Business and Personal.

The charge for insertion under this head is One Dollar of line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in the following week's issue.

Marine Iron Works. Chicago. Catalogue free. "U. S." Metal Polish. Indianapolis. Samples free. Gasoline Brazing Forge, Turner Brass Works, Chicago Yankee Notions. Waterbury Button Co., Waterb'y, Ct Handle & Spoke Mchy. Ober Lathe Co., Chagrin Falls.O. Schwaab Stamp & Seal Co., Milwaukee. Send for cat'g. Spool & variety turning & printing. H. H. Frary, Wa terbury, Vt.

For Sale-Gasoline Engines. 1 to 25 H. P.; also cast ings. Dirigo Engine Co., Portland, Me.

Gear Cutting of every description accurately done The Garvin Machine Co., Spring and Varick Sts., N.Y. FERRACUTE Machine Co., Bridgeton, N. J. Full

line of Presses, Dies and other Sheet Metal Machinery Hub, spoke, wheel, bending, and handle machinery Single machines or full equipments, by the Defiance Machine Works, Defiance, Ohio, U. S. A.

1. 'he celebrated "Hornsby-Akroyd " Patent Safety Oil Engine is built by the De La Vergne Refrigerating Machine Company. Fort of East 138th Street, New York.

The best book for electricians and beginners in elec tricity is " Experimental Science," by Geo. M. Hopkins. By mail, \$4. Munn & Co., publishers, 361 Broadway, N. Y Michigan Military Academy,

Orchard Lake Michigan.

Twenty-first year. Prepares for leading Universities Graduates are now in Harvard, Yale, Princeton, Cor nell, and University of Michigan. New gymnasium 50 x 100 feet. Address Colonel Rogers, Supt.



MINTS TO CORRESPONDENTS.

WINTS TO CORRESPONDENTS.
Names and Address must accompany all letters or no attention will be paid thereto. This is for our information and not for publication.
We ferences to former articles or answers should give date of paper and page or number of question.
Inquiries not answered in reasonable time should be repeated; correspondents will be arin mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department. each must take his turn.
Bu yers wishing to purchase any article not advertised in our columns will be turnished with addresses of houses manufacturing or carrying the same.
Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.
Scientific American Supplements referred to may be had at the office. Price 10 cents each.
Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

(7502) C. V. F. asks: 1. Will you please tell me if the moon gives any heat? A. Certainly; the moon gives off heat. You will find a statement on this point in "The New Astronomy," by Prof. Todd, price by mail, \$1.50. This, however, is probably heat which the moon has absorbed from the sun and afterward radiates. The part of the moon which is near the close of its long night of two weeks is probably at a temperature of about 300° below zero. 2. Where are some of the best art galleries in New York? A. The Art Gallery of the Metropolitan Museum is probably the best in New York.

(7503) F. D. B. writes: In a recent Notes and Queries column you gave the ingredients of a polarity tester that discolors at the positive pole. Will you please let me know what is used in the testers that give a purple discoloration at the negative poles? A. To produce a purplish discoloration at the negative pole prepare two solutions as follows:

1. Alcohol	10 parts.
Phenolphthalein	1 **
Dissolve and add	

Water distilled 110 Water distilled 10 parts. 2. Sodium sulphate..... 1

Soak blotting paper in No. 1. Drain and soak in No 2. After this let it dry. To test pole of open circuit, moisten a strip of the paper and place the ends of the wires about an inch apart upon it.

(7504) J. L. C. writes : 1 should like to know if there is anything about new hay to attract the lightning, as a number of barns have been burned by lightning this year after the hay was in. A. We have no explanation to offer for the belief prevalent among farmers that barns are more frequently struck by lightning when full of hay. We have seen no statistics on this point. We

Advertisements.

ORDINARY RATES.

Inside Page, each insertion, - 75 cents a line Back Page, each insertion, - - \$1.00 a line

BACK Fage, each insertion, - - 51.00 a line LF For some classes of Advertisements, Special and Higher rates are required. The above are charges per agate line-about eight words per line. Tbis notice shows the width of the line, and is set in agate type. Engravings may head adver-tisements at the same rate per agate line, by measure-ment, as the letter press. Advertisements must be received at Publication Office as early as Thursday morning to appear in the following week's issue.

AN ADVANTAGE OF BEING A SUBSCRIBER TO THE Scientific American

By special arrangement, subscribers to the SCIENTIFIC AMERICAN can obtain the



at once and pay for it on the installment basis.

In thus making it easy to come into immediate possession of this wonderful invention, we believe we are conferring a favor on every one who takes

advantage of the offer-and for these reasons: The improved Gram-o-phone Zon-o-phone is not only a great scientific curiosity but an inexhaustible source of home entertainment-as practical as a piano and a thousand times more varied and entertaining.

The plano, banjo, or any other musical instrument has its limitations, but so far as addressing the ear is concerned the improved Gram-o-phone Zon-o-phone has none. It sets in motion sound waves exactly similar to those vibrated by the originals, reproduces the same results-and to a degree of perfection simply marvelous.

To confound the improved Gram-o-phone Zono-phone with earlier and less successful methods is to judge the" long

distance" lines of 1898 by the telephone of 1877. Its records are on

disks of hard rubber-flat, circular, indestructible. They are made by a process which

to pay almost any



price for a desir-Signed records by Moody-Depew-Jefferson

able record, as it can be copied indefinitely. The authenticity of every record is guaranteed, all later records being signed. They include those of

Rev. T. DeWitt Talmage Wm. H. Crane, Robert G. Ingersoll, Maggie Mitchell, etc., Chauncey M. Depew, Dwight L. Moody, Joseph Jefferson, Sol. Smith Russel,

who will entertain you in your own homes exactly as they entertained you upon the platform. Sousa's band, including his most celebrated solo

artists, will play for you. Operatic artists, comedians, story tellers, banio

players, male quartets, "coon singers," are instantly available.

And most wonderful of all is its simplicity. Practical and profitable for exhibition purposes. Many are making money with it.

Price, improved Gram-o-phone Zon-o-phone, \$25; records, 50 cents each.

Special limited offer to actual subscribers to SCIENTIFIC AMERICAN. \$5 cash and \$3 per month. for seven months, records cash as ordered. The proprietors agree to refund the money, less express charges, if the instrument is not satisfactory and is returned immediately. For further particulars, address NATIONAL GRAMOPHONE Co., 874 BROADWAY, NEW YORK.







s225,000

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New York, N.Y.



have seen other buildings struck by lightning while barns near by were unharmed. Until it is shown by figures that more barns are struck than other buildings, we would not attempt to account for this belief. It should be remembered that thunder storms are frequent only at the season when barns are full of hay.

NEW BOOKS. ETC.

THE TELEPHONE. Outlines of the De-velopment of Transmitters and Re-ceivers. By William J. Hopkins. New York, London, and Bombay: Longmans, Green & Company. 1898. Pp. 83. Price \$1.

This book gives a clear and connected explanation of the principle underlying the design of the telephone transmitters and receivers. It is not a descriptive cata logue of instruments, but deals with the facts and principles in such a way that they will be easily and thoroughly understood. For this reason only those instruments have been described which have demonstrated their importance by long service or which seem to mark steps in the development of the modern transmitters and re ceivers. A thorough grasp of these principles will make it easy to apply them to the instruments.

SECTORLESS WIMSHURST MACHINE -This article gives directions for making. 4 illustra-tions, SCIENTIFIC AMERICAN SUPPLEMENT 1131. Price 10 cents. For sale by Munn & Co. and all news-dealers. Send for new catalogue.



Langbein	X
	9 7
Elevator. See Gram elevator. Elevator, H. J. Herren	0
Elevator, II. J. Herren (10,00)	ò
Elevator, E. A. Trapp 610,929	χ.
Embroidering machine, G. Baum 611,097	Ŷ
Embroidering machine jacquard mechanism, H.	Q
Hill 611,011	0
Excelsior machine, W. H. Brown 610,893	- A
Fabric. See Plush fabric.	x
Farm gate, swinging and sliding, J. Pratt 610,916	Ŷ
Fancet for cans atc wanted G W Banker 610.885	9 Fis
Faucet for cans, etc., vented, G. W. Banker 610.885 Feed regulator, boiler, C. B. Mitchell 610,913	0
Fonce M Stoffee C11100	x
Fence, M. Steffee	¥
Fence, wire, T. B. & C. T. Custer 610,896	Ŷ
Fender. See Car fender.	0
Fertilizer distributer, E. B. Rainey 611,184	ò
Fibrous material from peat, producing, K. A.	x
Zschorner 610,957	¥
Zschorner	Ŷ
J. Wheeler	0
Filter, centrifugal, H. Chapman 610,983	• 1.C
Fire kindler, automatic, G. I. Green 610,986	7
Fireplace, J. E. May 611,179	X
Fireproof, compound for rendering substances,	Ŷ
H. Gallinowsky	Q
Fireproof concrete floors, mould for, H. Foveaux 610,984	ò
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Flushing device, W. Scott 610,977	X
Folding chair, E. E. Allen 611,048	Ŷ
Folding machine, M. J. Locke 611,070	0
Frame. See Bicycle frame.	Ó
Fruit jar or can, S. J. Dunkley 610,897	Ā
Furnace. See Electric furnace.	X
Furniture, combination, J. E. Plummer 611.144	Ŷ
Galvanic element, Krayn & Koenig 611,175	Q
Game, J. H. & G. L. Tickner 611,086	9 Or
Gas from oil, apparatus for making, F. L. Mar-	
tenette	& the
Gas generator, acetylene, F. E. Bundy 610,937	Y
(Continued on seen age)	9

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