RECENTLY PATENTED INVENTIONS. Engineering.

Boiler Feeder.-John E. Winder, Kansas City, Mo. This feeder is combined with a rank arranged above the water level of the boiler, a supply pipe entering and discharging into the tank while a nozzle within the tank opens into the supply pipe a steam pipe connecting the nozzle with the steam compartment of the boiler. The device is designed to automatically keep the water in the boiler at a height previously determined upon, to heat the water before feeding, and to precipitate impurities before the water enters the boiler. In the feed pipe is arranged a column adapted to be filled with a suitable compound, fed gradually through a lazy cock to the tank to lubricate the several parts, and also cause the dissolution of scale or incrustation, and prevent its formation in the boiler. The device is entirely automatic in operation, and as simple and durable in construction.

AIR BRAKE VALVE.-Lewis S. Riggs, Selma. Ala. This is an automatic cut-in valve for use with compressed air pipes under cars for applying and releasing the brakes, and the invention covers a novel construction and arrangement of automatic valves in connection with the couplings and blind couplings, whereby all failures to open the air valves after the couplings are made are avoided. After the act of coup ling the pipes is effected, the valves automatically open air communication through them, so that by no means can the pipes be left in an obstructed or inoperative

Railway Appliances.

CAR COUPLING. - Thomas Dee, Concord, N. H. This coupling is made with two drawbars provided with lateral hooks and pivoted to the car to swing outward or away from each other only. one of the bars being longer than the other and having an enlarged head, together with other novel features. The coupling is designed to be effected automatically, hut also to uncouple automatically should the car be derailed, thus causing the air brakes to set themselves and stop the car, and also prevent the derailed car from dragging the remainder of the train with it.

Mechanical Appliances,

BENCH PLANE. - Saverio Tuoti, New York City. Combined with the plane stock and cutter is a longitudinal screw in the stock, a nut on the screw engaging the cutter for adjusting it endwise, while a transversely ranging screw with a nut engages the cutter for adjusting it laterally. The construction is such that the plane iron sets at quite a sharp angle with the working face of the plane, so that it will cut very easily, while the means for adjusting the plane iron endwise and laterally are simple and efficient, while a face section is adjustable to regulate the size of the shaving throat, insuring the true and smooth working of the plane on any quality or grade of hard or soft lumber.

BARK MILL.—Albert F. Jones, Salem. Mass. In this mill an annular base with a hub in the center is rigidly secured to the hopper, radial wings in oblique planes connecting the hub and base, a bearing sleeve in which is journaled a shaft being arranged in the hub, while a horizontal revolving knife-carrying disk is mounted on the lower end of the shaft and adapted to revolve beneath the oblique radial wings. The construction of the machine is such that its various parts can be readily adjusted, removed and replaced, while in operation it is designed to reduce the bark more rapidly and much finer than the machines now in

Agricultural,

HAY LOADER. - Adolph and Albert Lasack, Oxford Junction, Iowa. This invention covers an improvement on a machine formerly patented by Adolph Lasack, there being but one crank shaft provided for the improved implement, while the feed arms are made to practically correspond in shape to the shape of the bed over which they travel, thus increasing their working area, the arms being in spring-controlled sections, one of the sections of each arm serving as a rake head. The implement is so lightened and simplified by the improved construction that it may be readily worked by an inexperienced operator.

Miscellaneous,

Suspenders. - Andrew J. Bobbs, Marion, Ind. A narrow back piece is, according to this invention, adapted to be worn between the shoulders and along the spine, the back piece being stiffened by a stay of steel or whalebone, while supporting and bracing straps connected with the back piece cross each other diagonally thereon, and a cross strap is arranged at right angles to the back piece, the fastening and supporting devices being secured to the ends of the cross and supporting straps.

ADDING MACHINE. - James Richardson, North Tarrytown, N. Y., and Frank E. Heath, New Combined with keys representing the figures from 0 to 9 are registering and verifying wheels, with a mechanism for imparting motion to them according to the number carried by each key lever, with a novel positive carrying mechanism for causing any wheel of the series to carry one to the next wheel in order. There are also positive stops for preventing the wheels from passing beyond the prescribed limit, and a let-off device for releasing the feeding ratchets, with a spring for returning the summation wheel turning mechanism to the starting point.

VOTING BOOTH. - Peter Zuckriegel, Tell City, Ind. This is a knockdown booth, adapted to form one of a series of booths or to be used singly, and is especially designed to facilitate voting under what is known as the "Australian system," affording secrecy for the voter, while the whole construction may be knocked down and folded up in small compass for transportation or storage. It is made with a backboard ning gear is especially adapted for use with buggies,

to which is hinged a series of partition boards capable of folding on each other and on the backboard, a clamping rod supporting curtains and connecting and binding the partitions. A triple booth of this kind, with half partitions or panels between each compartment, weighs only 106 pounds, affords complete privacy for the voter, and may be set up and adjusted by the most inexperienced.

TYPEWRITING MACHINE. - Michael Hearn, Hampstead, England, Combined with a carriage having a rack and a pivoted and spring-pressed lever with a pawl engaging the rack, are pivoted and counterbalanced type levers arranged in a circle, with operating key levers pivoted in the rear of the type lever-, with semicircular levers pivoted near their ends and adapted to beengaged by the key levers when they are depressed, there being connections between the semicircular levers and the pawl-carrying lever. The machine is designed to be very simple and effective. A further patent has also been granted the same inventor for an improvement in typewriting machines in which weighted or balanced type levers are operated by finger keys, the type levers having a counterpoise at one end and a bevel-headed screw fitted to them.

OIL WELL BAILER VALVE. - Andrew W. Knittel, Evans City, Pa. Combined with an outer tube provided with a valve supported by a forked shank secured to the inner wall of the tube and projecting below it, is a sliding sleeve fitted to the tube and having a valve seat furnished with a forked barbed rod or spear, to limit the movement of the sleeve and loosen the sand in the tube. The bailers are used for the removal of salt water and oil, and the valve is designed to be unaffected by the presence of sand.

MAST HOOP.—Charles S. Mott. Patchoque, N. Y. This hoop is made with two abutting ends, one having a dovetail tongue and the other a dovetail recess to receive the tongue, a sliding sleeve being adapted to cover the connected ends of the hoop, with means for locking the sleeve over the joint, the device thus forming a sectional hoop capable of being readily sprung around a mast and conveniently disengaged

BUCKLE - Charles G. Blue, Pleasant Hill, Mo. This is a buckle for harness and other straps which have a sliding tongue, the buckle being so made that the tongue can be easily introduced within the frame and have a free movement thereon, while the strap end can be readily introduced and will be securely held in the buckle. There is no permanent attachment between the tongue and frame in this buckle, and owing to the open connection of the parts there is but little chance for fouling by dirt or other foreign matter.

SHOE FOR DEFORMED FEET.-Legrand D. Harding, Coltax, Washington. This shoe has the usual outer and insoles, and a strengthening plate is held to the soles and hinged near the ball, in connection with straps and supports secured to the sole and adapted to fasten over the foot, a support being secured to the strengthening plate on one side of the shoe and shaped to stand off from the foot. The shoe is designed to adapt itself to the movements of the foot, while maintaining pressure as required on special portions.

SPRING HINGE.—Herman A. J. Rieckert, New York City. This is an improvement on a former patented invention of the same inventor, by which the hinge is made more simple and durable in construction, being provided with a tube or casing fitted into a suitable recess in the door, and held in place by side and bottom plates screwed or otherwise fastened to the door. A spring held in the tube press on a double-faced cam, having lugs fitting in suitable guideways, so that the door can swing in either direc tion, and friction is reduced to a minimum

KNOCKDOWN FURNITURE.—Herman A J. Rieckert, New York City. Combined with a frame provided with posts, each made in two parts. and hinges connecting the two parts of each post together lengthwise, are horizontal bars connecting the adjacent parts of two opposite posts with each other, shelves fitted be tween the posts and resting on the bars, and a top cover or shelf fitted on dowels of the posts. The construction is especially designed to facilitate the forming of show cases, wardrobes, tables, counters, etc which may be quickly knocked down and folded for storage or transportation, and easily set up.

FOLDING BOX. - John Howenstine, ort Wayne, Ind. This box is preferably made of thin wooden sheets, double pieces with their grain crossed being used for the sides, lid and bottom, the materia being re-enforced by wire rods and staples, the end walls being secured to the sides and bottom by end battens, while turn-buckle latches are located on depending battens of the lid and adapted to interlock with cross pins in the end walls. The box is designed to be a strong, light, and cheap receptacle, adapted to serve for egg cases, fruit crates, etc., and to be readily set up and knocked down.

SUBSOIL PIPE.-Martin Rehm, Long Island City, N. Y. This invention provides means whereby the spigot end of a pipe section may be positivelyand securely locked when inserted in the hub of an opposed pipe section, by turning one section a slight are also so made that when coupled a packing will not be needed at the joints, and their inner cylindrical faces are flush at the abutting surfaces when the sections are locked together.

LINING FOR BUTTER TUBS. - Joseph Mersman, Ottawa, Ohio. This is a lining of paper of other thin flexible material, folded outwardly over the top edge of the tub and inwardly at its lower end, where it is folded to form a flange, over which a cir cular false bottom of paper is placed, making a thin non-odorous removable lining, which is inexpensive and adapted to remain in upright position in the tub.

VEHICLE RUNNING GEAR.-George L. Banks, Fredonia, Kansas. This invention provides a mechanism between the body and springs, designed to prevent the latter from receiving a sudden strain, thereby adding to their durability. The improved run-

the construction being such that the springs need not be attached to the body, the spring having an independent end movement and at the same time keeping the body level sidewise.

CARRIAGE TOP ADJUSTER. - William W. Swan, Andover, South Dakota. Two arms are each rigidly, adjustably, and detachably secured to a lower brace section, and project forwardly beyond the bows, to form a simple, inexpensive, and convenient device for the manipulation of the jointed frame supports of the vehicle cover, whereby the frame may be easily raised or lowered by one seated in the vehicle, these arms also preventing the flapping of the curtains when the top is lowered.

GATE.—Hiram Barker, St. Joseph, Mo. This invention relates to an improvement in lifting farm gates, providing a short, durable and light gate, in lifting or opening which the pivoted end is made to counterbalance and at one point overbalance the free end, thus rendering the operation of opening the gate very convenient and expeditious.

WIRE FENCE. - John W. Buchanan, Smithville, Ohio. This is a fence in which the wires are secured at one end to a post, chains being attached to the other ends of the wires, and the chains passed through holes in another post at any required distance off, whereby the wires composing the different panels of the fence may be tightened separately, by inserting keys through the links of the chains on the outer side of the distant post.

SPRINKLING CAN.—Alexander P. and Francis M. Baker, Empire, Wis. This is a specially devised can for spraying poisoned solutions on plants and bushes, and is constructed with a readily operated valve by means of which the flow of liquid can be economically controlled, to be applied only where it is needed. The device can also be readily changed to an rdinary water sprinkler.

COFFIN HANDLE. - Lyman E. Woodard, Owosso, Mich. This handle is preferably made of wood, strong and light, and adapted to be conveniently overed by fabric of the same kind as that used to face the exterior of the casket, and with the handle are furnished hinge joints adapted for adjustment to suit different diameters of handle bars, and connect them strongly to the side of the coffin.

Note.-Copies of any of the above patents will be furnished by Munn & Co., for 25 cents each. Please send name of the patentee, title of invention, and date of this paper.

SCIENTIFIC AMERICAN

BUILDING EDITION

JUNE NUMBER.-(No. 68.)

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- Plate in colors of a handsome residence on River side Park, New York City. Floor plans and elevations. Architect Mr. Frank Freeman.
- Colored plate illustrating a row of brick dwellings at Newark, N. J., costing about \$3,000 each. Perspective elevation, floor plans, etc. E. S. Amerman, Newark, N. J., architect.
- 3. Engravings and floor plans of a double residence on Washington Heights, New York City. \$20,000 each. A very picturesque design.
- 4. A dwelling at New Haven, Conn. Cost \$8,000 complete. Perspective view, floor plans, etc.
- 5. A colonial cottage erected for Mr. C. W. Macfar lane at Elm Station, Pa. Cost \$5,300 complete. Floor plans and perspective view.
- Design of a modern interior. A comfortable hall and staircase.
- 7. A picturesque cottage erected for George W. Childs Esq., in his Villa Park at Wayne, Pa. Cost \$7,200 complete. F. H. & W. L. Price, Philadelphia, architects. Plans and perspective.
- 8. A tower house recently erected at Elm Station. Pa. Cost \$4,600 complete. Floor plans, perspective
- A row of low cost colonial houses erected at Rose ville, N. J. Cost complete \$2,000 a house. Plans and perspective view.
- An English cottage erected at Elm Station, Pa.
- Cost about \$4,000. Perspective and floor plans.

County, New York, at a cost of \$695.

12. Miscellaneous contents: Simplicity in furnishing timber,-Architect of the Woman's Building of the Columbian Exposition, Chicago.-Redwood for interiors.-The Richmond heater, illustrated. -Some new designs in radiators, illustrated .-Improved plumbing appliances, illustrated.—Bent glass.-Improved woodworking machinery, illustrated.—Astrong and light lawn fence, illustrated. -The "Heatencook" range, illustrated.-The H. W. Johns liquid pairits.—A new roofing metal,

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References to former articles or answers should give date of paper and page or number of question.

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or in this department, each must take his turn.

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(3078) S. J. B. asks for a good patent leather polish for shoes. A. A waterproof blacking which will give a fine polish without rubbing, and will not injure the leather: 18 parts beeswax, 6 parts spermaand decoration.—Weight as a test of strength in ceti, 66 parts oil of turpentine, 5 parts asphalt varnish, 1 part powdered borax, 5 parts Frankfort black, 2 parts Prussian blue, 1 part nitro-benzol. Melt the wax, add the powdered borax, and stir until a kind of jelly has been formed. In another pan melt the spermaceti, add the asphalt varnish, previously mixed with the oil of turpentine, stir well, and add to the wax. Lastly add the color, previously rubbed smooth with a little of the mass. The nitro-benzol gives fragrance,

> (3079) J. P. T.—The ruby jewels can be round out larger with a hard copper taper wire twirled by the fingers or in a lathe, using diamond dust and oil. The diamond jewels require a steel taper wire with diamond dust and oil.

> (3080) G. G. asks (1) if in liquid measure . c. is an abbreviation for cubic centimeter? A. Yes 2. How many c. c.'s in one fluid ounce? A. 29'5720. 3. And how many ounces in one liter? A. 33'8160.

> (3081) L. S. A. asks: 1 What will clean or polish a marble slab of a soda water fountain which has become rough and dirty by the action of the soda water? A. Use ground pumice stone and water, followed by whiting or putty powder, both applied with a wet woolen cloth, or try following: Mix 1/4 pound soft soap with same of whiting in powder, 1 ounce washing soda

and a piece of copper sulphate as big as a walnut, boil together a few minutes and spread hot over the marble, leave for 24 hours, then wash off and polish with tlannel or a piece of felt.

(3082) J. S. asks for a recipe for taking indelible ink out of linen. A. A solution of bichloride of mercury (corrosive sublimate) is about the best material for the purpose

(3083) C. L. F. asks (1) how to make a a good cheap brass solution. A. Cyanide of potassium 1 pound, cyanide of copper 2 ounces, cyanide of zinc 1 ounce, rain water 1 gallon. Add finally sal ammoniac 2 ounces. Use at 160° F. The color is affected by relative sizes of anode and cathode. Use brass anode. 2. How is fire gilding done? A. Make an amalgam of gold 1 part, mercury 3 parts. Rub it over the perfectly clean surface of the object until coated, expose to a very low red heat, cool, clean with a brush and cream of tartar. A little muriatic acid may be needed in connection with the first application of the amalgam.

(3084) A. H. asks whether melting aluminum in a common cast iron ladle has a bad effect on the aluminum, and what it is. A. Plumbago crucibles are recommended. See the SCIENTIFIC AMERICAN vol. 62, No. 26, for details on manipulation of alumi

(3085) H. F. D. asks: 1. The upturned edges of rubber soles in tennis shoes peel off from the upper cloth. Please give the proper cement or process see "Rubber Hand Stamps and the Manipulation of Rubber," \$1 by mail. A good job cannot be made after manufacture. The soles should be vulcanized in place. 2. Who was the first discoverer of America-Columbus or Leif Erikson? A. The discoveries of Leif Erikson antedated Columbus' voyages by nearly four centuries.

(3086) W. H. writes: I want to make a wooden box and divide it into compartments, by means of sheet lead partitions. Required something to line the box, adhering to it and to the edges of the partitions, so as to make each compartment independently acid proof (for a 20 per cent solution of sulphuric acid). It must be an insulator. Should be melted and used hot or as a paste which will harden. Please give me a recipe which does not require special apparatus. A. There are several recipes. One reads thus: Burgundy pitch 150 parts, gutta percha in shreds 25 parts, ground pumice stone 75 parts. Apply hot and melt in with a hot iron. Another reads: Resin 4 parts, gutta percha 1 part, and a little boiled oil. Before applying either composition the cells should be absolutely dry.

(3087) J. J. McL. asks for (1) a receipt for making extract of lemon. A. Expose 4 ounces lemon rind to the air until partially dry, rub up in a porcelain or glass mortar, agitate with 2 quarts deodorized alcohol until the color is extracted, add 6 ounces freshly made oil of lemons. Let it stand for two days and filter if necessary. The oil is made by distilling water from the rinds: the oil distills over with the steam. 2. One on extract of vanilla. A. Cut 1 ounce vanilla into small pieces, rub up with 2 ounces sugar in a mortar, percolate with 1 pint alcohol, add 1 pint simple sirup. Artificial vanillin is now largely used instead of vanilla

(3088) F. T. asks how to make phosphate, such as is used for drinking purposes, in soda water which comes from the fountain on the counter. A. Use 2 drachms phosphoric acid to 1 gallon of simple sirup.

(3089) M. S. S. asks how to make a furniture polish that will make a fine gloss and dry in the shortest possible time. A. Dissolve 4 ounces beeswax in 1 pint turpentine, color with alkanet root if desired. There are many other formulæ; the above is given for its simplicity.

(3090) W. L. C.-Calcined gypsum or plaster of Paris is used in the Cassner dry battery.

(3091) J. A. B. asks what preparation to use for removing finger spots and other soiled marks from a banjo head without necessitating its removal from the banjo while applying. A. Try bread crumbs, India rubber, or a very smooth piece of pumice stone for bad spots.

(3092) A, G. asks: 1. What is infusorial earth? A. Siliceous skeletons of diatoms. These re presented a low form of animal life, and infusorial earth is made up of remains of their microscopic skeletons, 2, What are its uses? A. Principally as a polishing agent, as an absorbent for explosives, and in brick and tile and stoneware making. 3. What is its commercial value? A. About \$5 per ton. 4. Can sulphate of aluminum be easily and cheaply reduced to merchantable metal? A. No; but it should be of value for the manufacture of alum. 5. Is the Cowles method applicable in reduction of same? A. No.

(3093) W. H. says: Here is my receipt for ingrowing toe nails: Soak the foot in for ten or fifteen minutes, then take a medium sized file (a new one, so it is very sharp) and file off the top of nail down as thin as you please; once a week is often enough. I have tried every other known remedy, but this, used for a year, beats them all.

(3094) P. J. L. asks (1) how to deodorize kerosene. A. It cannot be completely deodorized. Treatment with concentrated sulphuric acid and bichromate of potash, mixed, may do something, but complete deodorization is not likely to be attained. 2 How to make camphorated oil? A. Dissolve 20 parts camphor in 80 parts cottou seed oil. In China an oil is drained off from the crude camphor, which is termed camphoroil. 3. How to make vaseline. A. By decolorization of petroleum residue with sulphuric acid and bichromate of potash and digestion with bone char

(3095) H. B. asks: Is there any difference in the two saccharometers (used in this country for beer worts), Kaiser and Balling, as to degrees? A. They are identical except as regards range. The Kaiser goes up to 40 per cent, the Balling stops at about 10 per cent lower. The reading temperature is 14° Reaumur (63% outlet or nozzle of the exhaust should be about for Fah.), and the readings correspond to percentages of cane sugar.

(3096) W. P. B.—The mottling of small steel work, gun work, etc., is described in Notes and Queries, No. 6, Scientific American, September 24,

(3097) C. O. S. asks for a good and cheap way for refining lard, so as to get it quite white and able to stand hot climates. A. Cleanliness is the great point in treating lard. The fat is freed from all adhering fleshy or discolored matter by cutting. It is then cut up into small pieces and washed until the water runs off clear. It is next melted by direct fire or steam coil until it becomes perfectly clear. It is run through close linen filters into the barrels, in which it is stirred until white and opaque, but only thickly fluid. The great point is when to cease stirring. It is then cooled and tightly covered. Air makes it rancid. In Brannt's "Animal and Vegetable Fats and Oils," \$7.50, and in the same author's "Manufacture of Soap and Candles." \$7.50, there is some information on this and allied sub-

(3098) R. D.—For the indicated horse power of a proposed engine: Multiply the proposed horse power by 33,000; divide this product by the mean engine pressure multiplied by the speed of the pistor (assigned) in feet per minute; this gives the area of the cylinder in square inches. The mean engine pressure must be assumed from the value of the cut-off, and may be obtained from the steam tables in engineering books The piston speed may be assumed at any figure between 300 and 400 feet per minute. The length of stroke is arfor repairing it. A. For treatment of rubber in general bitrary, from 11/2 to twice the diameter of cylinder. The knot is 1.157 miles. Fastest trains about 60 miles per hour. Driving wheels 6 feet 6 inches diameter. Special locomotives may have driving wheels larger. A rate of 80 to 90 miles an hour is probably the maximum velocity a locomotive could run.

> (3099) B. C. writes: I have a guitar that has got some grease or oil spots of a dark color on the face of the instrument. Can you tell me what and how to remove them without injuring the sound or tone of the guitar? A. Fuller's earth mixed to a cream with benzine and placed in a thick layer over the spots, and allowed to dry, may draw out some of the grease. there will be danger of injuring your instrument by the benzine acting on the varnish.

> (3100) S. D. asks: 1. How can we purify natural gas so as to use it for lighting? It burns with a blue blaze with great heat, but does not give much light. A. Carbureting with gasoline will effect your purpose; no purifying is needed. Possibly passing through slaked lime would help it. 2. Will natural gas run a gas engine as well as coal gas? A. Not generally, and in your case certainly not. 3. Our gas well has a steady flow, but the gas will not burn at all times. What is the cause? A. Your gas evidently varies in composition. When it will not burn, it is because it contains probably too much nitrogen

> (3101) H. V. asks: 1, Can the smoke rom zinc ore roasting furnaces profitably be worked up for sulphuric acid? A. There is no reason why it should not, except that the percentage of sulphur is low, and if the roasting is effected with fuel there will be too much organic matter in the fumes to make it profitable. 2. What effect will the smoke of 50 such furnaces in a city of 10,000 inhabitants in the course of time have on health? You know that it kills all vegetation fo quite a distance. A. We should not anticipate much, if any, injury to health.

> (3102) E. asks: What chemicals or acids united to phosphorus will produce a constant glow in an air-tight bottle? A. The nearest approach to what you ask is Balmain's luminous paint, described in ou SUPPLEMENT in several places. A solution of phos phorus in olive oil will glow after exposure to the air.

(3103) W. McC.—Gun barrels and other parts are properly blued by finishing of an even or polish grain, and heating until the proper color is obtained For amateur work a brown stain may be made on the clean and polished barrel by brushing with a mixture of protochloride of antimony 1 part, nitric acid 1 part, hydrochloric acid 2 parts. Add the hydrochloric acid very slowly to prevent ebullition. Apply to the surface of the metal with a woolen rag and rub the surface with green young oak wood until the desired brown color i obtained. Wash with warm water, dry, and wipe with boiled linseed oil.

(3104) S. E. B. asks: Can you give me a receipt for treating oak and giving it a 16th century finish? Also a receipt for treating iron, such as grates fenders, etc., giving the same an old iron finish? A Oak may be given the appearance of age by spongin with sulphuric acid and water equal parts, or what i preferable staining with umber in thin shellac vainish Iron work may be treated with a wash of sulphate o soda and heating over a fire, or by brushing a solution of flour sulphur in 10 parts of turpentine, dissolved by heat ing, over the irons, then holding them over an alcohol ne heat until the black poli

(3105) F. D. S. says: I wish to use th power of a fall of 30 feet of water delivered through a iron pipe 2 feet in diameter and 70 feet long. a. Who size turbine should I use? b. How much useful power would I obtain? c. What would be the rate of flow from the end? A. If you have a full supply at the hea of your pipe, it will deliver over 8,000 cubic feet of water at the mouth per minute. If you are sure that you hav this quantity of water supply, you may realize 225 hors power with a 48 inch turbine of good make, or equal t the Leffel wheels.

(3106) W. H. S.-To polish rubber, the hard rubber should be turned as smooth as possible Then finish with the finest sand paper or flour emer paper. Then polish with a paste of oxide of tin (putt powder) and water on a cloth.

(3107) W. McL. asks if it is practicabl to exhaust steam from engine and heaters into smoke stack. A. If there is a necessity for a stronge draught than the natural draught of the stack, a well ar ranged iet exhaust is practical and advantageous. The diameters of the stack below the top and in th center for best effect. If not needed for draught, and

the stack is large enough and draught strong enough to overcome the choking by the volume of steam, it is practicable, if convenient, for iron chimneys. Brick chimneys should be kept free from steam under all cir-

(3108) A. K. F.—The frying sound in the telephone is caused by induction from other lines. earth currents and static discharges. To increase the volume of sound in a magneto telephone, use a carbon transmitter.

(3109) J. C. P. asks for latest method of determining by simple process, suitable for high school laboratory, the presence of arsenic in wall papers, etc. A By simple burning the garlic-like odor of arsenic can be detected if arsenic is present in large quantities. If chemically pure zinc and sulphuric acid are obtainable, Marsh's test is best. It is given in all analytical chemistries, such as Shepard's "Inorganic Chemistry,"

(3110) H. H. asks: Where is the Hennepin Canal? A. In Illinois. It extends from the Illinois River at the town of Hennepin to the Mississippi River near Rock Island. It forms part of the waterway intended to connect Lake Michigan with the Father

(3111) E. G. W. asks: What do you consider the highest surface speed (with reference to friction) infect per minute at which iron forged shafting may safely run in babbitt boxes without danger of melting the babbitt, provided the best known lubricating oil is used? A. We have no information as to the extreme limit of friction or speed necessary to melt babbitt metal, both the lubricant and babbitt metal being of uncertain value. The severest trial of frictional value is on a fast railroad train, where a journal speed of 800 feet a minute has been attained on short runs. In ordinary machinery 400 to 500 feet per minute can be obtained with safety from overheating. As a general rule the percentage of friction due to load decreases with an increase of velocity. See chapters on friction in Trautwine's "Engineer's Pocket Book," \$5 mailed.

(3112) W. S. S. asks: Kindly give the weighs for cord of granite, lime, and sandstone. A. No definite weight can be given. Each kind of stone varies in different localities. If you mean broken stone, an approximate answer only can be given, granite 2.700 pounds, limestone 2,600 pounds, sandstone 2,400 pounds per cord. These figures will vary from 100 to 200 pounds, according to locality and condition.

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June 9, 1891.

AND EACH BEARING THAT DATE.

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