(18) C. W. C. writes: I am fixing up a small mill to grind feed for my stock. It has a pair of sixteen inch burrs which run vertically, to be driven by a common 8 or 10 horse power with a 5½ or 6 inch belt over a 10 inch pulley. What should be the length of the belt? A. We think the driving and the driven shafts should not be less than 12 feet apart.

(19) A. B. writes: I wish to make some mirrors, will you give me formula for depositing the silver? Have tried carefully the Siemens method described in SUPPLEMENT No. 105, but do not succeed. What is the trouble? A. You have probably neglected to clean your glass properly, or your aldehyde ammonia was not right. Try again, or use Chapman's process.

(20) J. J. C. writes: In receipt for cements in No. 9, current volume, you mention fresh beaten blood, etc., for Chinese cement; what kind of blood shall I use? A. Use such as may be obtained at slaughter houses. Beat it with an egg beater.

(21) G. B. writes: Some three weeks ago the town council engaged a man to dig a well for the public. He agreed to dig a 5 feet in diameter well for $2 a foot in depth; owing to the nature of the ground he had to increase the diameter to 7 feet, which the council said they would receive, and pay him in proportion of above agreement. A dispute has now begun as to what it should be—the council say $98, and his mathematicians say $137.20. Who is right? A. The relative amount of earth removed will be as the square of two diameters; if the price for 5 feet diameter was $2.60 per foot, then for 7 feet diameter it would be as the square of 5 to the square of 7 or as 25 to 49—49

200

25)9800

$ 392×35 per foot and
3·92×35 feet=$137.20

(22) J. W. writes: Please give an easy and practical method of setting a locomotive engine eccentric while on the road in case it should slip. A. If the position of the eccentric on the shaft is marked, as it should be, you have only to set the eccentric to the marks and fasten; if not marked, place the crank on the proper center, throw the valve gear into its proper position, and turn the eccentric around till the cylinder takes steam freely, and fasten. Whether you turn the eccentric forward or back, will depend upon whether it is the go-ahead or the backing eccentric.

(23) E. De N. asks: Will a crooked pipe of the same size and length, having same pressure (for water head), pass as much water as a straight pipe would? A. No: every bend you make reduces the quantity delivered.

(24) A. S. D. asks: Do the steamboat inspection laws prohibit the use of portable boilers in small steamboats, such as small ferry boats, when the boiler is made of lawful iron and the tubes put close together as they are in portable sawmill boilers? A. They do not.

(25) F. A. writes: In answer to A. W. H. (7), of February 14, 1880, No. (7), I would say that I obtained a fair copy from an electrotype by means of the gelatin pad by saturating a cloth pad with the ink, then pressing it on the electrotype, and, when dry, placing the same face down on the pad. If A. W. H. has a better method I will be obliged to him for instructions.

(26) J. W. C. asks: 1. Is tool steel better than machinery steel for magnets? A. Tool steel hardened and drawn to a yellow makes a good magnet if properly charged. 2. Will the Callaud battery answer as well as a Bunsen battery for a telephone? If not, why? A. Either will answer, but the Leclanche is considered the best battery for this purpose.

(27) R. H. G. asks: 1. What holds the smooth surfaces together that Professor Tyndall speaks of as being held as well in vacuo as in the open air? A. The force of adhesion. 2. Also of what is celluloid made? A. See p. 335, Vol. 39, SCIENTIFIC AMERICAN, query 46.

(28) M. J. L. asks: 1. What size should a boiler be (light as can be made) to raise and hold two or three pounds of steam, to run an engine not exceeding one horse power? A. To run a one horse power engine, it should have 12 to 15 feet fire surface. The thickness of metal may be 1-16 inch if the boiler is cylindrical. 2. How could the steam be gauged with perfect safety? A. Use both a pressure gauge and a safety valve, or if the pressure is not more than three or four lb. you can use a column of water as a safety valve.

(29) S. A. G. asks: 1. What makes the mark on sawed lumber. Does each tooth make a mark when a circular saw is used? A. If the teeth are evenly set, each tooth will make its own mark; but if not, some one projecting tooth will mark more distinctly than the others. 2. What would be the power required to run a boat 60 feet long and 20 feet wide—size of cylinders and boilers? A. For a stern wheel boat 66 feet by 20 feet wide, 2 engines, 10 inch cylinder and 30 inch stroke; one flue boiler 46 or 48 inches diameter and 18 feet long.

(30) C. B. G. asks: What is the best fire escape from a third or fourth story window that a lady could manage and carry in her trunk, and where could I get it? A. We think there is nothing better than a good strong knotted rope.

(31) P. A. H. asks how to make a strong battery out of a new pile Leclanche battery. A. The elements of Leclanche battery are not suitable for any other form. If you wish to make a strong battery see directions given in SUPPLEMENTS, No. 157, 158, and 159.

(32) R. E. M. writes: We have two saws, one 54 inches in diameter, the other 60 inches diameter. Now, if both run at the same speed, which will consume the most power in doing the same work? Both saws are alike in all respects but as mentioned. A. The larger one.

(33) E. J. C. asks: 1. Can I construct an induction coil of No. 36 wire and No. 16 or No. 24 wire? I have these sizes on hand. A. For a large induction coil, No. 16 will do for the primary and No. 36 for the secondary. For small coils, use four or five layers of No. 18 or No. 20 for primary and No. 36 for secondary. 2. What size wire is generally used in sounders? I find 24 too large. A. Nos. 20 to 24 are used for local sounders, and for main line sounders Nos. 24 to 32, and in some cases wire as fine as No. 36 is used. The size depends entirely on the length or resistance of the circuit in which the instruments are used. 3. I constructed a telephone as shown in SUPPLEMENT, 142, Vol. 6, Fig. 4. It does not work as well as it should. Is it an exact representation of the Bell telephone? A. It is on the principle of the Bell telephone, and should work well if constructed according to the direction referred to.

(34) C. W. N. asks: How much will a ⅝ inch wire cable chain support? A. If you mean ⅝ inch diameter wire rope, about 14,000 lb.; if you mean chain of ⅝ inch diameter wire, about 26,500 lb. A safe working load is but one-fourth or one-fifth these weights.

(35) C. W. W. writes: A mechanical engineer of high standing claims that a pump will not draw water as high by running the pipe in a curve over a knoll as it would raise it vertically. As a proof of his assertion he states that it had been tried with a pump in good condition, to draw water out of a canal the bank of which was twenty-one feet eight inches above the level of the water. The pump was located about two hundred feet from where the pipe entered the canal. I claim that the pump or pipe must have been defective, as the only difference a curve would make would be what little additional friction the increased length of pipe, due to the curve, would have over a vertical lift equal to the highest point of the curve. I would state that the pipe in question was large enough to supply the pump under any condition. A. The curve makes no difference in the height the pump can lift, save only the increased friction, but the pipes must be tight; with the curved pipe as described, it is really a siphon in form, and if there be the slightest air leak, the air will collect at the top of the curve and thus stop the action of the pump. There should be a cock or valve at the highest point to let off the air.

(36) W. H. M. asks: 1. What are the requisite qualifications to become a locomotive fireman? A. Activity, faithfulness, sobriety, close observation, and a cool head. 2. Who are the proper persons to apply to for a situation? I don't think it is the master mechanic, as I have written to several and have received no answer. A. The master mechanic or superintendent. 3. In link motion, is it necessary for every hanger to be a little above or below the central line of motion? Will it not work just as efficient by being exactly upon the line of motion? A. It depends upon the proportion of the parts. 4. Which is the accepted mode of firing a locomotive boiler? A. There is no accepted mode, as the treatment differs with different fuel and different service; the best mode with any particular fuel and service is the result of experience.

(37) W. T. S. asks (1) whether 12 ⅜ inch stay bolts are sufficient to stay the top sheet of a fire box 24X42 inch; one end of the bolts are turned into an eye, the other end running through a clevis with a nut on, steam pressure to be 120 lb. per square inch. A. No; you should have at least 30 stays, ¾ inch or ⅞ inch diameter. 2. Would there be any objection in using steam from two boilers, by running a steam pipe from the smaller boiler into the larger one, running the pump on the smaller boiler to supply it with water? A. No.

(38) S. F. A. writes: We have a difference of opinion in the shop (U. P. R. R. machine shop) in regard to how a key should be fitted in a driving wheel. One party claims that the key should be fitted to bear the hardest, top and bottom; and the other party claims that it should be fitted to bear the hardest on the sides. A. The key should be a close fit at the sides, but have no draught; all the draught should be on top and bottom.

(39) W. H. D. asks how in using a "Richards" indicator for taking diagrams from steam engines, one is sure to have the proper spring inserted in the instrument. The indicator lent me has several springs all stamped with different numbers, which to an amateur like myself are very puzzling. I want to take diagrams from different engines, under varying pressures of steam, say with 20, 30, 40, 50 lb., and up to 100 lb. pressure in the boiler. I suppose I must change the springs for each rise or fall in pressure I work at, as the springs indicate such a course from some being stronger than others; 40 to 50 lb. will probably be what I will use most. A. The numbers on the springs are the number of pounds one inch in height of the cards made with that spring will represent. If you are using, say a spring marked 40, then in marking off the card, you will divide each inch in height into 40 parts, each part being one pound per square inch, and so with a spring marked 20, divide each inch into 20 parts, etc. There should be with the indicator a scale corresponding to each spring and marked 20 scale, or 30 scale, or 40 scale; these scales are to be used in measuring a card made by a corresponding spring.

(40) E. E. K. asks: 1. What is the weight of an ordinary locomotive without tender? A. For passenger engines 50,000 to 70,000 lb., for freight engines 70,000 to 80,000 lb. 2. What is the weight of the tender? A. Depends upon their capacity. 3. What proportion of the locomotive rests on the drive wheels? A. In passenger engines about two-thirds, in freight engines from four-fifths to the whole. 4. Is there any device in use to prevent drive wheels from slipping, outside of the use of sand? A. None successful that we are aware of.

(41) D. L. writes: I wish to locate two hydraulicrams to work together; the fall is 10 feet, and length of entry pipes 25 feet. The water is to be raised 80 feet through a pipe 1,000 feet long. Will they raise the same quantity of water through a tube of 2 inches diameter as through one of 1 inch diameter (outlet tube of course)? Would the rams work successfully in case the tube were 4 inches diameter? A. The rams will operate better through a 2 inch than a 1 inch pipe. No objection to the pipe being 4 inches diameter.

(42) H. S. asks: 1. What pressure will mercury flasks bear for a steam boiler, as in SUPPLEMENT, No. 182? A. We do not know the test to which mercury flasks are submitted; but they will undoubtedly bear ten times the pressure usually carried on steam boilers. 2. How many flasks, and what size cylinder and propeller would it require for a Sharpie 26 feet long, 6½ foot beam, to go eight to ten miles per hour? A. 20 flasks submitted to the fire, and 4 or 6 for steam reservoir; engine 4 inch by 4 inch stroke; propeller 24 or 26 inches diameter, and 33 to 38 inches pitch.

(43) P. H. asks: 1. Should in the speed of circular saws there be any difference for a cross cut and a rip saw? A. No difference of speed between a cross cut and rip saw. 2. What should be the speed of the cylinder of a planer (surfacer), and what the feed for soft wood work, such as general mill work, and what for hard wood work, such as furniture? A. For a planer, about 800 revolutions per minute; the feed must depend upon the character of the wood and condition of the knives. 3. What is the proper speed of a band and what for a scroll saw? A. Speed of band saw 6,000 feet per minute; speed of scroll saw if well constructed and balanced, from 800 to 1,000 strokes per minute.

(44) J. C. B. asks: Can you give me any remedy that will drive off or kill water bugs? Our house is becoming infested with them. A. Persian insect powder thoroughly blown into all the crevices at the wall, around the water pipes, and around range will generally dislodge and kill them. The powder should be applied once a week for three or four weeks.

(45) J. G. S. asks: Can you tell me through the SCIENTIFIC AMERICAN how I can copper plate or silver plate small brass articles without a battery, or how to make a battery and liquid to do it as cheaply as possible? A. You will find on p. 409 (15), Vol. 40, of SCIENTIFIC AMERICAN, directions for making a silvering solution to be applied with a cloth, and on p. 219 (43), same vol., there are directions for coppering castings.

(46) J. S. B. writes: In your issue of March 20, under "Notes and Queries," your correspondent, B. S. (19) complains of the wasting away of copying pad in cleaning after use. There is no necessity for cleaning off the impression. If the pad is laid aside for 24 hours it will be found that the ink has been entirely absorbed, and a perfectly clear surface is left for another copy.

(47) S. B. G. asks: 1. Why was Cleopatra's monolith named a needle? A. Slender rock columns, whether natural or artificial, are commonly called "needles." 2. Has Cleopatra's needle reached New York yet? A. No. 3. In what part of the city will it be set up? A. Not decided. 4. Does the Cassiquiari River in Brazil always flow in the same direction? A. No.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

G. W. G.—Nickeliferous pyrrhotine—worth an analysis.—J. M.—Quartz, with sulphide of iron—not valuable.—J. W. K.—Magnetite—magnetic oxide of iron—in gneiss rock.—J. B. G.—It is quartz rock—of no value.

COMMUNICATIONS RECEIVED.

Report of Weekly Meeting of Polytechnic Association.

On the Iowa Meteorite. By A. W. B.

Curiosities of the Key Board. By

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending

March 9, 1880,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A complete copy of any patent in the annexed list, including both the specifications and drawings, or any patent issued since 1867, will be furnished from this office for one dollar. In ordering please state the number and date of the patent desired, and remit to Munn & Co., 37 Park Row, New York city.

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