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MECHANICAL ENGINEERING IN ANCIENT EGYPT, PART V: JEWELLERY (ROYAL CROWNS AND HEADDRESSES UP TO THE 18th DYNASTY)

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ABSTRACT

This research paper explores the role of Mechanical Engineering in the production of Crowns and Headdresses in the Era of Ancient Egypt. The ancient Egypt Kings and Pharaohs used a relatively large number of Crowns indicating royalty and power. They started using Headdresses by their King since about 3100 BC and continued in this use for almost all their historic periods. The paper presents the use of the Khat Headdress, Modius Crown, White Crown, Red Crown, Blue Crown, Double Crown, Nemes Headdress, Cap Crown, Seshed Crown, Two Feathers Crown, Double Plumed Crown and a number of Compound Crowns. The paper covers a historical era up to the 18th dynasty of ancient Egypt.

KEYWORDS: History of mechanical engineering, ancient Egypt, jewellery industry, royal crowns and headdresses.

INTRODUCTION

The ancient Egyptians build one of the oldest and marvellous civilizations in the ancient world. Their kings and Pharaohs took crowns and special headdresses to emphasize royalty and power.

Steindorff, 1951 wrote an extensive paper in the Freer Gallery of Art about a royal Egyptian head. The king head was wearing a white crown and considered a treasure of the Freer

Gallery of Art. The head was from the 6th dynasty of the old kingdom. He presented also some statues in the Egyptian Museum, Louvre Museum, Museum of Fine Arts of Boston, Metropolitan Museum of Art of Newyork, British Museum and Berlin Museum. Steindorff and Seele, 1957 presented a number of illustrations in their book 'when Egypt ruled the east'. They presented illustrations from the Egyptian Museum, British Museum, Metropolitan Museum of Art, Berlin Museum, Oriental Institute Museum, Archaeological Museum Florence, Louvre Museum and Ashmolean Museum. They discussed the ancient Egypt history and art during periods starting from old kingdom to the decline and loss of Egypt's independence. Sandra, 1993 cleared up the misconceptions concerning the khepresh crown worn by Egypt Pharaohs during the new kingdom. She studied the development of its form and clarified its meaning when worn by the king. Wilkinson, 1995 collected 13 research papers about the valley of the sun kings of ancient Egypt presented in the International Conference of the Valley of the Kings held in the University of Arizona in October 1994.

Ziegler, 1998 presented a collection of 13 papers of Egyptology researchers on various topics including statues, royal women and monuments. Seawright, 2002 studied the most common headdresses or crowns of the deities of ancient Egypt. This covered the: Amen, Amentet, Anqet, Atem, Geb, Hathor, Hapi, Heh, Horus, Labet, Isis, Khonsa, Ma'at, Min, Mut, Nefertem, Nit, Nekhbet, Nephthys, Nut, Osiris, Ptah, Satet, Serqet, Seshat, Shu, Thoth and Wedjet. Bard, 2007 studied the definitions and history of the Egyptian archaeology, hieroglyphs, environmental background to pharaonic civilization geography, Egyptian prehistory, early civilization old kingdom, first intermediate period, middle kingdom, second intermediate period, new kingdom, third intermediate period and the Greco-Roman period. She included useful illustrations from tombs, temples and museums. Dunn, 2011 studied some specific crowns worn by ancient Egypt Kings and Queens. His study covered the: White Crown, Red Crown, Double Crown, Two-Feathers Crown, Atef Crown, Nemes Headdress, Khat Headdress, Seshed-Circlet, Cap Headdress, Blue Crown, Amun Crown, Vulture Cap and Divine Crowns. Witteveen, 2013 declared that the ancient Egypt crowns never physically been found neither inside not outside the graves. He handled the details of the Nemes Headdress giving some examples of Pharaohs wearing the nemes. Arnold, 2016 studied the wood statue in the Metropolitan Museum of Art which belongs to the rein of of Amenemhat II of the 12th dynasty (1919-1885 BC). The statue was wearing the Red Crown of the Lower Egypt. Hassaan, 2016 published a series of research papers aiming at exploring the history of Mechanical Engineering during the ancient Egypt era. This was through investigating the production of some jewellery parts: pectorals, necklaces and bracelets.

Predynastic and Early Dynastic Periods

The ancient Egyptians new wearing Royal Crowns from time of Late Predynastic period (about 3100 BC). Fig.1 shows the King Scorpion of the Late Predynastic Period (about 3100 BC) in the Ashmolean Museum of Oxford [Louvre Museum, 1999]. The King is wearing the Khat Headdress.

Fig.1 King Scorpion wearing the Khat Headdress.

The second type of crowns and headdresses recorded in this period is the While Crown of the Upper Egypt. This appears in one side of King Narmer (the first king of the first dynasty) palette as shown in Fig.2 [Dunn, 2011]. The King is wearing the While Crown and smiting the heads of the enemies of Egypt.

The third type of ancient Egypt crowns is the Red Crown of the Lower Egypt. It appears in the other side of Narmer's palette as shown in Fig.3 [Dunn, 2011].

Fig.2 King Narmer wearing the White Crown.

Fig.3 King Narmer wearing the Red Crown.

The King Narmer used also another type of crowns which is a Short Modius Crown as shown in Fig.4 [atlantablackstar, 12 images].

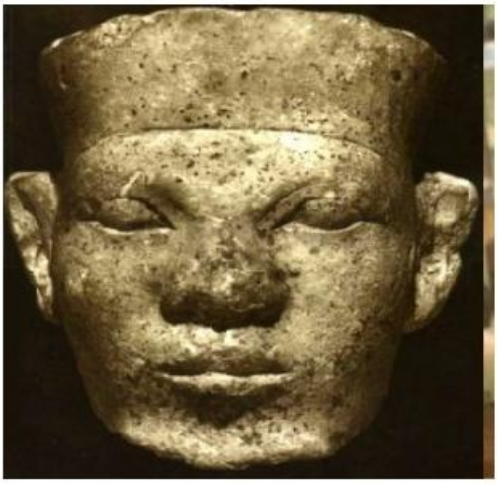


Fig.4 King Narmer wearing the Short Modius Crown.

After unification of Upper and Lower Egypt by King Narmer of the first dynasty, the Double Crown appeared in an invory palette found in the tomb of King Den (the 6th King of the first dynasty. The Double Crown of King Den is shown in Fig.5 [Wikipedia, Den].

Fig.5 King Den wearing the Double Crown.

The White Crown of Upper Egypt continued to appear in the second dynasty. A model of this is shown in Fig.6 for King Khasekhemwy, the first King of the second dynasty [lookless, Early dynastic period].

Fig.6 King Khasekhemwy wearing the White Crown.

Old Kingdom

In the old kingdom (3rd to 6th dynasties), artifacts of ancient Egyptians depict the fact that its Kings used the White, Nemes, Modius, Cap and Atef Crowns. Fig.7 shows King Djoser (the founder of the 3rd dynasty) wearing a White Crown in his step pyramid at Saqqara [Friedman, 1995]. King Djoser worn also the Nemes Headdress as depicted in his statue of the Egyptian Museum shown in Fig.8 [Moore, 2014].

Fig.7 King Djoser wearing the White Crown.

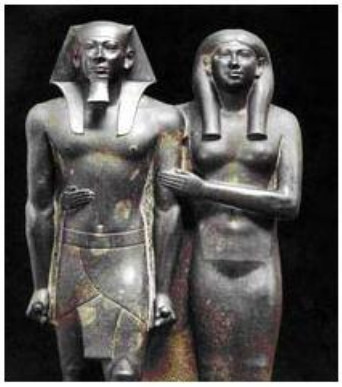
Fig.8 King Djoser wearing the Nemes. Headdress.

The kings of the Old Kingdom continued wearing the Modius Crown as in the Early Dynastic Period. Fig.9 shows King Huni (the last King of the 3rd dynasty) wearing a Modius Crown [Moore, 2014]. Also, King Khufu of the 4th dynasty appeared in his Egyptian Museum statue wearing the Modius Crown (Fig.10) and in another statue head wearing the Khat Crown

(Fig.11) [Moore, 2014]. The Kings Khafre and Menkaure who came after King Khufu worn the Nemes Headdress as shown in the statue of the Egyptian Museum (Fig.12) for King Khafre [Wikipedia], King Menkaure in his statue in the Museum of Fine Arts of Boston (Fig.13) [chinaculture, 2007] and the White Crown as shown in the statue of King Menkaure in the Egyptian Museum (Fig.14) [Wikipedia]. Moreover, King Menkaure of the 4th dynasty worn a Cap Crown as shown in Fig.15 [Reisner, 1931]. The Cap Crown is decorated by cobra in its front.

Fig.9 King Huni wearing the Modius Crown. Fig.10 King Khufu wearing the Modius Crown.

Fig.11 King Khufu wearing the Khat Crown. Fig.12 King Khafre wearing the Nemes.



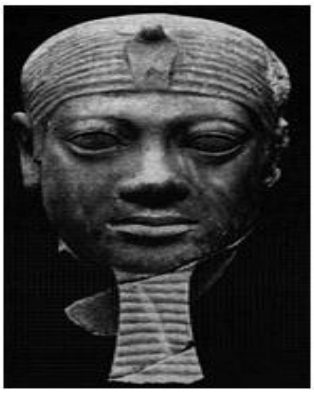


Fig.13 King Menkaure wearing. a Nemes Headdress. **Fig.14 King Menkaure wearing White Crown.** **Fig.15 King Menkaure wearing a Cap Crown.**

Moving to the 5th dynasty of the old kingdom we find that its Kings continued to use the Modius, Atef, Nemes and White Crowns and Headdresses as follows:

- King Userkaf, the founder of the 5th dynasty used the Modius Crown as shown in Fig.16 [Cristalinks], a head of the King in the Egyptian Museum.
- King Sahure, the second king of the 5th dynasty worn the Nemes Crown as in Fig.17 which is a complete statue of King Sahure in the Metropolitan Museum of Art [Metmuseum, Sahure].

Fig.16 King Userkaf wearing the Modius Crown.

Fig.17 King Sahure wearing the Nemes Headdress.

King Sahure worn also the Khat Headdress as shown in his complete statue shown in Fig.18 [Wikipedia,

Fig.18 King Sahure wearing the Khat Headdress.

- A Pharaoh from the end of the 5th dynasty appeared in an unfound complete statue (only his head) wearing the White Crown of Upper Egypt. The head and the crown is shown in Fig.19 [Smithsonian Institution, 2016]. The missing information of the King name, tomb or temple prove the side effects of the criminals mafia stealing the artifacts in allover the world. The profiles of the crown are very accurate and complex to manufacture with primitive tools, but they are the Ancient Egyptians who built the big pyramid in only 20 years !!.

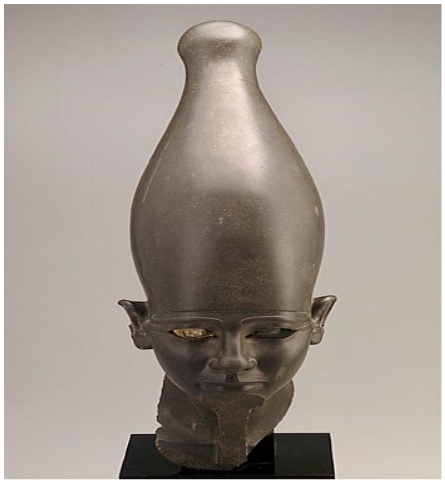


Fig.19 King wearing the White Crown.

Going to the 6th dynasty of the old kingdom, we have two examples of the first and last Kings wearing the Modius Crown as follows:

- King Teti, the founder of the 6th dynasty in an inscription displayed in the Egyptian Museum wearing a long Modius Crow as shown in Fig20 [Steindorff, 1951].

Fig.20 King Teti wearing a long Modius Crown.

- King Pepi I, the last king of the 6th dynasty in his complete statue in the Egyptian Museum wearing a short Modius Crown as shown in Fig.21 [pentirest].

Fig.21 King Pepi I wearing a short Modius Crown.

Middle Kingdom

In the middle kingdom (11th and 12th dynasties), we have two Kings from the 11th dynasty wearing the Modius Crown and the White Crown as follows:

- King Mentuhotep II, the 6th king of the 11th dynasty standing in the Jubilee Garment and wearing a long Modius Crown as shown in Fig.22 [Metropolitan Museum].
- King Mentuhotep III, the 7th king of the 11th dynasty standing in the Museum of Fine Srts of Boston and wearing the White Crown of Upper Egypt as shown in Fig.23 [Museum of Fine Arts, Boston].

Fig.22 King Mentuhotep II wearing the Modius Crown.

Fig.23 King Mentuhotep III wearing the White Crown.

The Royal Crowns continued in use during the 12th dynasty of the middle kingdom.

King Senusret I, the 2nd King of the 12th dynasty wearing the Nemes Headdress in the Neues Museum of Berlin as shown in Fig.24 [Wikipedia, Senusret I]. King Senusret I also worn the White Crown of Upper Egypt as depicted in his statue shown in Fig.25 [sankofasoul.tumblr].

Fig.24 King Senusret I wearing the Nemes Headdress.

Fig.25 King Senusret I wearing the White Crown.

- King Amenemhat II, the 3rd King of the 12th dynasty standing in the Metropolitan Museum of Arts in NY wearing the Red Crown of Lower Egypt as shown in Fig.26 [Arnold, 2016].

Fig.26 King Amenemhat II wearing the Red Crown.

- Princess Sit-hathor, the daughter of King Senusret II, the 4th King of the 12th dynasty had an existing real Seshed Diadem (Crown) shown in Fig.27 [pinterest, sit-hathor].

Fig.27 The Seshed Crown of Sit-hathor.

We are still with the great 12th dynasty where we find its 5th King Senusret III wearing the Nemes Headdress as shown in Fig.28 [Dunn, 2011].

Fig.28 King Senusret III wearing the Nemes Headdress.

Amenemhat III, the 6th King of the 12th dynasty continue to wear the Nemes Headdress as clear in his statue standing in the Cleveland Museum of Art of the USA (Fig.29) [clevelandart].

Fig.29 King Amenemhat III wearing the Nemes Headdress.

Second Intermediate Period

In the second intermediate period of the ancient history (13th to 17th dynasties) there are evidences that the Nemes, Cap and Ring Crowns were in use as follows:

- Fig.30 shows a setting statue of the royal sealer and high steward Gebu of the 13th dynasty, 1700 BC setting in the Ny Carlsberg Glyptohek, Copenhagen [Wikipedia, 2008]. The high official Gebu is wearing a Nemes Headdress without any decoration or a cobra on its front.

Fig.30 High steward Gebu of the 13th dynasty.

- Fig.31 shows a pure gold Seshed Crown from the 15th dynasty within the collection of the Metropolitan Museum of Art [metmuseum, 2000-2016]. It is decorated the head and horns of gazelles and flowers interchanging with each other.

Fig.31 A Seshed Crown from the 15th dynasty.

- Fig.32 shows a Seshed Crown from the 17th dynasty located in the Rijks Museum of Leiden, Holland [commons.wikipedia, 2009].

Fig.32 A Seshed Crown from the 17th dynasty.

New Kingdom

Here, we are following one of the strongest and powerful kingdoms of ancient Egypt, the New Kingdom. It covers dynasties 18, 19 and 20.

Dynasty 18

- In Fig.33 we see the head of Pharaoh Ahmose I, the founder of the 18th dynasty wearing the White Crown of Upper Egypt and located in the Metropolitan Museum of Art of the USA [Wikipedia, 2015].
- In Fig.34 we see Pharaoh Thutmose I, the 3rd Pharaoh of the 18th dynasty wearing the Modius Crown on his head located in the British Museum [Wikipedia, 2016].

Fig.33 Ahmose I wearing the White Crown. **Fig.34 Thutmose I wearing the Modius Crown.**

- In Fig.35 we see Pharaoh Thutmose I in a coloured wall inscription wearing a Double Crown composed of the Red Crown of Lower Egypt and the Double Plumed Crown [Dunn, 2011].

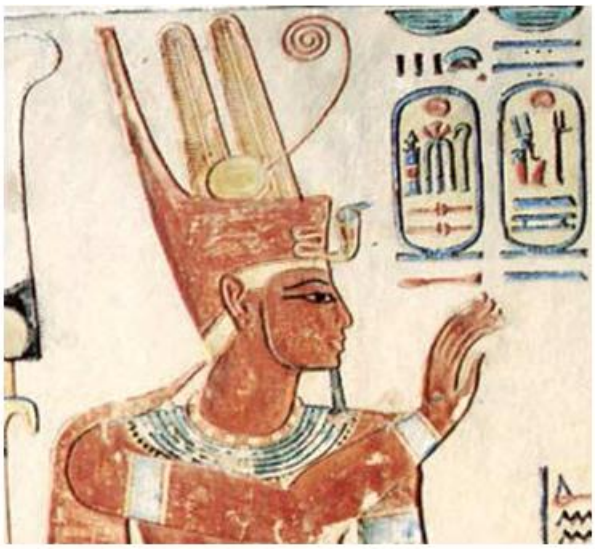


Fig.35 Thutmose I wearing a Double Crown.

- In Fig.36 we see Queen Hatshepsut, the 5th Pharaoh of the 18th dynasty wearing the Nemes Headdress in the same way as the other preceding Kings. She is in a seating statue located in the Metropolitan Museum of Art, USA [Metropolitan Museum of Art, 2014]. The Nemes Headdress of the Lady Pharaoh is not decorated except the standard cobra in its front.

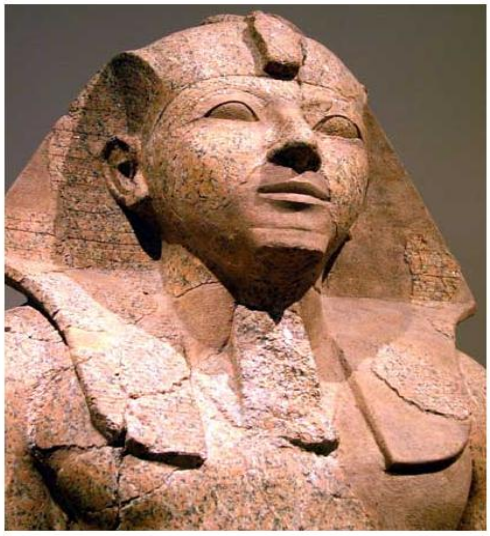


Fig.36 Hatshepsut wearing the Nemes Headdress.

Next are samples from the rein of the strong Pharaoh Thutmose III, the 6th Pharaoh of the 18th dynasty. Fig.37 (a) shows the top half of Thutmose III statue located in the Kunsthistorisches Museum, Vienna [Alamy, 2016]. The Pharaoh is wearing a decorated Nemes Headdress with the cobra in its front. The decoration in the bottom two flaps is different than that in the top part. Thutmose III worn also the Atef Crown as depicted in the colored relief of Luxor Museum of Egypt which is shown in Fig.37 (b) [Ancient-Egypt, 2014].

Fig.37 (a) Thutmose III wearing the Nemes Headdress.

Fig.37 (b) Thutmose III wearing the Atef Crown.

- Now, we move to the rein of Pharaoh Amenhotep II, the 7th Pharaoh of the 18th dynasty. Amenhotep II continued his successors in wearing the Nemes Headdress as depicted in his statue in the Egyptian Museum of Turin, Italy shown in Fig.38 (a) [Wikipedia, 2016]. A statue head in Brooklyn Museum of USA shown that he worn the Cap Crown with cobra symbol in its front as shown in Fig.38 (b) [Wikipedia, 2016].

Fig.38 (a) Amenhotep II wearing the Nemes Headdress.

Fig.38 (b) Amenhotep II wearing the Cap Crown.

Next is the Pharaoh Thutmose IV, the 8th Pharaoh of the 18th dynasty. He used a number of crowns and headdresses including the Khat Headdress, the Double Crown, the Two Feather Crown and the Double Plumed Crown and. Fig.39 (a) shows a statue of the Pharaoh settling with his mother in the Egyptian Museum wearing the Khat Headdress [egyptopia]. Fig.39 (b) shows the Pharaoh in a relief in his Alabaster Chapel at Karnak wearing the Double Crown [pinterest]. Fig.39 (c) and (d) show the Pharaoh in a coloured relief in Karnak wearing the Two Feathers Crown (c) and the Double Plumed Crown (d) [euler.slu].

Fig.39 (a) Thutmose IV wearing the Khat.

Fig.39 (b) Thutmose IV wearing the Double Crown.

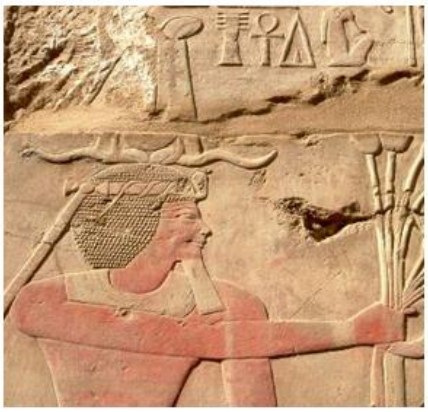


Fig.39 (c) Thutmose IV wearing the Two Feathers Crown.

Fig.39 (d) Thutmose IV wearing the Double Plumed Crown.

Now, we move to the rein of Pharaoh Amenhotep III, the 9th Pharaoh of the 18th dynasty. Pharaoh Amenhotep III worn the Blue Crown and driving his military chariot (Fig.40 (a) [gettyimages],

Fig.40 (a) Amenhotep III wearing the Blue Crown.

Pharaoh Amenhotep III worn also the Nemes Headdress as shown in the inscriptions shown in Fig.40 (b) [crystalinks]. The mother of Pharaoh Amenhotep III, Queen Tiye worn the Double Plumed Crown as shown in Fig.40 (c) [crystalinks].

Fig.40 (b) Amenhotep III wearing the Nemes Headdress.

Fig.40 (c) Queen Tiye wearing the Double Plumed Crown

Other crowns worn by Pharaoh Amenhotep III are the Blue Crown Combined White-Modius Crown shown in Fig.41 (a) [Dunn, 2011], the Red Crown of Lower Egypt as shown in Fig.41 (b) [amenhotepiii.weebly].

Fig.41 (a) Amenhotep III wearing the Combined White-Modius Crown.

Fig.41 (b) Amenhotep III wearing the Red Crown.

Finally, in the rein of Amenhotep III we can see his architecture engineer, priest and scribe Amenhotep bin Hapo shown in Fig.42 wearing a Nemes Headdress [w-book.blogspot].

Fig.42 Amenhotep bin Hapo wearing the Nemes Headdress.

Now we visit Pharaoh Akhenaten, the 10th Pharaoh of the 18th dynasty. First of all we find Akhenaten wearing a Nemes Headdress in his statue in Batn Ihrit (Theadelphia) as shown in Fig.43 (a) [touregypt]. Akhenaten used also the Blue Crown as we see him in his statue setting in the Egyptian Museum as shown in nFig.43 (b) [marqaret, 2011].

Fig.43 (a) Akhenaten wearing the Nemes Headdress.

Fig.43 (b) Akhenaten wearing the Blue Crown.

Pharaoh Akhenaten worn compound crows such as the Khat plus the Modius Crown shown in Fig.43 (c) [Ford, 2012] and the Nemes plus the Modius Crown shown in Fig.43 (d) [110pounds, 2012]. The Modius Crown was worn also by Queen Nefertiti, the wife of Pharaoh Akhenaten as depicted in her bust statue in the Neues Museum of Berlin as shown in Fig.44 [Wikipedia, 2016].

Fig.43 (c) Akhenaten wearing the Khat plus Modius Crown

Fig.43 (d) Akhenaten wearing the Nemes plus Modius Crown.

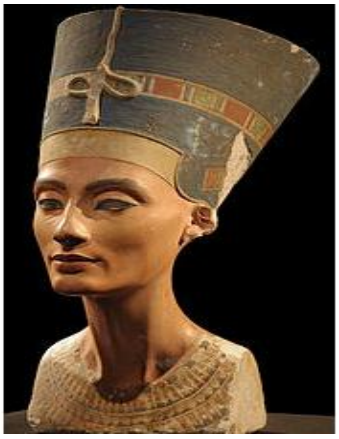


Fig.44 Queen Nefertiti wearing the Modius Crown.

Now, we visit the young Pharaoh Tutankhamun, the 13th Pharaoh of the 18th dynasty. Pharaoh Tut worn a number of Crowns and Headdresses as depicted from his artefacts and statues available in the Egyptian Museum. Some of them are as follows:

- Fig.45 (a) shows his Nemes Headdress as a part of his golden mask [Soliman, 2009].
- Fig.45 (b) shows his Khat Headdress on one of his statues [Richard-seaman].
- Fig.45 (c) shows his White Crown of Upper Egypt on one of his statues [Richard-seaman].
- Fig.45 (d) shows his Red Crown of Lower Egypt on one of his statues [Margaret, 2011].
- Fig.45 (e) shows his Modius Crown on one of his statues [Richard-seaman].

Fig.45 (a) Tutankhamun wearing the Nemes Headdress.

Fig.45 (b) Tutankhamun wearing the Khat Headdress.

Fig.45 (c) Tutankhamun wearing the White Crown.

Fig.45 (b) Tutankhamun wearing the Red Crown.

Fig.45 (c) Tutankhamun wearing the Modius Crown.

CONCLUSION

- Ancient Egypt new Royal Crowns as early as about 3100 BC..
- King Scorpion of the Late Predynastic Period worn a Khat Headdress..
- King Narmer of the first dynasty worn the White Crown of the Upper Egypt, the Red Crown of the Lower Egypt and the Modius Crown..
- After the unification of Upper and Lower Egypt by King Narmer, King Den of the first dynasty worn the Double Crown..
- Kings continued to wear the White Crown: King Khasekhemy of the 2nd dynasty, King Djoser of the 3rd dynasty, King Menkaure of the 4th dynasty, King Mentohotep III of the 11th dynasty, King Senusret I of the 12th dynasty, Pharaohs Ahmos and Tutankhamun of the 18th dynasty.
- For the first time, King Djoser of the 3rd dynasty appeared wearing the Nemes Headdress. Then, it became a popular headdress for Kings and High Officials such as: King Kafrae of the 4th dynasty, King Menkaure of the 4th dynasty, King Sahure of the 5th dynasty, King Senusret I and Senusret III of the 12th dynasty, High Steward Gebu of the 13th dynasty, Queen Hatshipsut, Pharaos Thutmose III, Amenhotep II, Amenhotep III, Akhnaten and Tutankhamun of the 18th dynasty. .
- Kings continued to wear the Modius Crown: King Huni of the 3rd dynasty, King Khufu of the 4th dynasty, King Userkaf of the 5th dynasty, King Teti of the 6th dynasty, King Mentuhotep II of the 11th dynasty, Pharaoh Thutmose I, Queen Nefertiti and Pharaoh Tutankhamun of the 18th dynasty.
- Kings continued to wear the Khat Headdress: King Khufu of the 4th dynasty, King Sahure of the 5th dynasty, Pharaohs Thutmose IV and Tutankhamun of the 18th dynasty.
- King Menkaure of the 4th dynasty and Pharaoh Amenhotep II of the 18th dynasty worn the Cap Crown.
- King Amenemhat II of the 12th dynasty and Pharaohs Amenhotep III and Tutankhamun of the 18th dynasty worn the Red Crown.
- A seshed Diadem (Crown) was worn by Princess Sit-hathor, the daughter of King Senusret II of the 12th dynasty. It appeared also in the 15th and 17th dynasties.
- Pharaoh Thutmose I of the 18th dynasty worn the Double Crown (Red + Double Plumed Crown). Double Crowns were worn also by some Pharaohs of the 18th dynasty: Amenhotep III (White + Modius), Akhenaten (Khat + Modius), Akhenaten (Nemes + Modius).
- Pharaoh Thutmose III of the 18th dynasty worn an Atef Crown

- Pharaoh Thutmose IV of the 18th dynasty worn a Two Feather Crown
- Pharaoh Thutmose IV of the 18th dynasty worn a Double Plumed Crown. It was worn also by his mother Queen Tiye
- The Blue Crown was worn by Pharaohs: Amenhotep III and Akhenaten of the 18th dynasty.
- High Officials in ancient Egypt worn the Nemes Headdress such as the High Steward Gebu and the Architecture Engineer Amenhotep bin Hapo.

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