tests, must be regarded as established by the work of Charpy, Bengough and Hudson, Mathewson and Phillips and Thompson. Moreover, according to Howe, the first effect of slight heating in the case of iron may be either a softening or a hardening, depending on the intensity of the previous deformation, and in his view at least two agencies are at work in producing these results.

Prof. Carpenter and Mr. Taverner, of the Royal School of Mines, have investigated the way in which the tenacity of cold-worked aluminium of one particular degree of hardness is affected after the application of heat at various temperatures, and for periods of time very much longer than any that have been employed in any previous investigations. They find that the effect of heat at temperatures from 550°-300° C. inclusive is to cause a very rapid softening of the metal, and that *the same ultimate value of tenacity is reached in all cases*. Softening is complete in ninety-six hours, and nearly the whole of this occurs in the first hour of the test. At 250° C. the rate of softening, while still considerable, is much less rapid. Between 600 and 800 hours are required for complete softening, and here also the same ultimate value of tenacity is reached as at higher temperatures.

From 200° to 100° C. inclusive the rate of softening is slow, and as the temperature of 100° is approached, very slow. The actual sequence of changes can be classified conveniently under three heads :—(1) A comparatively rapid drop in tenacity in the first hour. (2) A tendency either to cease falling or actually to rise, such rise, in one case only, bringing the tenacity up to the original value. This period is in most cases completed in about 100 hours. (3) A relatively very slow fall of tenacity which is maintained on the whole steadily. These tests are still in progress. Assuming the present rate of loss of work-hardness to be maintained, and that the metal ultimately reaches the same tenacity as specimens tested at the higher temperatures, periods of the order of from one to three years will be required for completion. The fluctuations in the tenacity values referred to under (2) appear to be well established. Similar fluctuations in the rate of solution of hard-worked aluminium-sheet had previously been recorded by Seligman and Williams. The authors have also shown that the cold-rolled aluminium loses a considerable part of its work-hardness, in the temperature range 200° to 100° C., with scarcely any recovery of plasticity as judged by the elongation test. H. C. H. C.

## *BRILLIANT FIREBALL OF OCTOBER 1.*

METEORS of the largest type exhibit a propensity to appear in the twilight of early evening. On Monday, October 1, at 6.37 p.m., a splendid object of this class presented itself, moving slowly along an extended flight in a south to north direction. It was observed by a large number of persons in various parts of the country, and descriptions have been received from places so wide apart as Weston-super-Mare, Somerset, and the extreme North of England.

The accounts to hand are not, as usual in such cases, in perfect agreement, but some of them are excellent, and form a good basis for determining the meteor's real path in the air. The Rev. Canon J. M. Wilson observed the meteor from Worcester, and describes its flight as from 40° E. of N., alt. 15° to 18°, to 5° E. of N., and alt. 5°. Duration about 2½ sec. for the section of path he viewed. The Rev. J. Dunn, of Weston-super-Mare, describes the fireball as very brilliant, passing just above Capella. It was visible for five seconds; the head was some ten minutes of arc in diameter, and it threw off a short, reddish trail of sparks. Mr. H. J. Woodall saw the fireball from Oldham, and says it was in a direction 9° N. of E., and falling towards N. at an angle of 30°. The Rev. Watson Stratton, writing from Goole, Yorks, gives the path as from N.N.E., nearly as high as Polaris, to a point a few degrees W. of N., and about alt. 12°. Mr. Philip Burtt was at Penrith Station, and viewed the meteor as it descended and terminated its career just to the right of the moon. It was of a rich yellow colour. Mr. T. J. Moore reports from Doncaster that the direction was from E.N.E. to N.N.W., and that about one minute after the object had passed a very loud explosion was heard.

Many other accounts from Liverpool, Grantham (Notts), and other places might be quoted. Spectators agree as to the remarkable brilliancy of the object, and state that it aroused apprehension in cases where its real nature was not understood.

I have computed the real path as follows :—

Height at appearance, 56 miles over 4 miles E. of Boston, Lincolnshire.

Height at disappearance, 19 miles over 15 miles N. of Stanhope, Durham.

Length of luminous course, 160 miles.

Velocity per second, 23 miles.

Radiant point, 320°−22° in Capricornus.

The Rev. J. Dunn's estimate of the diameter would give the dimensions as half a mile, but this included the flaming effect and glare. Probably the solid nucleus was not many inches in diameter. As to the sound heard at Doncaster, it came too quickly for it to have been a meteoric effect.

Another fireball was seen on September 23. It lit up the sky, and was directed from a radiant at about 322°−23°, and probably belonged to the same system as the more recent one of October 1. Observations of the latter are still coming in, and it may be found desirable slightly to alter the results above given. A second fireball was seen on the same night at 10.46. Its radiant appears to have been at 351°+2°, and its height seventy-six to forty-one miles.

W. F. DENNING.

## *THE TASK OF BRITISH AGRICULTURE.*

THE speech of the President of the Board of Agriculture at Darlington on October 5 calls for the widest attention as an authoritative pronouncement on the present situation of British agriculture in relation to the need for increased food production. The exigencies of a long war have imposed upon the British farmer the duty, on one hand, of securing a greatly increased production of bread-corn and potatoes, and, on the other, of maintaining the supplies of milk and meat. The ideal placed before him by the Board of Agriculture in the first place is an increase of 3,000,000 acres under grain, potatoes, and roots, to be obtained partly from existing arable land and partly by ploughing up pasture. To secure this end the Government is prepared to help, and Mr. Prothero outlined how much has already been done in the way of guaranteed prices for corn, extension of credit facilities, supply of soldier and women labour, increased supplies and controlled prices of fertilisers, supply of horses, ploughs, and ploughmen, and further of mechanical tractors. Of the last-named 1500 are already at work, and it is hoped that by February next the number will have increased more than fourfold. A timely warning was given, however, that the tractor in its present stage of development must be regarded as the least efficient of ploughing implements, and should be used preferably for the lightest work.

On the question of the maintenance of the milk supply Mr. Prothero urged that with the reasonable