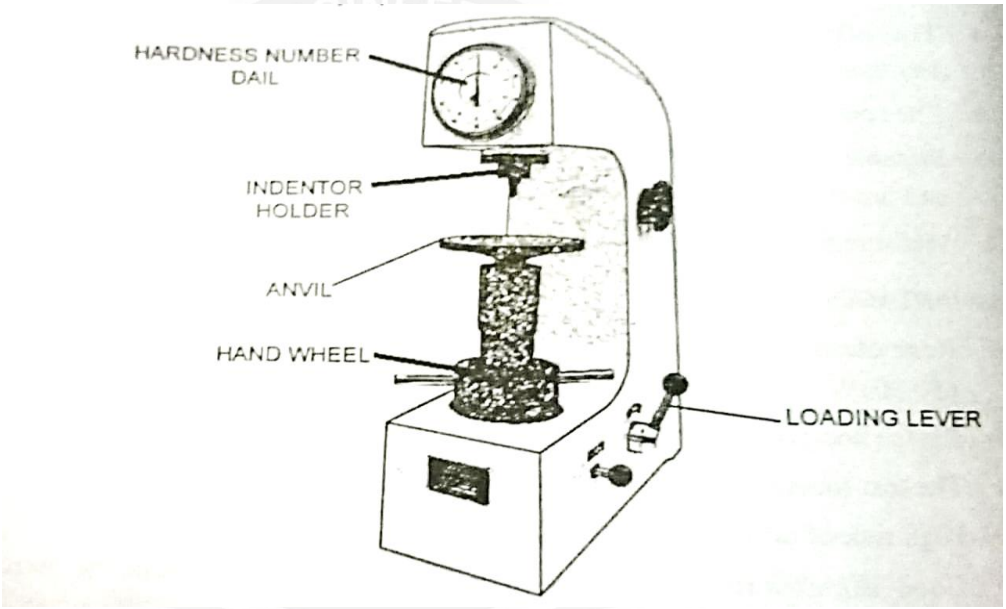
2.4 ROCKWELL HARDNESS TEST

- In the Rockwell test the depth of the indenter penetration into the specimen surface is measured. Each time a test is performed two loads are applied to the sample being tested.

1. PRINCIPLE

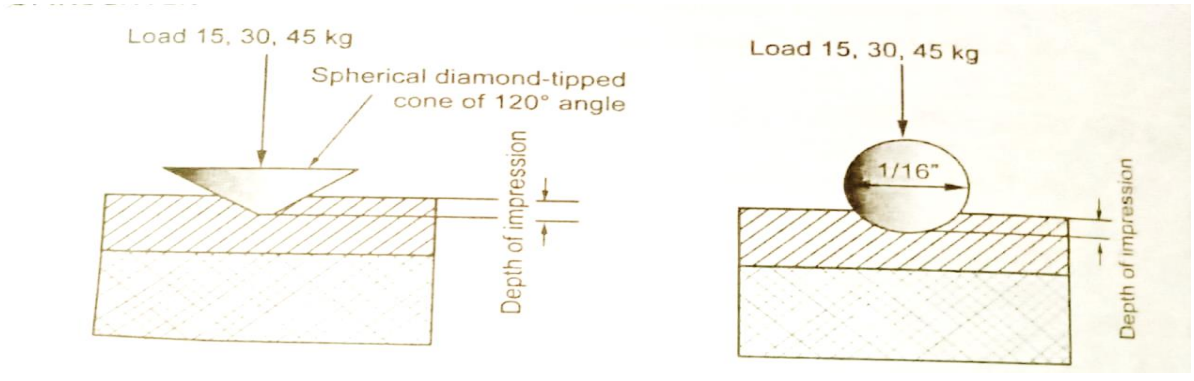
- Rockwell hardness test is to determine the hardness of a metal by 'differential depth' measurement test. This hardness testing method involved the measurement of the increment of an indenter forced into the metal by a primary and a secondary load.



2. COMPONENTS

- Rockwell hardness tester
- Indenter

3. INDENTER



- The indenter or ‘penetrator’ is either made of hardened steel with shape of a spherical ball or made of diamond with shape of a cone having a spherical tip called the ‘Brale’.
- The indenter may be either a diameter 1/6”, 1/8” or a spherical diamond cone of 120° angle.

4. WORKING

- The specimen to be tested is made flat by grinding and then roughly polished because any surface irregularities will be taken care of by the minor load.
- The application of the minor load becomes effective when the surface of the specimen kept on the anvil is brought in contact with the indenter by rotating the elevating wheel.
- First, the indenter is forced into the test material under a preliminary minor load and this depth is recorded.
- With the minor load still applied an additional load is introduced known as the major load which increases the depth of penetration on the sample.
- The major load is then removed, and the force on the sample is returned to the minor load.
- The increase in the depth of penetration that results from applying and removing the major load is used to calculate the Rockwell hardness value.

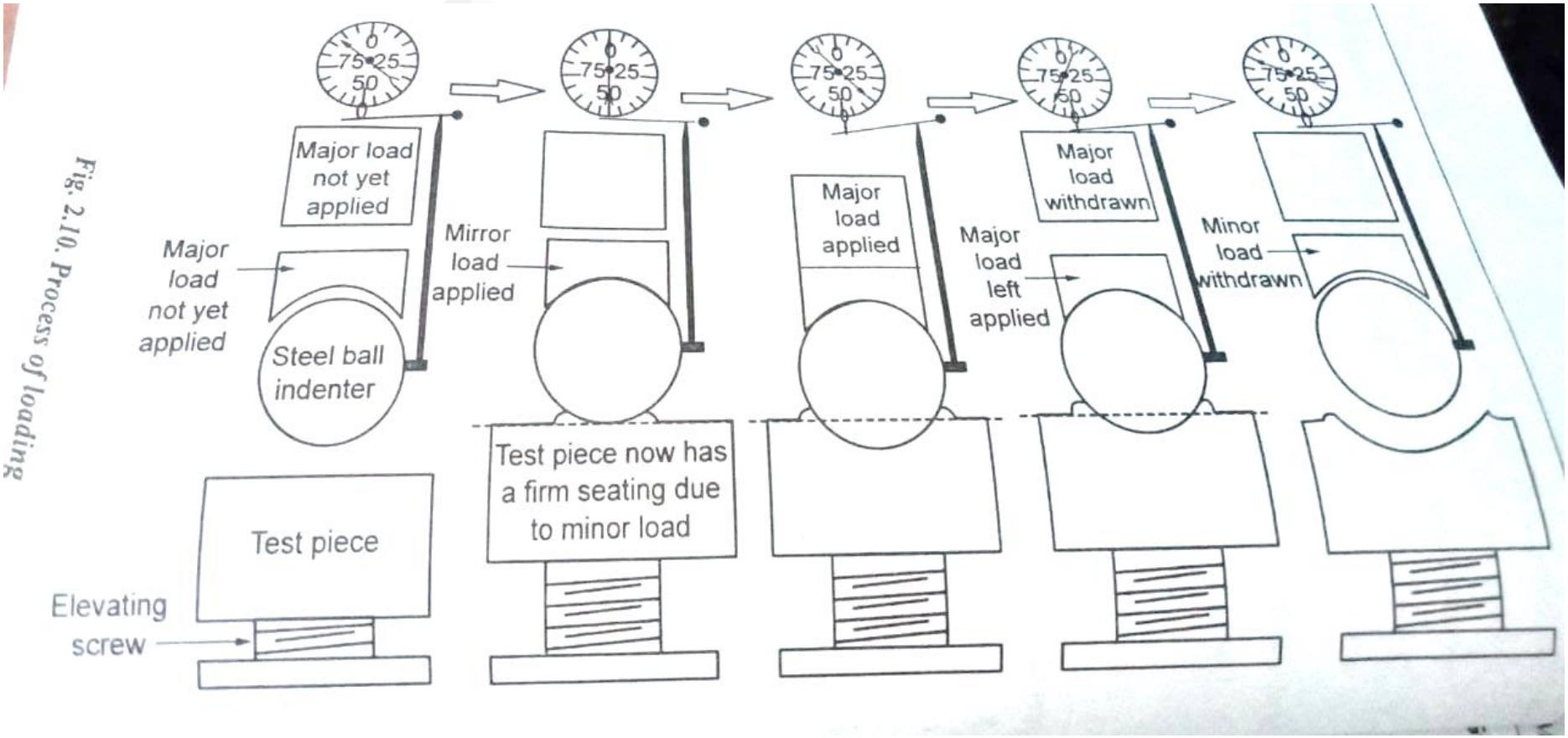


Fig. 2.10. Process of loading

5. APPLICATIONS

- It is widely applied in the industry of cemented carbides, Copper alloys, Thin steel and medium case hardened steel, Cast iron, aluminium etc due to the rapidity and simplicity.

6. ADVANTAGES

- High accuracy is achieved.
- Relatively short time needed to train operator.
- It is generally used for testing of larger samples.
- It can be used for advanced tests.
- There was no special surface preparation.

7. DISADVANTAGES

- The main limitations are due to the fact that between maximum and minimum load there is only a 10:1 ratio.
- The quality of the indenter and the surface has a strong influence on the test results.
- Relatively low sensitivity on the difference in hardness.