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A STANDARD HORSE POWER FOR STEAM
ENGINES.

It is customary to value steam engines by the conventional unit of horse power. A manufacturer will build an engine of so many horse power for so much money, but if you ask for the dimensions you will hardly find two makers who will give the same figures. In Britain the manufacturers have approximated to a common standard, but in Canada and the States, "*nominal horse power*," as a commercial unit of capacity, or power of performance is an exceedingly vague expression; so much so that scarcely an individual manufacturer can be found whose practice is uniform. It signifies but little what a horse power is defined to be, so long as it is uniform, but at present the same sort of confusion exists as would be introduced if every mechanic were to adopt a different length for his foot rule, one making it twelve inches, another thirteen, and so on.

A recognized uniform standard of power is a desideratum which, if established, would enable buyer and seller to deal with greater confidence and certainty, and is, therefore, a legitimate subject for legislation.

For an article which is every year becoming more essential as an adjunct to the most important industrial pursuits, there should certainly be a common unit of measure. If we bargain for a bushel of wheat, a barrel of flour, a yard of calico, or a ship of so many tons burden, a legal standard determines with the utmost nicety the quantity we are to receive; but if we contract for a ten-horse steam engine there is room for a hundred different interpretations as to the actual size and practical value of the article. This uncertainty is the fruitful cause of dissatisfaction and not unfrequently of litigation. We were recently called upon to give evidence in a case where the dispute hinged on the capacity or actual force to be understood by so many horse power. A dozen witnesses, all of them professing to be experts, were examined, but no two of them held the same opinion, further than that a horse power should indicate the ability to elevate 33,000 lbs. one foot high in one minute. Beyond this not very convenient constant, laid down by Watt in the very infancy of the steam engine, no one appeared to have advanced. As to how the power thus demanded was to be developed there was no fixed opinion. Whether in a small cylinder with high speed and high pressure, or in

a larger cylinder under opposite conditions, was apparently as unsettled as in the days of the Marquis of Worcester; nor was there any greater concord as to the size of cylinder and pressure of steam which would best produce the required force.

This uncertainty must tell materially against the extension of the use of steam power by prejudicing the interests of both manufacturer and purchaser, and in our opinion both would be served if a legal definition were given to a "*horse power*" as a commercial unit. Exception may be taken to the interference of the Legislature in questions of this kind by those who look with jealousy upon any interference in trade transactions, but we can see no good foundation for such objections. It is as reasonable, and quite as necessary, to establish a standard "*Horse Power*" as a "*Standard Bushel*," a "*Standard Yard*," or a standard for determining the tonnage of ships. Leave the contracting parties to make their bargains by nominal or actual horse power, or by specific dimensions as they think best, but where a contract is made for an engine of so many horse power let us have a legal definition of its meaning.

The rather odd number 33,000 lbs. raised one foot high was adopted by the fathers of the steam engine as expressing the *force* which a good horse, working under favorable circumstances, could exert in one minute of time. The expression was convenient when horses rivalled steam engines, and is now retained because it would be inconvenient to change that which has continued for so great a length of time. One-horse power is therefore equivalent to 33,000 foot pounds—that is 33,000 units of work in a minute. This "*is actual horse power*," and was formerly synonymous with "*nominal horse power*," but at the present time these terms have widely different meanings. The divergence first arose in a desire to give full measure, just as the *cwt.* of 112 lbs. is given for 100 lbs.; or the heaped bushel for the actual bushel. Later the competition among manufacturers and the wonderful march of improvement in this branch of mechanism, whereby the development of power in a cylinder of given capacity has been doubled, and even quadrupled, has increased the discrepancy, until the constantly widening difference between nominal and actual power culminated in the *Great Britain*, whose engines of 2,600 nominal horse power have developed an *indicated* or actual power of 8,300 horses.

Actual horse power is liable to many disturbing causes, some of which vary with every change in the dimensions of the machinery, and its final determination can never be arrived at with exactness until the engine is at work and an indicator attached to the determined point at which the force is to be delivered. Numerous attempts have been made to establish a formula for determining from given dimensions and a stated pressure of steam the actual power which an engine will develop, but so much depends on workmanship and on the arrangement and proportion of parts that all these attempts have only modified the value attached to the nominal power.

Where the same rule obtains for determining the nominal power, it is the excess of force developed over the power so determined that forms the true index to the comparative value of the engines pro-