Subject: Building Services-I
Topic: Garbage
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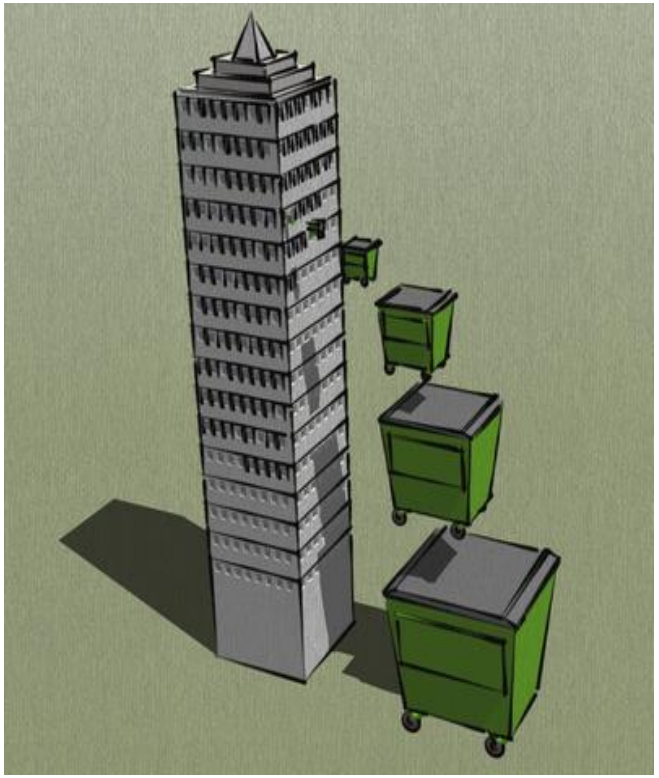
GARBAGE DISPOSAL IN HIGH RISE

- Since the beginning, humankind has been generating waste, be it the bones and other parts of animals they slaughter for their food or the wood they cut to make their carts.
- With the progress of civilization, the waste generated became of a more complex nature.
- At the end of the 19th century the industrial revolution saw the rise of the world of consumers.
- Not only did the air get more and more polluted but the earth itself became more polluted with the generation of no biodegradable solid waste.
- **The increase in population and urbanization** was also largely responsible for the increase in solid waste.



GARBAGE DISPOSAL IN HIGH RISE

- In the existing set up, it is the responsibility of the local government to collect, treat and dispose of the segregated waste from the generators in a sustainable manner.
- A large quantity of biodegradable waste finds it way in landfills which are nothing but open dumpsites and are least scientifically managed.
- Finding space for landfills has become a great challenge. The dumping of waste leads to GHG emissions, leachate generation and all kinds of environmental pollution and pose a serious threat to human health and environment. There is therefore an urgent need to manage municipal solid waste in a more holistic, integrated and sustainable manner. Why is this required?

GARBAGE DISPOSAL IN HIGH RISE

- With in all residential buildings including apartments, individual houses, and hostels, the following have to be provided in order to promote sustainable management of solid waste which involves storing segregated waste and treating the biodegradable part in the common treatment plant.
- Rapid urbanization, changing lifestyles and increasing population has led to a dramatic increase in the quantum of waste generated by various sources.

GARBAGE DISPOSAL IN HIGH RISE

- A. Space has to be provided in every house hold for storage of segregated waste in the form of wet and dry bins.
- This area has to be at least 1.2mx1.2m and has to be ideally located in the kitchen.

- **IN AN APARTMENT COMPLEX**

1. **Secondary storage space** (communal storage) has to be provided at a common location for each apartment block (existing and new) where the dry waste can be stored for further segregation, recycling or collection. The space requirement shall be calculated so as to carry 2.6 kg of waste per household, (family of 4 persons) and an average density of waste, say 0.5 t/m3.
2. **Where chutes are provided,** they have to be 2 separate chutes for dry and wet waste. They should follow the norms given by the National Building Code, 2005.
3. Enclosures for the communal storage has to be at least 2 m high with provision for washing down and draining the floor into a system suitable for receiving a polluted effluent. It should be covered and secured to prevent access for animals.
4. Space has to be provided for composting organic waste on site. This can be part of the mandatory green space and maintained by the watchman.

SYSTEM OF GARBAGE COLLECTION

- Bins
- Sacks
- Skips
- Refuse chutes
- Garchey system
- Sink grinders
- Central sugs

SACKS

BINS

SKIPS

SYSTEM OF GARBAGE COLLECTION

STORAGE → COLLECTON → DISPOSAL

- The storing of refuses until collection in disposable plastic or paper bags is becoming increasingly more popular and is generally more hygienic than storing refuse in a metal dustbin.
- The re-use of bags is not considered acceptable from the hygienic point of view and the bags are therefore disposed of with the refuse. Bags can be used as liners for metal bins and this is probably the most hygienic method of storing refuse.

COLLECTION

- Door-to-door collection of waste is another method of segregation, but it is not a common practice as yet in India except in the metros where some private organizations are doing such work. The rag picker plays a very important part in the segregation of waste.
- It is now becoming more and more essential to look for methods by which the garbage load on the land can be reduced. It has been seen that at present segregation of waste at source level seems to be the best.

Segregation of waste

Waste can be segregated as
1. Biodegradable and
2. Nonbiodegradable.

Biodegradable waste include organic waste, e.g. kitchen waste, vegetables, fruits, flowers, leaves from the garden, and paper.

Nonbiodegradable waste can be further segregated into:
a) Recyclable waste – plastics, paper, glass, metal, etc.
b) Toxic waste – old medicines, paints, chemicals, bulbs, spray cans, fertilizer and pesticide containers, batteries, shoe polish.
c) Soiled – hospital waste such as cloth soiled with blood and other body fluids.
Toxic and soiled waste must be disposed of with utmost care.

In indian context the average waste generated is 250 gms/day/person. But it also varies from the locality density and the type of society. (Higher /middle/ low).

DISPOSAL of waste from building

- In high-rise flats it is not practical or hygienic to carry dustbins or bags down to the ground floor for subsequent collection.
- A method of overcoming this problem is to provide a **refuse chute** carried vertically through the building, with an inlet hopper on each floor.
- The hoppers must be designed to close the chute when they are opened to receive refuse, or otherwise people on the lower floors might be covered with refuse from above when they put their own refuse into the hopper.
- This type of hopper also prevents dust, smoke and smells from passing through to the floors.

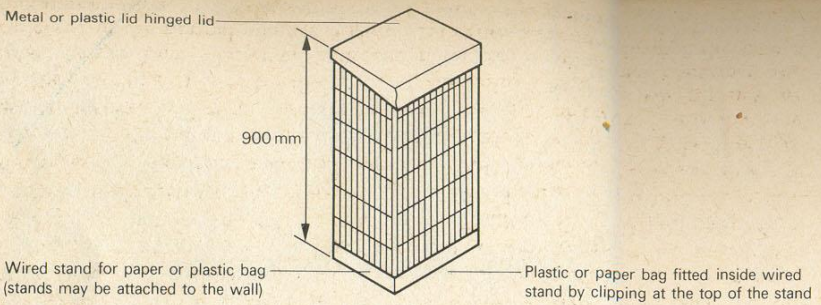


Fig. 11.1 Metal frame for plastic or paper bag

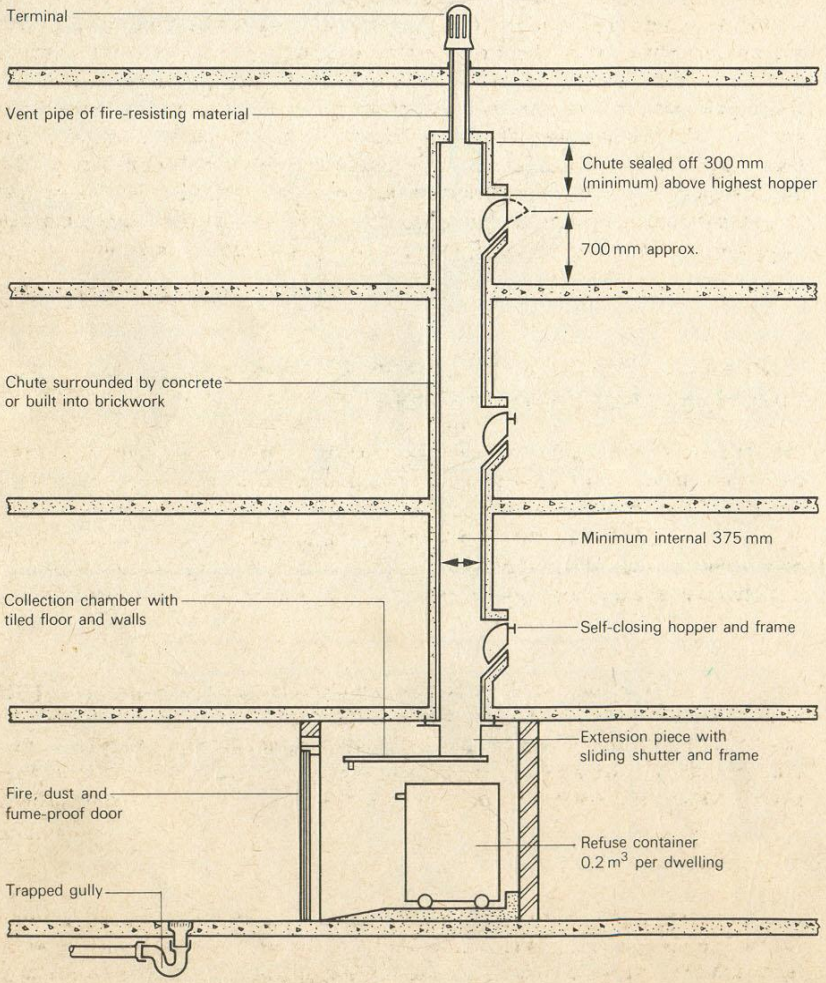
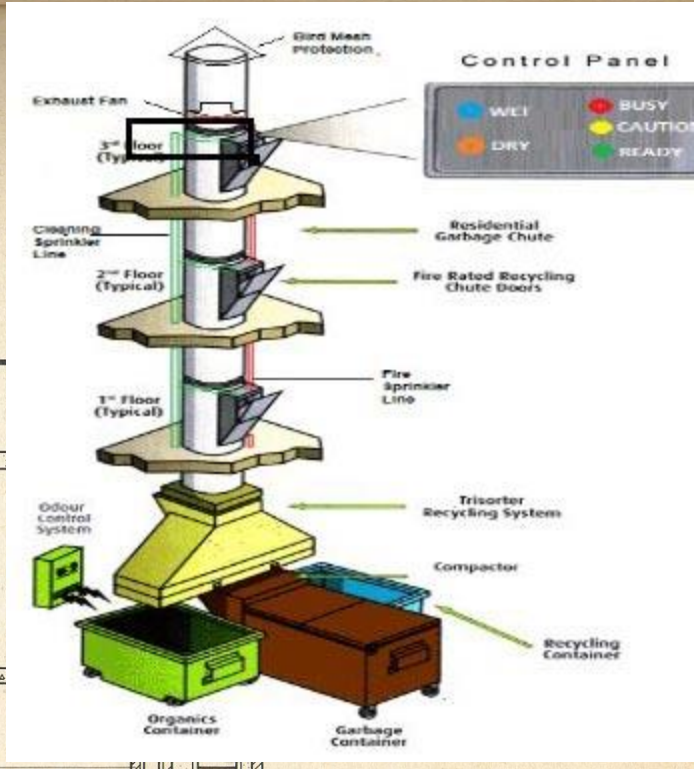


Fig. 11.2 Detail of refuse chute



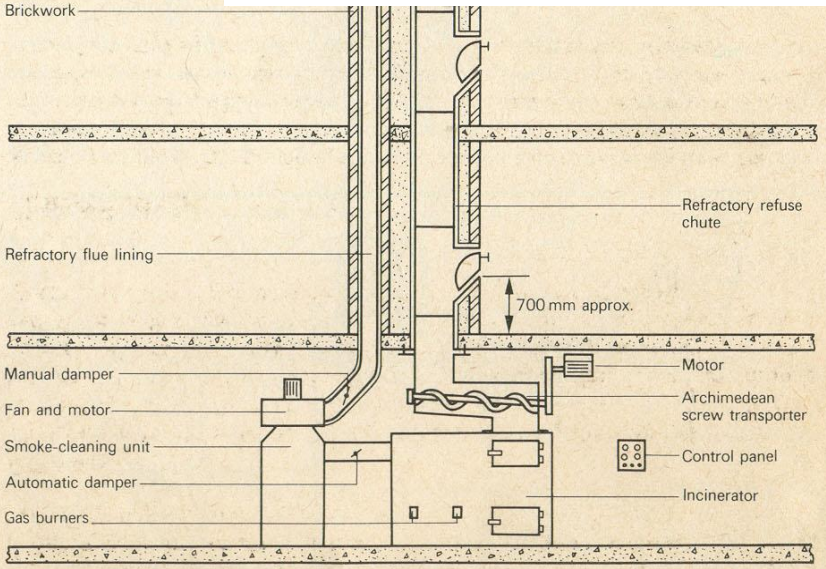


Fig. 11.3 Refuse chute with incinerator at its base

REFUSE CHUTES

PLANNING

- There may be more than one chute in a building and these discharge into a refuse container, or an incinerator, inside specially constructed chambers.
- Refuse chutes should be sited on well-ventilated landings,balconies or adjacent to the kitchens and storage spaces. It should not be sited in a kitchen. For sound insulation, any wall separating a refuse chute away from a habitable room
- Washing down facilities may be provided for the chute by means of a dry riser with jet heads fitted inside the chute at each floor level. Some authorities, "However, hold that bacteria breed more readily in the presence of water and therefore washing down of chutes should be avoided. Users should be advised to wrap the refuse in order to prevent soiling of the chute. A chute can be arranged to discharge into two bins" by bifurcating the end with a cut-off damper, operated by a caretaker when one is filled. A special machine may also be used, which automatically compresses the refuse into the bags.

VENTILATION

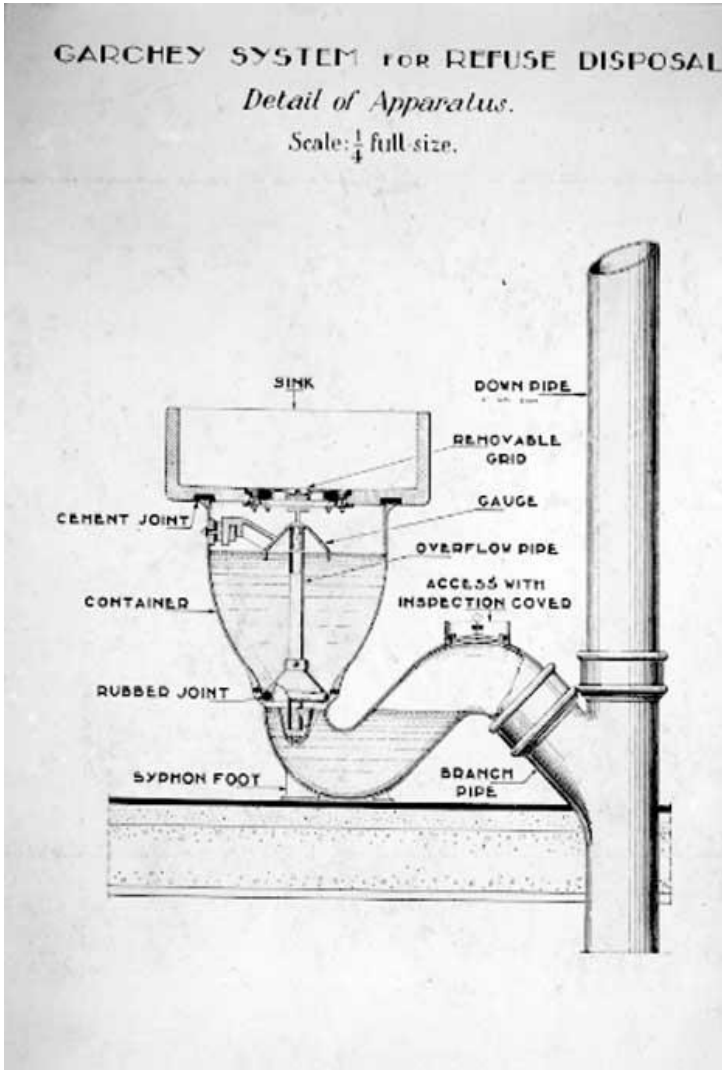
- The chute should be ventilated by means of pipe. The ventilator should be of non combustible material.

- **Materials**
- Refuse chutes should be of non-combustible and acid-resistant materials. Glazed stoneware, spun concrete or asbestos cement pipes may be used. Hoppers should also be made of non-combustible materials not subject to corrosion or abrasion. Hoppers are manufactured from cast iron, wrought and cast aluminum and steel. Steel hoppers are galvanized and cast iron hoppers painted.

- **Chambers**
- Refuse storage chambers must be surrounded by floors and walls, with at least 1 hour fire rating. Surface finishes must be non-combustible, moisture-proof and easy to clean. A 1/2-hour fire rating lockable, dust and fume-proof door must be provided and the floor must be laid to falls to an external trapped gully. A tap should be fitted outside, so that the chambers can be hosed down. To reduce noise, the chambers should be structurally isolated from the rest of the building, by means of double walls or separate floor slabs.

Garchey system

- It was invented by a Frenchman, M. Louis Garchey, and has been improved by a British company.
- The original French system required underground suction pipe work and a central incinerator plant, which increased the capital and running costs of the system.
- The new improved British system uses a refuse-collection vehicle, which replaces the underground suction pipe work and central incinerator plant.
- The vehicle is much cheaper and can receive 7 days refuse from over 200 flats, virtually serving an entire housing estate in one day or night shift of about 2-1/2 hours.
- Whilst the system is particularly suitable for high-density multi-storey flats, especially if it is installed whilst building work is in progress, it can also be installed in existing buildings, including single-storey dwellings.



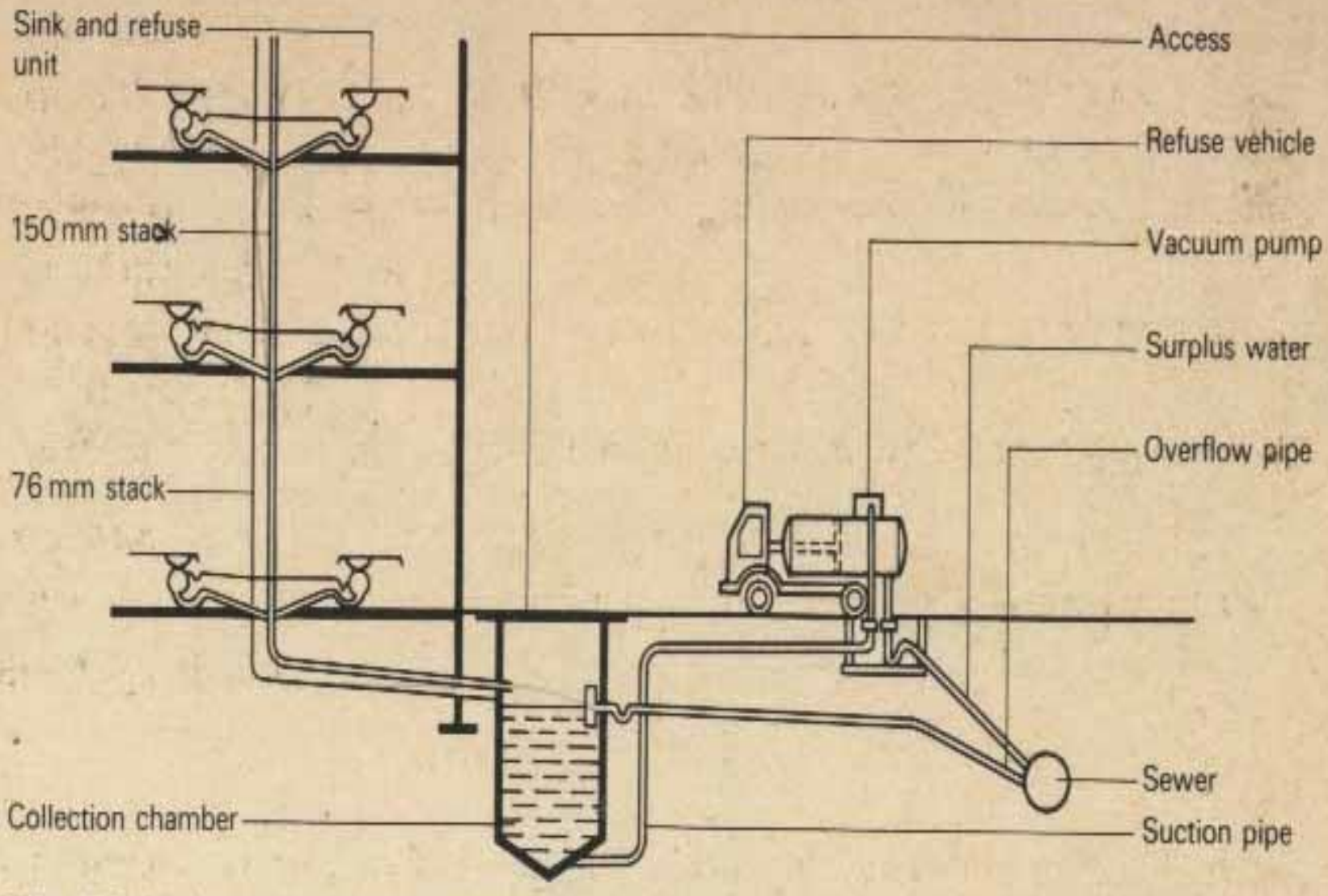


Fig. 11.5 Layout of Garchey system

- In the system a special sink has a grid and waste plug, which fits over the outlet and this enables the sink to be used for normal purposes. To deposit refuse, the housewife lifts off the sink grid and places the refuse in a waste tube. In order to remove the refuse, the grid lifts the tube and the refuse, together with retained wastewater, are carried through a trap into a vertical stack pipe. A concrete collection chamber below ground receives the refuse and wastewater and the chamber is emptied by the refuse vehicle at regular intervals, usually weekly, and taken directly to a tip. Any type of refuse can be handled by the system, including bottles and tins, providing that these will fit inside the tube. Larger items, however, must be taken to a communal container and collected in the normal manner.

The collection vehicle

- It includes-a patented pusher plate, which compresses the refuse inside a cylindrical tank.

Advantages

- The system has proved satisfactory and popular with the user and, unlike the refuse chute, the refuse can be removed without taking it to a landing or balcony. The refuse is taken directly from the kitchen sink, to the tip, through an enclosed water-sealed system and it is therefore more hygienic than the chute and there is less risk of fire spread. The refuse collection is easier, quicker, and quieter and the damp refuse does not cause spread of dust at the tip.

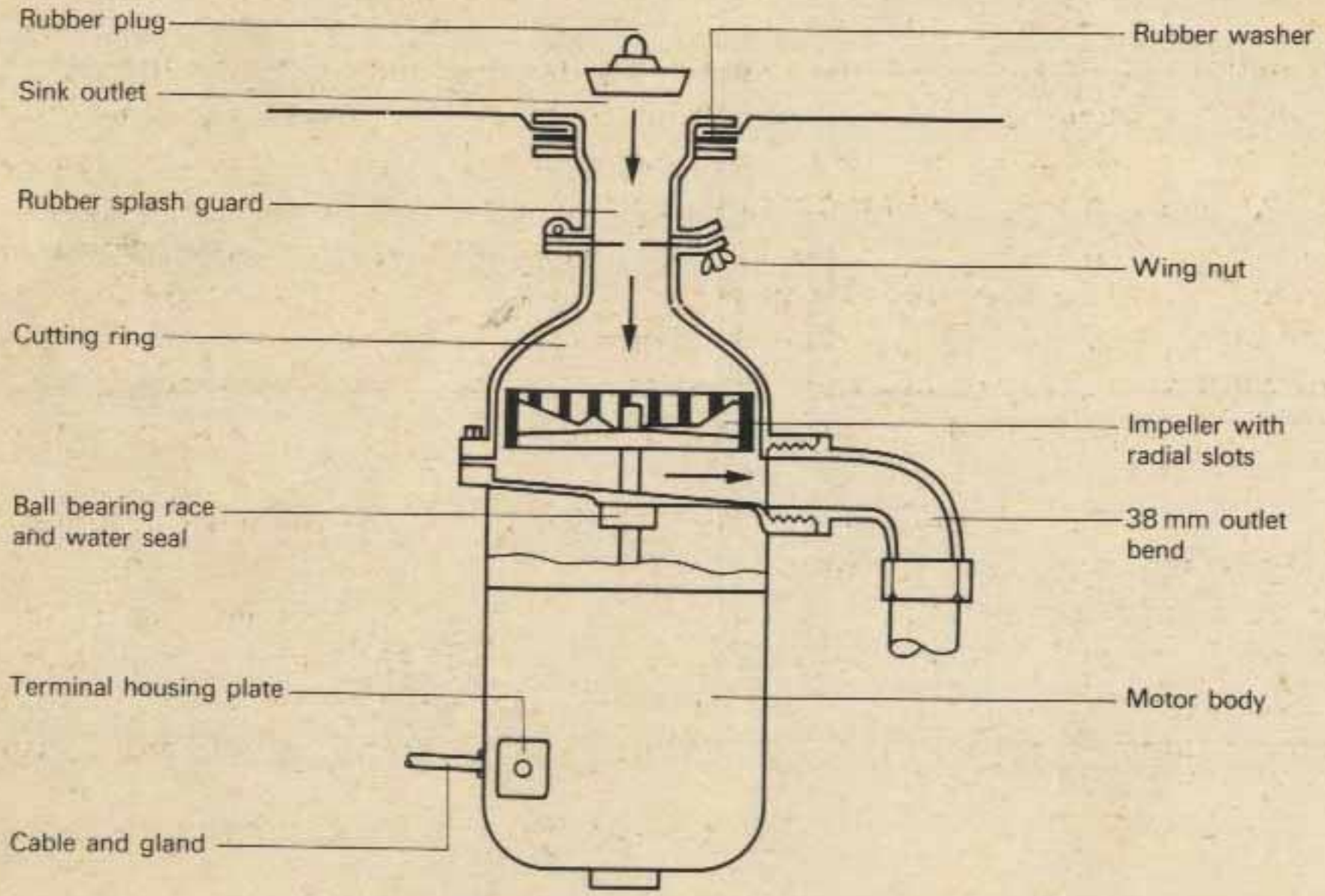
SINK GRINDERS

- In market,there are Several types of sink grinders are available, which are used mainly for the disposal of food waste, but cannot be used for metals, plastics, ceramics or string.
- The grinder, which is fitted under the sink, reduces the food waste to fine particles, which can be carried away by the wastewater to the foul water drain.

Safety

- It should be impossible for the users to insert his or her fingers into the shedding compartment and blockages should not be freed by hand.

Fig. 11.4 Sink unit



(a) Detail of sink grinder

CONCLUSION:

- It is found that with increase in the global population and the rising demand for food and other essentials, there has been a rise in the amount of waste being generated daily by each household. Waste that is not properly managed, especially excreta and other liquid and solid waste from households and the community, are a serious health hazard and lead to the spread of infectious diseases.

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