(here, the same text as received hand written from Myron, 29 Jun 2013, but with alternate symbols for easier discussion, and the additional hints in blue given in his e-mail)

244(5) Theory of the Photoelectric Effect

Consider the starting equation of note 244(4): for a photon colliding with a static electron:

(Relativistic conservation of total energy when a photon with mass collides with an electron. Note carefully that TOTAL energy is conserved.)

$$\gamma_p m_p c^2 + m_e c^2 = \gamma_p' m_p c^2 + \gamma_e' m_e c^2 \tag{1}$$

with $\gamma_p = 1/\sqrt{1-\frac{v_p^2}{c^2}}$ = relativistic mass increase of the photon having the velocity v_p ,

γ_p', γ_e' = relativistic mass increases of the photon and electron after the collision,

m_p, m_e = rest masses of photon and electron

c = light speed in vacuo, must be greater than the photon velocity v_p .

Now let:

(The de Broglie equations for photon and electron.)

$$\hbar\omega_p = \gamma_p m_p c^2 \tag{2}$$

with ω_p = angular frequency of the incoming photon

$$\hbar\omega_e' = \gamma_e' m_e c^2 \tag{3}$$

with ω_e' = angular frequency of the out coming electron(!)
(Is this really meant so?)

and consider the case where the photon is stopped by the collision:

(Conservation of energy with a static photon, total energy is again conserved.)

$$\hbar\omega_p + m_e c^2 = m_p c^2 + \hbar\omega_e' \tag{4}$$

where $m_p c^2$ is the rest energy of the photon. This concept does not exist in the standard model of physics. So

$$m_p = m_e / c^2 (\omega_p - \omega_e') \tag{5}$$

If:

(Describes the complete transfer of energy from photon to electron, without binding energy.)

$$\omega_p = \omega_e' \tag{6}$$

then

(A consequence of equation (6), mass of electron equals mass of photon.)

$$m_p = m_e \tag{7}$$

i.e. the mass of the photon and electron are the same and all the energy of the photon is transferred to the electron.

Now rate eq. (7) a new hypothesis of physics, the mass of the electron is the same as that of the photon.

If

(What is observed in the photoelectric effect.)

$$\omega_p \neq \omega_e' \tag{8}$$

then

(Introduces the binding energy.)

$$\hbar(\omega_p - \omega_e') = \Phi + (m_p - m_e)c^2 \\ = \Phi \tag{9}$$

where Φ is the binding energy of the photoelectric effect. From eq. (9):

(Is conservation of total energy in the presence of binding energy.)

$$\hbar\omega_p + m_e c^2 = m_p c^2 + \hbar - \omega_e' + \Phi \tag{10}$$

i.e.

$$\hbar\omega = \hbar\omega'' + \Phi \\ = E + \Phi \tag{11}$$

or

(If the photon and electron masses are equal, the usual equation of the photoelectric effect is recovered).

$$E = \hbar\omega_p - \Phi \tag{12}$$

which is the usual photoelectric effect equation, QED.

Therefore it is assumed that the photon and the electron mass are the same. The photon does not disappear, and transfers its energy to the electron.