Proof. Since \( f \) is fibred, it suffices to show \( f^{-1}(M) \) is contract for any given \( M \) in \( M \). The cat \( f^{-1}(M) \) has for its objects all \( M \)-admissible epins \( L \to M \times P \) with \( L \in P \), and a map \( \varphi \) from \( (L' \to M \times P') \) to \( (L \to M \times P) \) is a map \( L' \to L \) in \( P \) which is over \( M \) and which induces a map \( P' \to P \) in \( \overline{Q}(P) \). Let \( R_m \) denote the cat whose objects are \( M \)-admissible epis \( L \to M \), an in which a map \( \varphi' \) from \( (L' \to M) \) to \( (L \to M) \) is a triangle

\[
\begin{array}{ccc}
L' & \to & L \\
\downarrow & & \downarrow \\
M & \to & M
\end{array}
\]

where \( L' \to L \) is a \( P \)-admissible mono. Then as above (see lemma in \( \overline{Q} \)) we have an equivalence of categories

\[
f^{-1}(M) \to \text{Sub}(R_m)
\]

\[
(L \to M \times P) \to (\text{Ker}(L \to P) \subset L)
\]
Thus we are reduced to proving $R^m$ is contractible.

But by hypothesis 2) $R^m$ contains an object $(L_0 \to M)$, and for any other object we have morphisms in $R^m$:

$$(L \to M) \to (L \oplus L_0 \to M) \leftarrow (L_0 \to M).$$

Thus $R^m$ is conically contractible (ref.), so the lemma is done.

**Lemma 2.** $g$ is a heg

The proof is analogous to the preceding and will be omitted.

**Lemma 3.** The maps in the homotopy category $g : F \to \tilde{Q}(M)$

From the above two lemmas we see the categories $Q(P)$ and $Q(M)$ are heg. To finish the proof of the theorem it will be necessary to relate the homotopy equivalence obtained from $f$ with the inclusion functor $i : Q(P) \to Q(M)$.

Recall that direct sum makes $Q(M)$ into a $k$-group connected $H$-space, so that homotopy classes of maps from $P$ to $Q(M)$ form an abelian group.

**Lemma 3.** The functors $f$, $ig : \# F \to Q(M)$ are negatives of each other for the $H$-space structure on $Q(M)$. 
Proof: Follows immediately from the comm. diag.

\[ \lambda \quad \Rightarrow \quad \Omega(M) \]

\[ Q(M) \times Q(P) \xrightarrow{\text{id} \times i} Q(M) \times Q(M) \xrightarrow{\oplus} \Omega(M) \]

where \( \lambda \) is the obvious inclusion, and the fact that \( \Omega(M) \) is contractible.

It follows from the preceding lemmas that

Thus we have that \((-1)f = i \circ g\), where \((-1)\) is the inverse for the II-space structure on \(Q(M)\). From the preceding lemmas 1, 2, we have \(f, g\) are kags. \(\Rightarrow\) it is a kag. 

the theorem.