HINTS 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 This is for our information and not for publication.

References 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 bear in 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.

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Minerals sent for examination should be distinctly marked or labeled.

(9164) H. B. W. says: Mr. J. has two horizontal tubular boilers 48 inches by 12 feet, + 90 pounds steam pressure on boilers running two engines of 50 horse power each. The past year he used 450 tons bituminous coal to operate the two boilers. What would he save in coal should he install one boiler 66 inches by 18 feet doing the same work as the other two boilers now in use? A. It would require just as much coal to develop 100 horse power from one boiler as it would from two 50 horse power boilers if all other conditions were the same. In installing a new plant it would be probable that some improvements could be made over an old plant, but no direct gain would come from having one boiler instead of two to do the work. 450 tons of bituminous coal per year does not impress us as being a large amount of coal to develop 100 horse power for ten hours a day and 300 days in a year.

(9165) W. F. D. says: Will you please tell me where I can get information concerning the management of small steam launches—I mean the government regulations and rules? A. If you will address the Secretary of the Treasury, Washington, D. C., he will mail you the United States government regulations and rules regarding the use of steam launches and the conditions under which licenses are necessary and can be obtained.

(9166) C. W. S. says: Please give me the serial numbers of SUPPLEMENTS on tools for finding center of the ends of shafting, etc. Also number of SUPPLEMENT on the combination square. A. We would say that the commonest and best tool for this purpose is what is known as a "centering square," which consists of a square with a long blade bisecting the 90-degree angle of the square. This square is used on the end of a shaft much as a T-square is used on a drawing board, and by means of it a diameter of the end of the shaft can always be accurately drawn. By turning the square on the shaft, another diameter, approximately at right angles to the first, can be drawn. The intersection of these two diameters is the true center. There are also a number of machines on the market which drill and counterbore the ends of shafts accurately at their center. See SUPPLEMENT No. 311, mailed for 10 cents.

(9167) F. H. asks: Please let me know how much more power is required to turn a car, trolley, for instance, at an angle of 90 degrees, such as turning a corner, than it does when going straight ahead. A. The power needed to move a car around a curve depends upon the speed, weight, velocity, and length of wheel base of the car, and the radius of curvature of the track. There is, then, no general answer to the question. Some engineers' reference books give figures for particular cases.

(9168) A. V. B. says: Theoretically what are the most favorable conditions for obtaining the greatest efficiency in operating the compound steam engine? I am of the opinion that there are limitations as to length of stroke, point of cut-off, piston speed, and the proportionate size of the high and low pressure cylinders as applied to the locomotive for best possible results. This will of course cover the speed of train, tonnage, etc. To make myself as plain as I can I will state that I am aware that the compound locomotive is in its experimental stage, and I am working on what I think will be an improvement. Locomotives are, as you are aware, designed for high-speed trains and for the purpose of hauling trains where load is the first consideration, speed the secondary. You may confine your answer to the locomotive and where you cannot give proven facts please give your opinion. 1. Theoretically, what are the most favorable conditions for obtaining the greatest efficiency in operating the compound steam engine? A. You ask what are the most favorable conditions theoretically for obtaining the greatest efficiency in operating compound steam engines. In reply we can only say that the conditions of service vary so greatly in high-speed passenger service, with light and heavy trains, in fast freight service, and in freight service where maximum load is the principal consideration, on roads with light grades and curvatures, and on roads where the grades are heavy and the curves sharp, that there is no one set of conditions which will best meet all of the various requirements of this varying service. What is best in one place would not be best in another; also what is best for small locomotives would not be best for locomotives of large power. We think from this you will see that it is impossible to satisfactorily answer the question as you ask it. 2. For given stroke the proportionate diameter of cylinders? Is there any rule for proportioning stroke and diameter of cylinders for given piston speed? (Your opinion and reasons for best practice along these lines.) A. You ask if there is any rule for proportioning stroke and diameter of cylinders for a given piston speed. In reply to this we would say that there is no definite rule, and that the best practice varies quite largely. The practical considerations of the design of the engine largely govern this. With locomotives a 24-inch stroke has come to be regarded as almost a standard, regardless of the diameter of the cylinders, in both simple and compound engines, while the diameter of the cylinder is varied according to the power required. 3. What do you consider the best type of compound engine now operating on the different railroads? (Opinion and reasons.) A. In reply to your question regarding the best type of compound engine, we would say that many types have been suggested, but there are three which have stood the test of service: (No. 1.) The two-cylinder compounds, with the high-pressure cylinder on one side of the locomotive and the low-pressure cylinder on the other side. (No. 2.) The tandem compounds, with the high-pressure cylinder either directly in front of, or behind, the low-pressure cylinder, with both pistons acting on the same piston rod. (No. 3.) The four-cylinder compound, with a high-pressure cylinder either directly above or directly below the low-pressure cylinder on each side of the locomotive, with two piston rods on each side, both acting on a common cross-head. It is impossible for us to say which of these types is the best. Each one has advantages over the others. A greater number of No. 3 type have probably been built than of either of the other two types. The first is the simplest and the cheapest, but has the disadvantage of being the one in which it is most difficult to equalize the work on the two sides of the locomotive. No. 2 simplifies the cross-head construction, and insures that the pressure on it will always be central. It takes up less room vertically, but the cylinder casting projects forward on the locomotive considerably further than on the other types, and on some designs of locomotive this would interfere with the forward truck. The piston valves and steam passages in No. 2 are not quite so simple as they are in No. 3. No. 3 has two pistons, acting on a common cross-head, and with it it is impossible to so perfectly equalize the work done in the two cylinders as to have the pressure on the cross-head always central. On the other hand, the valve mechanism is simple and the cylinder arrangement is compact. You do not directly ask for the area between the high-pressure piston and the low-pressure piston, but it may interest you to know in a general way what ratios have been found most satisfactory. With type No. 1 it is desirable to have the cylinders more nearly equal in size than in the other types, as they are located on opposite sides of the engine. A common ratio here between tne area of the two pistons is 2.25. With type No. 2 common ratio is about 3.50, while with No. 3 the commonest ratio is about 2.75. 4. Which do you consider the best type of compound engine now operating? A. The experience with compound locomotives has been too short for engineers to decide definitely which is the best type. With stationary engines, the cross compound Corliss engine is conceded to be the most economical. The difficulties that have to be overcome with the compound locomotive are: First, the difficulty in starting on grade or under heavy load. Second, the equalizing the work on the two sides of the engine under all conditions of load. Third, the balancing of the reciprocating parts. Fourth, the difficulty of simultaneously varying the cut-off in the two cylinders in such a way as to get the same effect as is obtained by shortening the cut-off in the simple cylinder. Fifth, the increased danger of break-downs due to the more complicated mechanism and the difficulty of getting engineers who can intelligently operate and care for the compound engine. With stationary engines, a gain of nearly 40 to 50 per cent may be obtained by compounding. With locomotives the decreased fuel consumption is not quite so great, 35 per cent being, perhaps, an average figure.

(9169) M. H. says: I have a 40-gallon air tank. The compressed air, when allowed to escape from the tank, possesses a very musty, disagreeable odor. I took the side valve off and emptied a small quantity of rusty-looking liquid. After rinsing it with a solution of potassium permanganate (which remedied the evil somewhat) the air in the tank still smells. I had thought of passing steam through. Or would chlorine do? I must have the air absolutely odorless for my purpose. Can you help me? A. In reply to your question regarding the musty and disagreeable odor from your compressed air tank, we would offer you the following suggestion: If the air which you force into your tank is clean and perfectly dry, and if the tank itself is clean and dry, we do not think that you will have difficulty. First, therefore, clean your tank thoroughly. We would suggest using boiling water, and then drying it thoroughly, heating it for some time, if necessary, to a temperature above 212 degrees. Second, in order to insure that the compressed air which you force in will be clean, cause it to bubble slowly through clean water, and then pass it through a long tube of small lumps of calcium chloride to extract from it all the moisture which it may carry with it from the water which has been used to wash it.

(9170) G. P. K. says: What I want to know is the full value of the increased use of steam as laid down by Emory Edwards in the Axeom, in his work on steam engineering, and upon which he and others attach great importance. To use a little steam at a time, to use it quickly and to keep it hot is the fundamental principle of high rotative speeds, than which there is nothing more practically important in steam engineering. This in a general sense I can understand but what I want to get at is *how much* is gained or lost by rapid or slow use of steam. Suppose an engine is making a certain number of revolutions a minute. How much would be the actual or approximate gain on the basis of the quoted statement—to use that steam twice as fast, everything else being equal? If you have anything that will enlighten me on this subject I would like to get it but would rather some competent person would give as near as possible something more definitely expressed—in figures if possible. This fully dealt with in any work you may supply or in any article you may scientifically treat of I am willing and glad to invest in, as it is a matter I am very much interested in, as there are five engines in this establishment at work at present and I am working on a new plan embodying that principle. The number of engines at work in this region are legion and although the waste is used as fuel there is seldom any surplus of strain and the men who have charge of the engines—well, I will say nothing only that somehow we get along. A. We would say that we regret there is no positive information which we can give you on the subject. If it were not for losses of cylinder condensation, it would make no difference in the economy of an engine whether it should run at high or low speed. One of the principal losses in the steam engine, however, is due to the cylinder condensation, and this loss may be slightly reduced by increasing the speed of the engine. The amount of this reduction will depend entirely upon the design of the engine and the steam pressure that it is working under. There are no experimental data which will enable us to give you any exact figures. In some slow-speed engines the loss due to cylinder condensation amounts to only a few per cent, and in them an increase of the speed would help the economy very little. On the other hand, on some high speed engines there is a loss due to cylinder condensation of at least 15 or 20 per cent, which could, perhaps, be slightly reduced by still further increasing the speed of the engine, but in all probability such gain in economy would be small. There are probably very few cases in which increasing the speed of an engine would decrease the steam consumption by more than about 10 per cent. We regret that there are no exact experimental data on this subject which we can give.

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