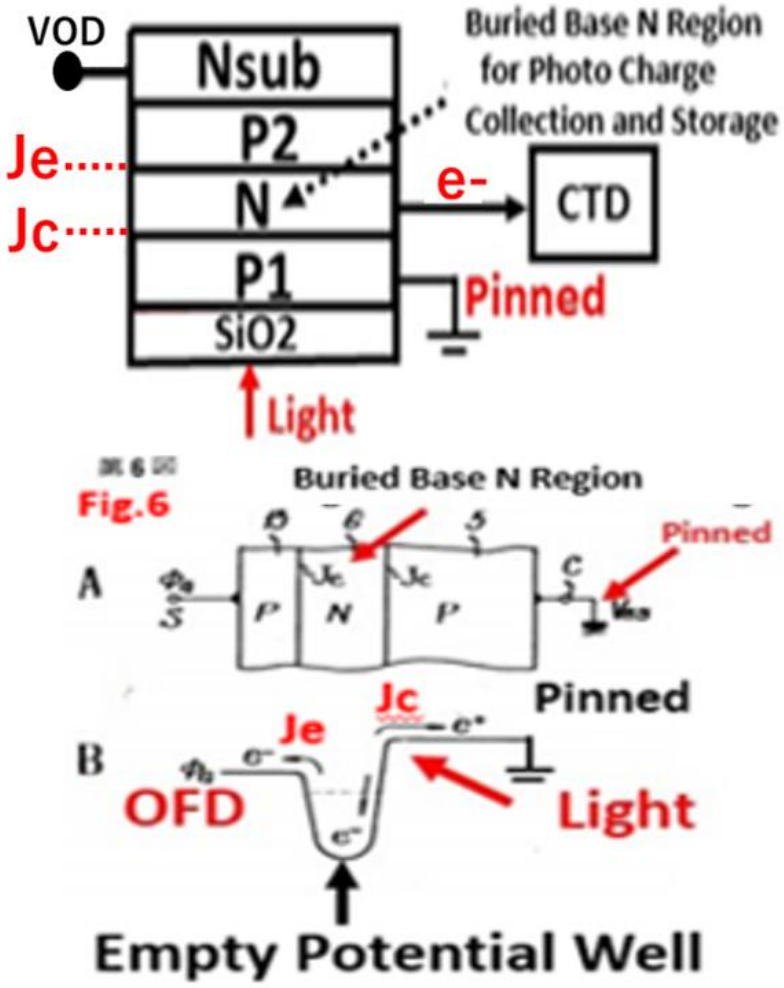

Fig 7 The patent claims in Japanese and an English translation with a reproduction of a figure drawn in Japanese patent application JPA1975-134985 which defined an PNP double junction dynamic photo transistor type Pinned Buried Photodiode with in-pixel overflow draining (VOD) capability.

***Abstract*— This paper reviews the invention of Pinned Buried Photodiode in 1975 by Yoshiaki Hagiwara at Sony which is also called as Hole Accumulation Device (HAD) which was originally defined in the form of the P+NPNsub triple junction type dynamic photo thyristor structure with the in-pixel vertical overflow drain (VOD) function to realize the electric shutter function capability. The evidence of the invention is explained with the three Japanese Patent Applications applied by Hagiwara at Sony in 1975. The first double junction type Pinned Photodiode was also developed by Hagiwara Team at Sony in 1978 and reported in the Japanese domestic SSDM1978 conference in Tokyo. The three original Japanese Patent Applications, filed by Hagiwara in 1975, were the evidence of the invention, however, being written only in Japanese and unfortunately never having been applied in USP and other oversea patents. The details are now reviewed and disclosed here with the English translation of the original Japanese Patent Applications for the first time in the IEEE English speaking community. The triple junction type Pinned Buried Photodiode has inherently the image-lag-free feature, the in-pixel VOD function and the electric shutter function capability, that have completely replaced film media and mechanical parts from the modern high-definition solid-state digital cameras.**

Keywords*—*PIN Diode, Buried Photodiode, Pinned Photodiode, Drift Field Bipolar Transistor, Dynamic Photo Transistor, In-pixel Vertical Overflow Drain, Electrical Shutter Function, Global Shutter Function, Pinned Surface Gaussian Doping Profile, Barrie Potential, Solar Cell, Quantum Efficiency,