T_b being the boundary-temperature. Further, $T=T_b\sqrt[4]{1+x}$, and therefore

$$\frac{dT}{dx}=\tfrac{1}{4}T_b(1+x)^{-\frac{3}{4}}.$$

$$\frac{dT_1}{dx}=T\frac{d}{dx}\left(\frac{T_1}{T}\right)+\frac{T_1}{T}\frac{dT}{dx}.$$

$$\frac{P}{\rho}=\frac{1+bx}{(b-1)x}hT_1.$$

h, the gas-constant, is of the order of c_v ; b, the ratio of the force of gravity to the force of radiation-pressure, is a number larger than 1.

Substituting this in the differential equations (14*a*) and (15*a*) these become :

$$\frac{d^2}{dx^2}\left\{(1+x)\frac{T_1}{T}\right\}=-\frac{c_vq}{4\mu T_b{}^3k}\cdot\frac{\lambda T_2}{T}\sqrt[4]{1+x}$$

$$\frac{d^2}{dx^2}\left\{(1+x)\frac{T_2}{T}\right\}=+\frac{c_vq}{4\mu T_b{}^3k}\cdot\frac{T_1}{T}\sqrt[4]{1+x}-\frac{hq}{4\mu T_b{}^3k}\cdot\frac{1+bx}{(b-1)x}\cdot\frac{\rho_1}{\rho}\cdot\sqrt[4]{1+x}.$$

The factor $\frac{c_vq}{4\mu T_b{}^3k}$ is of the order of 10^{-5}; therefore, unless x is very large or very small, we may neglect the right-hand members of (14*a*) and (15*a*). It appears that the layers where the right-hand members become of some importance contribute hardly anything to the radiation or to the line-absorption. So the general solution for the boundary is, with sufficient accuracy :

$$\frac{T_1}{T}=A+\frac{B}{1+x}$$

$$\frac{\lambda T_2}{T}=C+\frac{D}{1+x}.$$

Without drawing any positive conclusion, I draw attention to the fact that Dr. Jeans' analysis is not sufficient to prove the absence of a difference in phase, between r and T, in the outer layers.

Unusual Bright Filaments on the Sun on 1926 *February* 22.

By T. Royds, D.Sc. (Plate 2.)

On 1926 February 22 the spectroheliograms obtained at Kodaikanal showed near an active sunspot the development of remarkable bright filaments which were much brighter than ordinary flocculi. I have not been able to find a similar instance in the whole of the Kodaikanal record of spectroheliograms extending from 1904, and I am not aware of any having been published by other solar observers. It would appear,

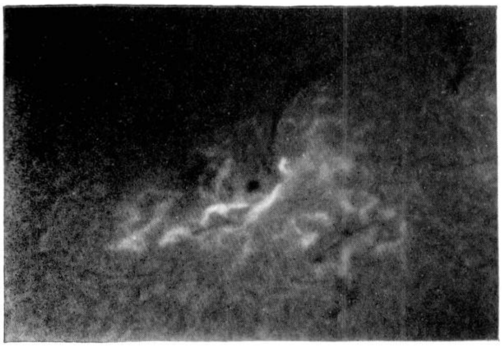

FIG 1. 8h 3m

FIG 2. 8h 8m

FIG 3. 8h 36m

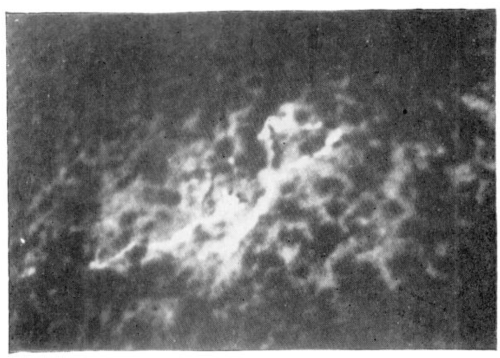

FIG 4. 9h 0m

This line represents 9′ or 400,000 km.

Figs. 1, 2, 3, and 5.—H_α Spectroheliograms.
Fig. 4.—K_{23} Spectroheliogram.
North is at the top.
East is on the right.

FIG 5. 9h 4m

Kodaikanal Spectroheliograms on 1926 February 22, therefore, that the phenomenon, which is illustrated in the accompanying plate, is a very unusual one.

Spectroheliograms were begun at 7^h 51^m I.S.T. (G.M.T.+5^h 30^m). Fig. 1 is an enlargement from the first H_α spectroheliogram at 8^h 3^m of a region near the active spot near the centre of the figure. The spot's position is 23° N. and 9° W. of the central meridian. Fig. 1 exhibits, in addition to dark markings and the usual bright flocculi, some parts of the flocculi which are much brighter than the rest, but this is not very exceptional. What is very unusual is to see these brighter parts develop into such intense and extensive bright filaments as exhibited in the later photographs.

By 8^h 8^m, fig. 2, there is considerable growth in length and intensity; at 8^h 36^m, fig. 3, there is further development, the more westerly branch now actually touching the sunspot, whilst the large dark marking seen to the north in figs. 1 and 2 has disappeared in fig. 3. Since the dark marking is restored, though in modified form and extent, in a spectroheliogram taken at 8^h 41^m with the slit set on the red edge of the H_α line, its apparent disappearance from fig. 3 should probably be attributed to Doppler displacement of the darkened H_α line. The dark marking reappears considerably changed in form in the spectroheliogram taken with the slit central on the H_α line at 10^h 24^m and is maintained thereafter.

Fig. 4 is a calcium K_{23} spectroheliogram taken at 9^h 0^m. This spectroheliogram was intentionally under-exposed to prevent the ordinary flocculi from developing into the dense white masses familiar to all who have seen calcium spectroheliograms. In consequence of the under-exposure, the ordinary flocculi appear in only medium brightness, but the relative brilliance of the bright filaments is made clear.

The maximum development in brilliancy of these filaments was reached at 9^h 4^m, shown in fig. 5. Subsequently the filaments persist with some changes of form, but become less brilliant. They were still striking in the last spectroheliogram taken at 15^h 6^m.

The bright filaments described were due, of course, to brilliant reversals of the H_α and K lines. The reversals in the H_α line were examined visually in the spectroscope; the reversal was not, in general, displaced, but the dark H_α line was displaced locally by over 2 Å. Mr. S. Balasundaram Iyer, Assistant, making visual observations of disc phenomena with another telescope, found that near the umbra of the spot the D_1, D_2 and *b* lines were also reversed; D_3 was dark to the north of the spot.

There was very little movement of the bright filaments over the surface of the sun, the maximum velocity being only 1·4 km./sec.