CLAIMS

1. A steel damper for seismic isolation installed between a lower part of a structure and a foundation, comprising:

an upper board fixed to the lower part of the structure;

a lower board fixed to the foundation to be at the same position in a plan view with respect to the upper board; and

four seismic isolation plates fixed to the upper board and the lower board and extending in a cross direction in a plan view, wherein

the four seismic isolation plates are members obtained by bending a long steel sheet, and include an upper fixing part and a lower fixing part parallel to each other, an upper inclined part and a lower inclined part that are closer to each other while being separated from the upper fixing part and the lower fixing part, and a connecting part that connects the upper inclined part and the lower inclined part to each other

the four seismic isolation plates are fixed to the upper board at a position where the upper fixing parts do not overlap each other, and are fixed to the lower board at a position where the lower fixing parts do not overlap each other,

the upper fixing part is fixed to the upper board by sandwiching the upper fixing part between the upper

board and an upper splice plate and tightening the upper board and the upper splice plate by fastening means,

the lower fixing part is fixed to the lower board by sandwiching the lower fixing part between the lower board and a lower splice plate and tightening the lower board and the lower splice plate by fastening means,

the upper splice plate is on a lower surface of the upper fixing part and the lower splice plate is on the upper surface of the lower fixing part, and

a dimension of the upper inclined part and the lower inclined part in a width direction gradually decreases while being separated from the upper fixing part and the lower fixing part.

2. The steel damper for seismic isolation according to claim 1, wherein

the seismic isolation plate has a relationship of $10\ mm \leq D \leq 450\ mm$ and $(D + L) \leq H \times 1.7$, where a bending height between the upper fixing part and the lower fixing part is denoted by H, a dimension of the upper fixing part and the lower fixing part in a longitudinal direction is denoted by D, and a dimension of the upper inclined part and the lower inclined part in the longitudinal direction is denoted by L.

3. The steel damper for seismic isolation according to claim 1, wherein

four upper splice plates are arranged to straddle adjacent upper fixing parts of the four seismic isolation plates, and end parts of the upper fixing parts are sandwiched between the upper board and the upper splice plates, and

four lower splice plates are arranged to straddle adjacent lower fixing parts of the four seismic isolation plates, and end parts of the lower fixing parts are sandwiched between the lower board and the lower splice plates.

4. The steel damper for seismic isolation according to claim 1, wherein

the upper inclined part connects the upper fixing part and an upper part of the connecting part to each other while linearly extending at a predetermined inclination angle, and

the lower inclined part connects the lower fixing part and a lower part of the connecting part to each other while linearly extending at the same inclination angle as an inclination angle of the upper inclined part.

5. The steel damper for seismic isolation according to claim 2, wherein

the upper inclined part connects the upper fixing part and an upper part of the connecting part to each other while linearly extending at a predetermined inclination angle, and

the lower inclined part connects the lower fixing part and a lower part of the connecting part to each other while linearly extending at the same inclination angle as an inclination angle of the upper inclined part.

6. The steel damper for seismic isolation according to claim 4, wherein

when the inclination angle is denoted by θ, $5.2^\circ \leq \theta \leq 15.3^\circ$ is set.

7. The steel damper for seismic isolation according to claim 1, wherein

an upper jig set to a predetermined height is fixed between the lower part of the structure and the upper board, and

a lower jig set to a predetermined height is fixed between the foundation and the lower board.

8. The steel damper for seismic isolation according to claim 1, wherein

a stud bolt is integrally formed on the upper board, and the upper board is fixed to the structure in a state where the stud bolt is embedded inside the structure made of reinforced concrete, and

a stud bolt is integrally formed on the lower board, and the lower board is fixed to the foundation in a state where the stud bolt is embedded inside the foundation made of reinforced concrete.

9. A seismic isolation structure comprising:

the steel damper for seismic isolation according to claim 1; and

a seismic isolation device installed between a lower part of a structure and a foundation, and moving in a horizontal direction while supporting a vertical load of the structure when a seismic motion occurs.

10. A steel damper for seismic isolation installed between a lower part of a structure and a foundation, comprising:

an upper board fixed to the lower part of the structure;

a lower board fixed to the foundation to be at the same position in a plan view with respect to the upper board; and

two sets of seismic isolation plates fixed to the upper board and the lower board and extending in a cross direction in a plan view, wherein

the two sets of seismic isolation plates have an upper split steel sheet and a lower split steel sheet that are split into upper and lower parts,

the upper split steel sheet has an upper fixing part provided at a center part in a longitudinal direction, a pair of upper inclined parts bent diagonally downward from both ends of the upper fixing part in the longitudinal direction, and an upper connecting part bent

downward from end parts of the pair of upper inclined parts,

the lower split steel sheet has a lower fixing part provided at a center part in the longitudinal direction, a pair of lower inclined parts bent diagonally upward from both ends of the lower fixing part in the longitudinal direction, and a lower connecting part bent upward from end parts of the pair of lower inclined parts,

the seismic isolation plate is formed by connecting the upper connecting part of the upper split steel sheet and the lower connecting part of the lower split steel sheet, and

in the two sets of seismic isolation plates, the upper fixing part and the lower fixing part are orthogonally arranged and overlapped with each other, the upper fixing part is fixed to the upper board, and the lower fixing part is fixed to the lower board.

11. The steel damper for seismic isolation according to claim 10, wherein

an upper jig set to a predetermined height is fixed between the lower part of the structure and the upper board, and

a lower jig set to a predetermined height is fixed between the foundation and the lower board.

12. The steel damper for seismic isolation according to claim 10, wherein

a stud bolt is integrally formed on the upper board, and the upper board is fixed to the structure in a state where the stud bolt is embedded inside the structure made of reinforced concrete, and

a stud bolt is integrally formed on the lower board, and the lower board is fixed to the foundation in a state where the stud bolt is embedded inside the foundation made of reinforced concrete.

13. The steel damper for seismic isolation according to claim 10, wherein

a dimension of the upper inclined part and the lower inclined part in a width direction gradually decreases while being separated from the upper fixing part and the lower fixing part.

14. A seismic isolation structure comprising:

the steel damper for seismic isolation according to claim 10; and

a seismic isolation device installed between a lower part of a structure and a foundation, and moving in a horizontal direction while supporting a vertical load of the structure when a seismic motion occurs.