEY CONVEYOR.

THE CHASE MANUFACTURING COMPANY
120 FRONT STREET, NEW YORK

S == EMERSONS PATENT PLANER SAWS ARE SUPERSEDING ALL OTHERS. SEND FOR ONE TOOTH FREE

A == EMERSONS PATENT CLIPPER SAWS EXPRESSLY FOR VERY HEAVY FEED AND HARD TIMBER.

W == EMERSONS PATENT FLANCE TOOTHED SAWS. SAME PRICE OF SOLID SAWS.

S == EMERSONS PATENT UNIVERSAL AND ADJUSTABLE SAW SWACE SENT PREPAIDON RECEIPT OF PRICE \$5.00.

N.B. SEND POSTAL CARD FOR CIRCULAR AND PRICE UST TO EMERSON. FOR D& CO. BEAVER FALLS.PA.

DAMPER REGULATORS BEST GAGE CUCKS.
MURRILL & KRIZER. 44 Holliday St. Balt.

The Most Powerful, and the Only Tight Shutting. Good Part Gate Turbine ever made. Prices of small wheels to sult the times. Seed address to A. M. SWAIN, CCMPANY



Working Models And Experimental Machinery. Metal, or Wood, made to order by J. F. WERNER, 62 Center St., N.Y.



MACHINIST'S TOOLS,

EXTRA HEAVY AND IMPROVED PATTERNS.
LUCIUS W. POND, MANUFACTURER,
WAREROOMS, 39 LIBERTY ST., N. Y.
LE Lathes, Planers, Boring Mills, Drills and Gear Cuters a Specialty.

DOGARDUS' PATENT UNIVERSAL ECCENTRIC MILLS-For grinding Bones, Ores, Sand, Old Cruntbles, Fire Clay, Gushos, Old Cake, Feed, Corn, Corn and Cob. Tobacco, Sauff, Sugar, Salts, Roots, Spices, Coffee, Cocoa-nut, Flax-seed, Asbeet os, &c., and whatever cannot be ground by other mills. Also, for Paints, Printers' Inks, Paste Blacking, &c. JOHN W. THOMSON, successor to JAMES BOGARDUS, corner of White and Elm Sts.. New York.

Rifles, Shot Gans, Revolvers of every kind. Send stamp for liustrated Price List to Great Western GUN WORKS, Pittsburgh, Pa. | Manufacturers. Syracuse, N.Y.

WAIN.

North Chelmstord, Mass. AMERICAN SAW CO.

TRENTON, N. J.

GREAT REDUCTION .x PRICES MOVABLE-TOOTHED

CIRCULAR SAWS.

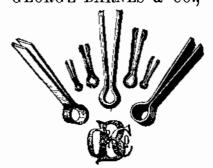
JULY 1st, 1874.

Send for new Price List.



THE AMERICAN TWIST
DRILL CO., Woonsocket, R. I., are
now the sole owners and manufacturers of the celebrated
DIAMOND SOLID EMERY WHELLS.
ET Illustrated Catalogue of Emery Wheels, Machinery, and Tools
FREE
W. S. JABBOE, Agent, 17 New Church st., New York.

GEORGE BARNES & CO.,



# .amplies from . Rock filver Paper Company, Chicago, III

#### Todd & Rafferty Machine Co.

MANUFACTURERS OF
The celebrated Greene Variable Cut-Off Engine; Lowe's
Patent Tubular and Fine Rollers: Plain Blide Valve Sta-The celebrated Greene variable Cut-Off Engine; Lowers Patent Tubular and Flue Bollers; Plain Bilde Valve Stationary, Hoisting, and Portable Engines. Bollers of all kinds. Steam Pumps, Mill Gearing, Shafting, &c.; Silk, Tow, Oakum, Bagging, Rope, Flax, and Hemp Machinery, Agents for the New Haven Manufacturing Co.'s Machinists' Tools; for Judson's Governors and Stop-Valves: Sturtevant Blowers; and Differential Pulley-Blocks. WAREKOMS, 10 BARCLAY ST., REW YORK.

FOR SALE-379 Morris, Tasker & Co.'s Cast Iron Steam Radiators. Apply, or address JOHN E. EYANSEN, Philadelphia, Pa.

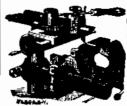
STEAM BOILER Inspection & Insurance COMPANY.

HARTFORD

W. B. FRANKLIN, V. P't. J. M. ALLEN, Pres't. J. B. PIERCE, Sec.

HARTFORD, CONN.

# WIRE ROPE



Haiversal Hand Planing Machine, a labor-saving investion, a tabled to any vise, to bench with stand and chuck, or to work itself, set to work in any direction in a moment. Up and down feed to Tool: reversible self trossfeed, Quickly saves its cost in hands of all metal working mechanics. Lacos E. SUITERBLIN, mfr, 60 Duane St. N.Y.

HOUSTON'S PATENT TURBINE WATER WHEEL.

In the test at Holyoke, in 1872, the Houston gave the highest percentage aver shown ing reliable tustand highest average re-shewn ing reliable testand the highest average re-sults ever obtained. In practical usel its everywhere demonstrating its superior-ity over all others. Emer-sen's full report furnished on application. Send for Orrou-lar.

iar. Mrrrill & Houston Iron Works, Beloit, Wisconsin

Est T. V. Carpenter. Advertising Agent. Address Box 773, New York City. C. HENRYHALL & CO., 20 Cortlandt St., N.Y.Ch.



The simplest, most durable and effective BTRAM FUMP now in use. Will pump gritty or muddy water without wear or injury to its parts. It caunot get out of order.

Branch Depots:
11 Pemberton Square, Boston, Mass.
137 Market St., Philadelphia, Pa.
59 Wells Street, Chicago, Ill.
50 Wells Street, Chicago, Ill.
60 Square Western Exposition, New Orleans.
611 \$6 513 North Second St., St. Louis, Mo.

1876

# INTERNATIONAL EXHIBITION.

U. S. CENTENNIAL COMMISSION,
PHILADELPHIA, PA.

In accordance with the several Acts of the Congress
of the United States, providing for the celebration

Centennial Anniversary

of American Independence there will be held in Fair-MOUNT PARK, Philadelphia in the year 1976, an

## International Exhibition

of Arts, Manufactures, and Products of the Soil and Mine. The Exhibition will be opened on the 19th of April and closed on the 19th of October.

APPLICATIONS FOR SPACE.

To secure space for exhibits in the Buildings of the Park, early applications should be made. The necessary forms for application, together with the Regulations for Exhibitors and needed information, will be forwarded on application to the Office of the Centennial Commission.

A. T. GOSHORN, Director-General.



Barnes' Foot & Steam Power
Scroll Saw.
For the entire range of Scroll Saw
ing, from the Wall to the Cornice
Bracket, 3 in. thick. Every Woodworker should have one. Four years
in market—thousands using them.
Persons out of work, or that have
spare time, can earn with one of
these foot power machines from 40
to 80 cts, per hour. It is a pleasure to
run one.—Say where you saw this,
and send for full description to W.
F. &d. Barnes, Rockford, Ill.; R. C.
Barnes & Bro.. 58 Park Place, N. Y





Improved Foot Lattes.

Small Engine Lattes, Sinall Gear
Cutters, Hand Planers for inctal, Ball
Turning Machines, Bilde Rests, Foot
Scroll Saws. The very best. Selling
everywhere. Catalogues free.
X. H. BALDWIN, Laconia, N. H.



OF THE

SCIENTIFIC AMERICAN. THE BEST MECHANICAL PAPER IN THE WORLD.

TWENTY-NINTH YEAR.

VOLUME XXXI—NEW SERIES.

The publishers of the SCIENTIFIC AMERICAN b to announce that on the fourth day of July, 1874, newvolumecommences. It will continue to be the aim of the publishers to render the contents of the new volume more attractive and useful than any of its pre The best Mechanical Paper in the World!

A year's numbers contain over 800 pages and severa hundred engravings of new machines, useful and nove

inventions, manufacturing establishments, tools, and

To the Mechanic and Manufacturer!

No person engaged in any of the mechanical pursuits should think of duing without the Scientific Ameri-CAN. Every number contains from \$5.00 an engravings of new machines and inventions which cannot be found in any other publication.

The SCIENTIFIC AMERICAN is devoted to the inter

ests of Popular Science, the Mechanic Arts, Manufactures, Inventions, Agriculture, Commerce, and the indus trial pursuits generally; and it is valuable and instructive not only in the Workshop and Manufactory, but also in the Household, the Library, and the Reading Room

One copy, six months...... 1.50 one copy of engraving, "Men of Progress".. 10.00 One copy of Scientific American for one year, and one copy of "Science Record" for 1874..... 5.00

Remit by postal order, draft or express.
The postage on the Scientific American is five cents per quarter, payable at the office where received. Cana subscribers must remit, with subscription, 25 cents extra to pay postage.

Address all letters and make all Post Officeorders and drafta payable to MUNN & CO., 37 PARK ROW NEW YORK,

THE "Scientific American" is printed with CHAS. ENEU JOHNSON & CO.'S INK. Tenth and combard Sts., Philadelphia, and 59 Gold St., New York.