

Bird scarer

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Industrial Design Centre

I. J. T. Bombay

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bird scarer

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Design of Bird Scarer

Diploma Project

Submitted in partial fulfilment of the
requirements for the Postgraduate Diploma
in Industrial Design

by

Vidyadhar R. Patil

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Approval Sheet

Diploma Project entitled

Bird Scarer

by Vidyadhar R. Patil is approved for the
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Problem Statement

Design of 'Bird Scarer'



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1. Introduction

India is primarily an agricultural country, and nearly three fourth of its population depends directly on agriculture for a living. Therefore, agricultural development is intimately connected with the joy and happiness of the people in this country.

Total grain production in India can be approximately to round one hundred and six million tons a year, which can safely reach a limit five percent more, if the damage caused by birds could be avoided. Countless efforts are made to get rid of this loss, but unfortunately never yielding a total success.

The first attempt and still used in most parts of our country is the use of sling, which has its own drawbacks and limitations; the main being the unsatisfactory short range, it covers.

Another method widely practiced is to hang dead bird or to make human figure in the field. The known fact that birds are afraid of irritated noise, steps into the invention of many birds scaring devices, for that purpose sound of different frequencies, and few resembling voices of predator birds; were tried for. These have

been found out successful only for a very short period of start before birds get habituated to them.

Plastic nettings stand as an alternative and reliable solution, but too costly for a poor country like ours. Use of plastic and paper bags is also in practice, but they too are costly and prove to be detrimental for the growth of crops.

The project deals with fabrication of some simple, but reliable bird scaring devices.

2.. Information

2.1 Crops

2.1.1 Grain crops

The following crops provide the essential food grains in India, which are damaged by birds.

Highbreed Jowar



Jowar

Wheat

Rice

Ground nuts

2.1.2 Grapes



Grape is one of the most delicious and freshening fruit known and is also perhaps the earliest fruit grown. Grape is a paying crop and that is why there has been consistent increase in its area in all the grape growing regions of India. Maharashtra is the leading grape growing State in the country. Shri A.S. Jachak from Dhekalwadi, Dist: Poona, Maharashtra obtained a record yield of 82,601.27 kgs. per hectare from his Cheema Sahebi (Selection 7) grapes in 1965-66. Likewise many grape growers harvested very heavy crops in recent years.

2.1.3 Horticultural crops

Guava

Pomegranate

Mango

Pineapples, etc.



• • Guava



• Pomegranate



• Pineapples



• Figs

These fruits are paying crops which are harvested in various regions of India.

2.2 Enemies

2.2.1 Squirrels

These are frequently destructive to fruit crops; often doing considerable damage to cacao, mango fruits, pineapples, etc. and sometimes even to seeds in nursery beds or boxes.

2.2.2 Fly foxes

These are large fruit-eating bats and often troublesome in the tropics. They commit their depredations on fleshy fruits by night and often do a considerable amount of damage to the foliage of trees which they inhabit, often entirely defoliating these.

2.2.3 The House Crows

It lives in close association with man and obtains its livelihood from his works.

Audacious, cunning and uncanny vary. It has no particular preferences. It will eat almost anything, dead sewer rat, offal, carrion, kitchen scraps and refuse, locusts, termites, fruits, grains, etc.

2.2.4 The Jungle Crow

Like house crow it is omnivorous and highly destructive. It associates with vultures to feed on carrion.

2.2.5 The Jungle Babbler

Flocks or 'sisterhoods' hop about on the ground rummaging amongst the fallen leaves and mulch for moths and other insects. Sociable even while paired off and nesting feeding in flocks and bonding toward off attack by predatory hawk or cat. Their food is spiders, cockroachs and other insects, wild figs, barries, grains and nectar of flowers.

2.2.6 The Common Babbler

It avoids humid forest. The birds feed on the ground and scuttles along like rats through thorn scrub and thickets. Their food is insects, berries, grains and flower nectars.

2.2.7 Redvented Bulbul

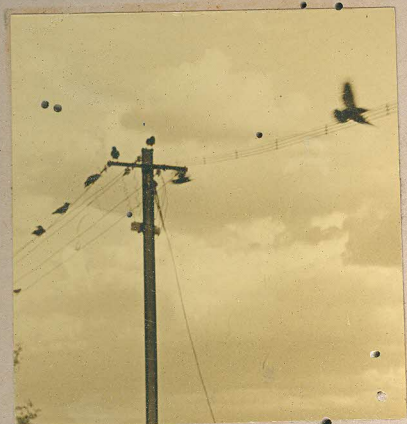
Common in gardens and light scrubs jungle, both near and away from human habitations. Large numbers collect to feed on banyan and pipal figs and insects.

2.2.8 Indian Robin

Familiar and confinding, frequents stony scrub country around town and villages. Hops along the ground. Its food is insects and their eggs, berries, grains and fruits, etc.

2.2.9 Red Whiskered Bulbul

It prefers better-wooded localities. It enters gardens and usually tame and confinding. Sometimes the two species are found side by side, but normally the habitat preferences are marked.



2.2.10 The Black Drongo or King Crow

A familiar bird of open country usually perched on telegraph wires. From exposed lookants it keeps vigilant watch for food. These are perched upon and carried off, held under foot, torn to pieces and swallowed. Its food is insects, flower nectar, ground nuts, etc.

2.2.11 The Brahminy or Black-headed Myna

It freely enters gardens and towns and villages. Partial to moist grass land. Its food is chiefly berries, wild figs and insects.

2.2.12 The Common Myna

A confirmed associate of man. It eats fruits, insects and kitchen scraps. Follows the plow for earth worms.

2.2.13 The Common Weaver Bird

Flocks, sometimes of considerable size, glean paddy and other grain in harvested fields. It damages ripening crops. Its seasonal local movements are largely governed by paddy and cereal cultivation which provide both nesting material and food.

2.2.14 The Striated Weaver Bird

Similar to the common weaver bird, except that it is more partial to tall coarse grass land and swampy reedy tank margins.

2.2.15 The Yellow-throated Sparrow

Often found in the neighbourhood of towns and villages. Keeps to open scrub country and

light deciduous forest. Gleans paddy grains and grass seeds instable fields and on cross-country cart tracks. Also feeds on berries, flower nectar and insects. Forms into large flocks in winter.

2.2.16 The House Sparrow

A confirmed hanger on of man, in hills and plains alike, whether in a bustling noisy city or outlying forest hamlet. Omnivorous and highly destructive to grains, fruit buds, flower nectars, etc. Sometimes collects in enormous flocks and does damage to ripening crops and in market gardens.

2.2.17 The Black-headed Bunting &

The Red-headed Bunting

The birds arrive September/October and depart again March/April. They keep in enormous flocks or 'swarms' to open cultivation of jowari, wheat, etc. particularly where the fields are interspersed with bush and babool jungle and may do considerable local damage to the ripening crops.

2.2.18 The Common Hawk-Cuckoo or

Brain Fever Bird.

Inhabits light forest; also partial to gardens, groves and mango topes, etc. near human habitations. Mostly silent during winter and, therefore, liable to be overlooked.

2.2.19 The Koel

Frequently in gardens, groves and open country abounding in large leafy trees. Its food is largely fruits and berries, also caterpillars and insects.

2.2.20 The Thick-billed Flower Picker

It feeds largely on ripe ^{Loranthus} berries. The edible pulp is stripped off by manipulating berry in bill, the viscous seed being wiped on to a neighbouring branch. Also eats peepal figs and lantana berries and other fruits.

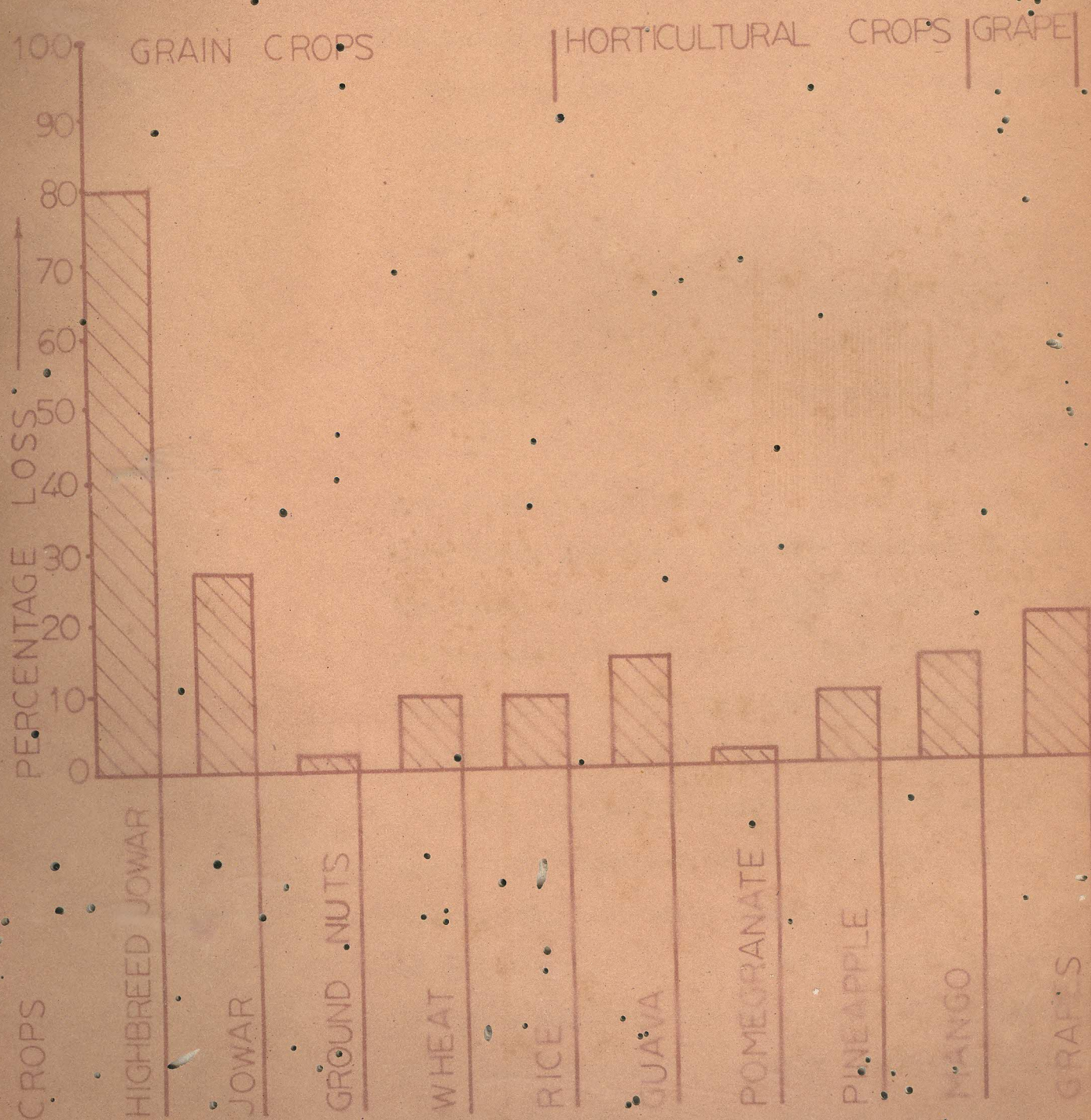
2.2.21 The Crow-Pheasant or Coucal

It is largely territorial. Affects open forests, scrub and bush country interspersed with grass land and shrubbery and groves about human habitation. Stalks along the ground or clambers and hops with agility amongst branches of shrubs in search of food.



2:3

PERCENTAGE LOSS DUE TO BIRDS
WHEN BIRDS ARE NOT SCARED OFF



2.4 Seasons of ripening of various crops

when damage due to birds occurs.

There are different seasons for different crops. Birds cause damage during the milking condition of crops to harvesting of crops.

In this period birds should be scared off, otherwise great damage causes to crops.

Following are the seasons of different crops :

- Hybrid Jowar - August - September - Oct
- Jowar - Feb - March
October - November
- Wheat - Feb - March
October - November
- Ground nut - Feb - March
October - November
- Rice - August - September
- Grapes - November - April
- Horticultural crops - Generally
Whole year

2.5 Flock formation

Most birds are gregarious for atleast part of the year. Although most of the birds flock by preference with conspecific individuals mixed flocks are common. In such cases the sign stimuli which elicit flocking can apparently be quite unspecific; another bird of about the same size, being sufficient to induce the response. However, many species have involved social signals - call notes, conspicuous rump and wing markings and so on - which function in flock integration. Often these are quite similar in unrelated species presumably by

convergence, for the colour patterns are often each as make the movements of taking flight conspicuous and the call notes have characteristics, which make them easily locatable and are audible over a distance not greatly exceeding that necessary for this function.

When a member of a gregarious species becomes separated from its flock it shows a specific type of appetitive behaviour. In the great tit, for instance this consists of hopping through the bushes, peering around (presumably looking for flock companions) and giving the flocking calls frequently when it rejoins the flock; it resumes feeding quietly. Flocking behaviour thus has several types of appetitive behaviour - looking for the flock flying in company, etc. but no consummatory act, the appetitive behaviour ceasing when other individuals are close.

In some species it is so marked that one individual which has been fed to satiation will start to feed again when it sees other individuals feeding, while an individual which is hungry will not feed for a while when placed with satiated individuals. No doubt this plays an important part in flock integration.

2.6 Methods of attacks of birds

The methods of attack of the various birds are very peculiar. The Brahminy Myna and the Common Myna which cause damage to grain crop and grape vineyards to its most alight in a flock usually of 3 to 6 birds about hundred feet or so away from the crops or vineyards and from there quietly walk towards the crops. Because of this they normally do not come in the sight of the watchmen watching the birds in flight above the crops.



The Brahminy Myna and the Common Myna, they walk through the rows of bearing grain or vines, watching the bunches in their nearest reach, they attack the bunches from below, pick the grains or berries, come down and eat them on the ground. This goes on till they are not disturbed by the watchmen.

The Redvented Bulbul visit the crops singly or in pair and sit on the bunches of crops and eat there or on the wire having the arms of the vine with fruit bearing canes pick a berry, come back on the wire and eat the berries there.



The Jungle Crow and the House Crow fly above the crops or the vineyards, pick up small bunches of grains or berries and go away to nearer tree and eat it there.



The Indian Robin, the House Sparrow and the Common Weaver bird come singly hide near a leaf of crop or a grape bunch, pick grains or berries and eat it there. Among these sparrows are perhaps the most destructive, in short time they will do considerable damage. Many times, they even sit on the bunches, pick grains or berries and go on eating till they are not disturbed.

The Jungle Babbler, the Common Babbler, the Koel, the Common Hawk-Cuckoo and the Crow Pleasant alight near open ends of rows of bearing bunches of crops, walk through the rows, pick up grains or berries, come on the ground and eat them there.

2.7 Time of attacks

It is observed that during the course of the day, birds visited crops in large numbers very frequently, at sun rise, in the afternoon between 12 noon to 2 p.m. and at sun set after 5 p.m. The most severe damage occurred during sun rise and sun set for grain crops and during the afternoon for grapes. It was also noticed that in grapes the table grapes suffered the most and in grain crops hybrid Jowar suffered the most.

2.8 Instinctive responses to stimuli likely to indicate danger.

These are of two types. First - responses to loud noises, quickly moving objects, unusual objects in a familiar environment, and so on. These are subject to rapid habituation if not reinforced by further stimuli indicative of danger. Second - each species has responses to stimuli indicative of particular predators - owls, hawks, snakes and so on. Just how specific these responses actually are, is uncertain. Certainly it is possible to combine characters of an owl and a mammal to produce a composite object which is very effective at evoking a response. Such responses to specific predators are probably less liable to habituation than general responses mentioned earlier,

though even here habituation does occur.

Many species have two or more distinct responses to predators. In passerines flying predators produce an immediate dash to crouching, while mammalian or perched avian predators induce mobbing - a form of ambivalent behaviour. Actual attacks on predators by small birds are rare, but larger species like the bittern may fight vigorously in defence of their nest. In nature, of course, birds become habituated to trains, aircrafts and gun fire.

However, habituation even to actual predators may occur. If an owl is shown to chaffinch on successive days, the 'mobbing' responses of the latter generally wanes.

Of course, habituation does not operate only a role in every sphere of the bird's life - feeding, sexual behaviour, nest building and so on.

2.9 Social attachments

India is facing great problem of food, in other hand population of India is also increasing rapidly. Jowar, wheat, rice are the main food of different States in India. We are growing 106 million tons of grains and due to birds' damage we are losing 10% out of it.



If we could save this much amount, we will not face food problem.

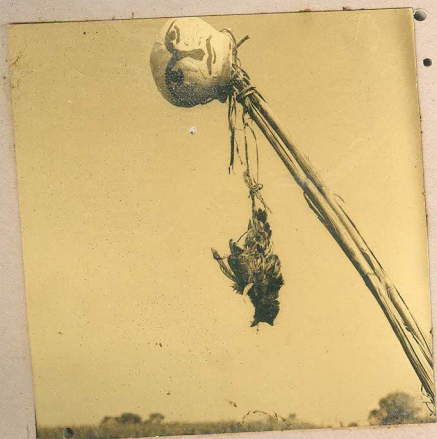
During the ripening season of crops farmer send their children to scare birds from field. By sending children to the field they save expenditure on labour, but they don't consider that school going children have examinations in those days. If these children go to field, they don't get time to study for examination. Due to the tendency of farmers to send children to the field, absenteeism in school increases.

2.10 Existing methods of scaring the birds. An observation survey around the country reveals no standard design existing to tackle the acute problem of bird scaring. Everywhere conventional methods of scaring birds which is with the help of a sling is used. In this manual labour is required.

2.10.1 A Sling

In most of the country this method is used. The sling is made up of leather or jute rope. It has centrally broad width to keep stones or soil particles to throw and two long strings attached to it. At the end of one string, hook is made to hold in one of the finger and another string is held in the same hand during

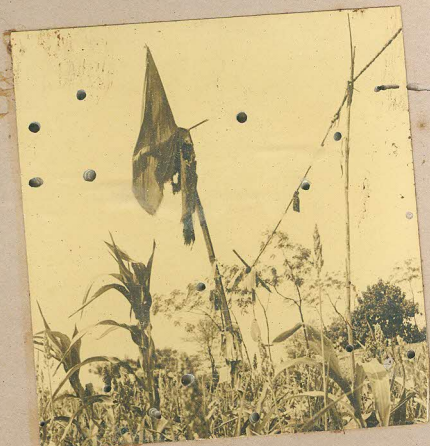
rotation. When sufficient velocity is achieved, the other end is left and due to centrifugal force particles are thrown away. With the help of sling, watchman can cover half an acre area.



Sometimes one of the birds is killed and hung to a stick in the field. Over the stick painted pot, on which manual figure is drawn, is put to scare the birds.



They make some figure by covering with the help of torn cloth.



They tie strings all over the field, to which small clothes are tied.

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Sometimes they put bullock cart in field to sit on that. Strings tied with small clothes are hung all over the field. These strings are connected to the cart. By sitting in the cart and pulling the strings birds are scared off.



By tying strings all over the field and pulling them, birds are not getting scared. To make it more effective along with these a sling should be used.



They hung tin or metal plates over that a rod is hung and one end of the rod, a string is attached which is pulled and released. This produces loud noise. The man operating this sits out of the field and pulls the string.



A long rod is fixed in the field to which a tin is tied at free end. By the sides of the tin, two strings are tied and the other ends of the strings a small rod is tied. One end of the rod a long string is tied. Near the tin a torn shirt or cloth is hung. The long string is taken to the shade where



watchman sits. By pulling the string the rod strikes on the tin and loud noise is produced. As birds are getting habituated to this sound, this system is found not effective.



For sitting watchman a thatch or platform is made at the centre of the crop. Below this watchman puts lantern, lunch tin, kambal, water pot, sling, etc. To protect from sun he puts umbrella over a rod which is tied to platform.



Sometimes farmers put paper bags over each bunch of crops to protect from birds.



Grape growers put plastic bags to each bunch of berries.



Agricultural knotted netting is used for protection of grape vineyards, vegetable farms and even kitchen gardens.

Plastic nettings are available in market. These nettings are manufactured by Garware Filament Corporation Pvt. Ltd., Poona.

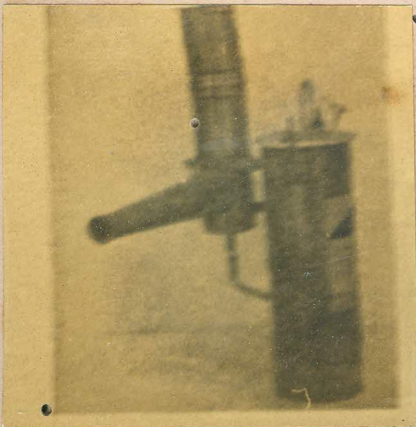
Specifications of agricultural netting is as follows :

Mesh size	Approx. stretched coverage per kg.	Width : in mtrs.	Cost Rs/kg.
2"	100 sq. mtrs.	7	66/-
1½"	60 sq. mtrs.	7	70/-
¾"	50 sq. mtrs.	7	75/-
½"	40 sq. mtrs.	7	80/-
¼"	30 sq. mtrs.	5	85/-

For fixing these nettings, following method is used.

Bamboos are pitched ¾ metres deep into the ground bearing a net hight of about 2½ metres above the ground. Poles are pitched at a distance 3½ mtrs. x 3½ mtrs. all around the border and alternate poles are provided in the centre. Straight angle iron frame (5 cms x 5 cms x 0.8 cms) is fixed on these poles. Straight wire rows are stretched at ½ metre intervals on the angle iron frame, on both sides in such

a fashion that is square of $1/2$ metre dimension of wire is formed. The netting is then lowered on to cover the entire area.



2.10.2 Mechanical Bird Scarer

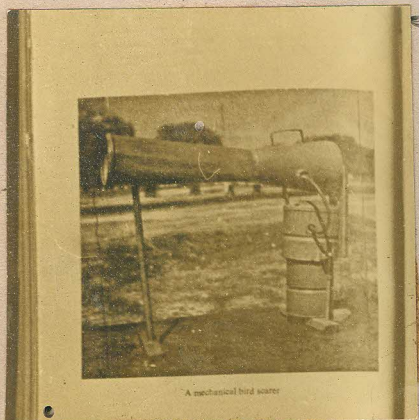
It is mechanical device to produce loud reports at regular intervals to scare away birds and wild animals destructure to crops. The explosion results from the combination of acetylene gas generated from mixture of water and calcium carbide.

These are kept in such a way that water drips from a small container over calcium carbide kept in separate chamber. The flow of the water can be regulated which in turn regulates the rate of explosion. The mechanical bird scarer may be timed to give two reports in one minute or only one in five minutes as required.

One such unit when fixed on a pole or a tree branch can cover 3 to 5 acres. It is light to carry and is available in several designs operated by wick or magnetic systems. It should not be used at one place for long because the birds and animals become familiar to the sound and do not get scared.

3. Analysis

Agricultural Implement Corporation was manufacturing one mechanical bird scarer which produces loud reports at regular intervals. The explosion results from the combustion of acetylene gas, generated from mixture of water and calcium carbide by chemical action.



These are kept in such a way that water drips from a small container over calcium carbide kept in separate chamber. The flow of water can be regulated which in turn regulates the rate of explosion. The mechanical bird scarer may be timed to give two reports in one minute or only one in five minutes as required. It is operated by wick or magnetic system.

3.1 Structural analysis

3.1.1 Calcium carbide chamber

- . It is made up of M.S. sheets.
- . It has window to load fresh calcium carbide and unload used calcium carbide.
- . It gives support to whole machine. It has M.S. channel section for base on which it is fixed with the help of M.S. nuts and bolts.
- . At the top water container is fixed.

3.1.2 Water container

- . It is also made up of M.S. sheets

- It has water-flow regulating valve of brass.
- Top is completely covered with M.S. sheet lid.
- It has two plastic tubes for outgoing gas.
- It is connected to combustion chamber with M.S. tubes which are used as kerosene container and support. The kerosene is used for lighting acetylene gas by wick.
- Around the water container gas chamber is provided.

3.1.3 Combustion chamber

- It is also made up of M.S. sheets.
- It has long diverging cylinder to produce loud reports, and at the end of cylinder there is support of M.S. tube welded to channel section at the bottom.
- It has a handle of M.S. flat joint with the help of M.S. rivets.

3.2 Functional analysis

3.2.1 Calcium Carbide Chamber

- . To contain calcium carbide.
- . Water drips over calcium carbide and produce acetylene gas which is taken in gas chamber surrounding the water container.
- . Acts as a support.
- . As it is having two different supports which are not connected to each other, hence no stability.

3.2.2 Water Container

- . The water is regulated by regulating valve, and ultimately regulates flow of gas.
- . Produced gas is taken from surrounding gas chamber to combustion chamber with the help of tubes.
- . Supporting tubes contain kerosene.

3.2.3 Combustion Chamber

- . Gas coming inside is burnt and noise is produced.
- . The explosion is controlled by a regulating mechanism. Due to long diverging cylinder noise is amplified.

3.3 Ergonomical analysis

- . It is heavy.
- . If this unit is mounted on tree, loading and unloading of calcium carbide is difficult.
- . Handle is at such position that machine is not balancing when lifted and gets tilted.

3.4 Formal analysis

- . The overall shape of the machine is converging towards bottom having steps in between.
- . It has two different unequal supports.
- . It is huge and crude in appearance.
- . Its green colour is attractive to birds.
- . Calcium carbide chamber and water container are having grooves at the centre.
- . Gas tubes are projecting outside.
- . Joints are seen from outside.
- . The overall form of the machine lacks ⁱⁿ visual unity.

3.5 Economical analysis

A man with the help of a sling can watch birds well and cover half acre area. For scaring the birds during whole season of crop, if farmer employs the labour, he spends about 150 rupees per acre.

The existing mechanical bird scarer costs 125 rupees. It makes loud reports at regular intervals and covers 3 to 4 acres area, but birds get habituated within few days to the sound and don't get scared. Machine becomes useless.

Only reliable thing is to cover the whole field with the agricultural knotted nettings. To cover one acre area with nettings costs about 5000 rupees. This nettings last long for 4 to 5 years. That means for one season of crop of one acre costs 1000 rupees.

Another method is to cover each bunch of crop with paper bags which costs minimum 200 rupees per acre, but due to this method it is found that the growth of grains get restricted.

One more method is to cover each bunch of grapes with plastic bags. This costs minimum 800 rupees per acre, but due to this also growth of berries stops and berries get rotted.

To protect the grapes from birds, grape growers spend about 400 to 500 rupees per acre for manual labour.

Therefore, it is better and economical to scare birds by using manual labour.

3.6 Material Selection

There are always many ways of satisfying the same need, with different materials and different processes. The formal qualities change according to the materials and processes. Each material has its own characteristics and these characteristics dictate certain methods of manufacturing process. The function of the product suggests certain form and shape and the form recommends the material and process.

The whole process of selection of material is a screening process. Among the methods employed for selecting the materials are -

1. value analysis
2. failure analysis
3. cost vs performance indices
4. computer evaluation

When selecting a material for specific application, the designer should consider the following :

1. Other application - what materials are now successfully used in similar application?
2. Properties - the product use conditions influence the properties required in the material. Other considerations affecting the choice of materials include finished

appearance, fabrication ease and the material cost by volume.

3. Process method - the method of processing must be considered for both end product satisfaction and economy.
4. Availability - consistent supplies unaffected by natural resource, price fluctuation and cost influence the selection of material.
5. Other factors which govern the material selection are dimensional tolerance, weight, type of finish, life, reliability against corrosion, wear, creep and ageing, effect of environment such as humidity, water and fluctuating temperatures.

4. Hypothesis

Referring to 2.8, it is crystal clear that no mechanical bird scarer should be designed on the principle of loud sound or quickly moving objects or unusual objects kept in a familiar environment will be of any use for a longer time as the birds will be habituated to these subjects in a very shorter time.

Unless something like sand or soil particles are in direct contact with the birds, they will not get scared.

Considering from economical point of view, the mechanical bird scarer which runs on external power like fuel oils, fuel gases, steam, etc. is costlier than scaring birds with manual labour.

Wind, the most abundantly available natural power cannot be relied upon because wind may not be available during the time of attack of birds.

In India, where labour is cheaply and readily available, a manually operated bird scaring device would be better than a mechanically operated one, because the latter may result in unemployment.

Considering these problems manual power is better and birds could be watched and scared immediately and efficiently.

4.1 Structural & Functional

- . This should have simple mechanism which will throw sand or soil particles atleast 200 feet long.
- . The loading and unloading of this should be simple, quick and it should require less force to operate.
- . It should be easily deassembled and assembled and also repaired by the operator himself.
- . Before throwing particles, if possible it should make loud noise.
- . Flickering and reflecting surfaces could be used.
- . These should be mass-produceable.

4.2 Ergonomical

- . It should be portable and light in weight.
- . All grips and levers should be designed for easy and comfortable operation.
- . It should be easily loaded and unloaded.

4.3 Formal .

- . The overall form of the scarer should be simple and unified.
- . All forms should be suited to the function and manufacturing processes and there should be smooth transition and merging of forms.
- . A bright colour having high reflectivity should be used for the machine because birds are very sensitive to light.
- . All information should be displayed simply and neatly so as to be easily legible.

5. Synthesis

To approach to the design problem is to arrive at a system governed by the problem constraints. To meet the need of protection of crop from birds, a separate unit based upon the fact that to check birds out, the best way is to hit them gently. In addition to this, a system of small units which gives flickering reflecting light would be more effective in scaring birds.

Design decisions

5.1 Netting for grapes, vegetable fields, kitchen gardens, etc.

The nettings can be made of low density polyethylene threads. To avoid the effect of ultraviolet rays, ultraviolet stabiliser is added in polyethylene.

For covering crops with nettings, more strength is not required, but it should have long life. Low density polyethylene has excellent physical and chemical properties and can be very easily extruded in fine fibres or threads. In India, polyethylene is cheap and easily available.

From the threads of l.d. polyethylene, nettings can be made in modular form. Modules of five metres square are provided with hooks. These

modules can be made in various meshes 2", 1½", 3/4", 1/2", 1/4". Each module can cover 25 sq. metres area. As per the area of the field, nett-ings are hooked to each other to cover entire area. Following will be the specifications of the modules along with cost :

<u>Mesh</u>	<u>Coverage in sq. metres</u>	<u>Approx.cost in Rs. per module</u>
2"	25	5/-
1½"	25	7/-
3/4"	25	9/-
1/2"	25	11/-
1/4"	25	15/-

5.2 Stationary manually operated device

It is very simple and cheap device. Advantage of elasticity of cane stick and spring is used to throw soil or sand particles.

A cane stick is fixed in a galvanised pipe socket. This socket is hinged in another socket having 135° bend at the corner. This hinge is spring-loaded. The bottom socket is put on a bamboo which is fixed in the field. As per requirements whole device can be rotated above the bamboo. To the bottom socket a tin is fixed in such a way that knob on the stick should hit the tin to produce loud sound. At the other end of the cane stick, a small plastic

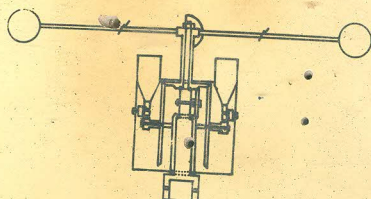
box is fixed along with a plastic handle.

When the stick is pulled down, particles are put in the box and stick is released. Due to the elasticity of cane and spring force, stick will rotate fast about its hinge and will strike the tin and noise is produced. Due to the centrifugal force acting on the particles, particles are thrown away and spread over the field. These particles are thrown in the direction of 45° to horizontal to get maximum range. It achieves 200 feet range. As this device rotates above the bamboo, particles can be thrown all around the device and can cover two acres area.

The height of the stick end from the surface is such that a man can operate the device by sitting on the surface.

5.3 Wind operated automatic device

This machine is operated by wind. The wind mill gives rotating motion to bottom part by reduction gears. The wind mill gives power to gears which are fixed on the shaft. These gears operate two pillet-bow mechanisms.



This mechanism has a box fixed on a rack which reciprocates in a guide. This guide is fixed to outer cover of the device and makes 45° angle to the horizontal. Over each pillet-bow mechanisms, hoppers are provided. Between hopper and pillet-bow, a reciprocating plate which has a hole for charging the box, is provided with spring load. This pillet-bow mechanisms are also spring loaded and these are opposite to each other. These are having knobs which strike on a metal plate for producing loud noise.

The hoppers are filled with dry soil or sand particles of mesh $1/4"$. The wind mill rotates pinion. Pinion takes rack back against spring force. When box comes exactly below the hopper, reciprocating plate moves back and hole coincides the opening of hopper and particles fall in the box. As rack goes back, it gets lifted due to guide and gets itself in upper channel, contact between rack and pinion looses and rack moves fast due to spring force. It strikes on plate and stopper and produces noise, also throws particles out of the box. The spring force is enough to throw 100 gms. of particles upto 100 feet. As the machine rotates on verticle shaft, it throws particles all around with making noise at every shot. It covers half acre area, but it requires wind velocity more than 10 km per hour.

5.4 Twisted plates

These plates are made from waste tins. One side of it is painted with black colour. It has a hole at one end. These are hung all over the field with the help of strings. The distance between two should be 3 metres. These rotate about its axis due to wind and gives flickering reflected light.

These are simple and mass produceable. These act as a scare-crow.

5.5 Portable unit

Working of this unit is similar to the air-gun, but here only spring force is used to achieve a maximum range of 200 feet for a weight of 100 gms of soil or sand particles. The shape of unit is such that, operator cannot aim like air-gun to shoot the target, but with easy grip he can get maximum range and hit the target gently. In scaring the birds, this fact is most important because birds should not be killed, but only scared off from the field.

It has mild steel barrel fixed on wooden frame in which a trigger system is fixed. Trigger levers are of polystyrene. The aluminium ram

has a plastic box at front for putting soil or sand particles and a knob for loading the ram at backside. The wooden butt is hinged to the frame near trigger. Mild steel lever is fixed to the butt with screws. An aluminium connecting lever is hinged at lever end and ram slider.

When the gun is folded at the butt hinge, levers take the ram back and load the ram; gun is made straight and only ram slider will go to its place. After loading the ram, sand or soil particles are put in the box and by holding the gun parallel to the horizontal trigger is operated. The ram goes fast and gives enough velocity to the particles and strikes on the stopper inside the barrel. The particles goes out and spread over the field.

Ergonomical

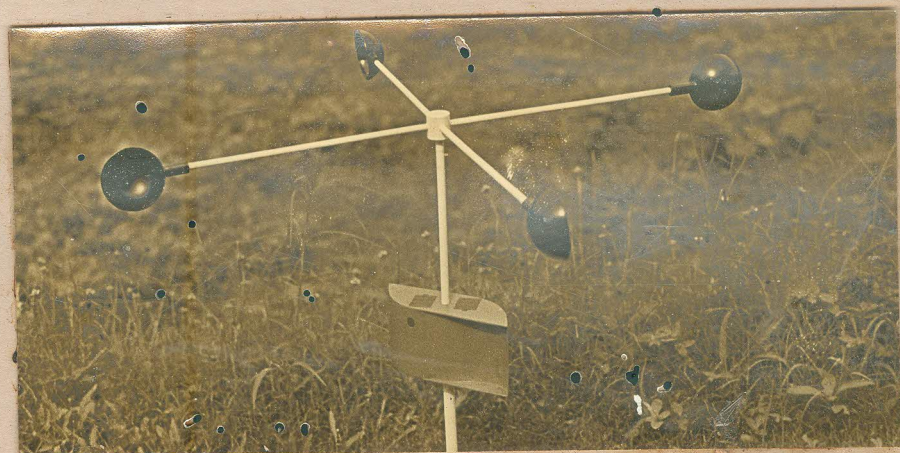
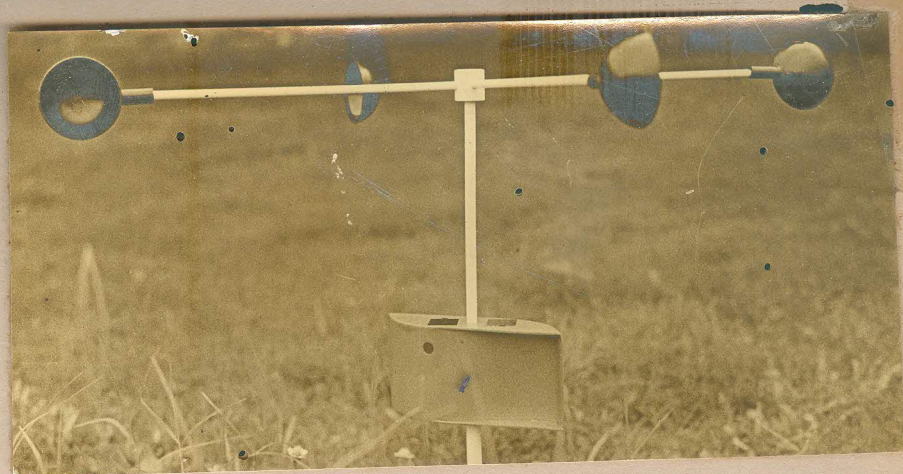
- . It is very easy to handle as it is light in weight.
- . All grips are designed to give no strains to the hands.
- . Operation of trigger is very simple and easy.
- . Folding of the gun for loading is simple and requires minimum force.

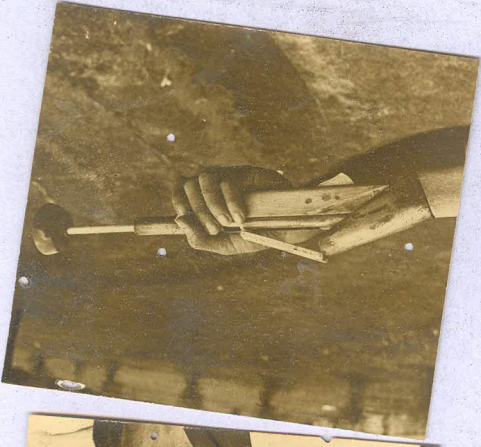
Formal

The basic shape of the product is derived from the function and ergonomical aspects. Care is taken to reduce the visual weight of the product.

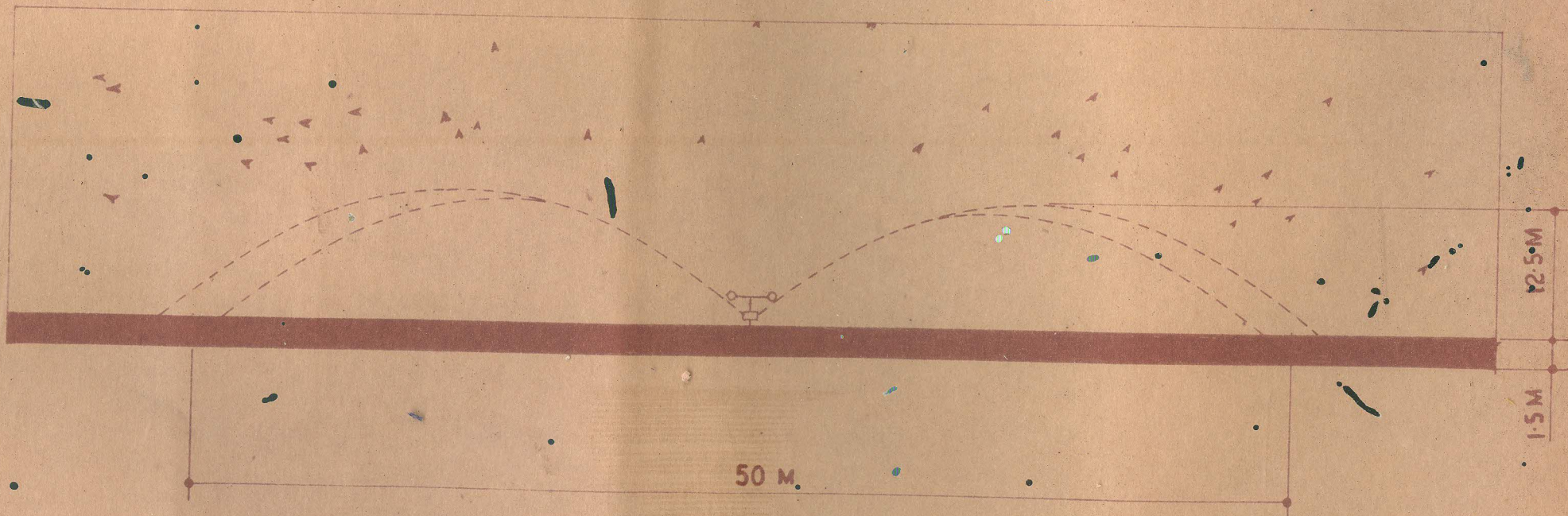
Economical

The manufacturing cost of the product will be less than Rs.15/-.



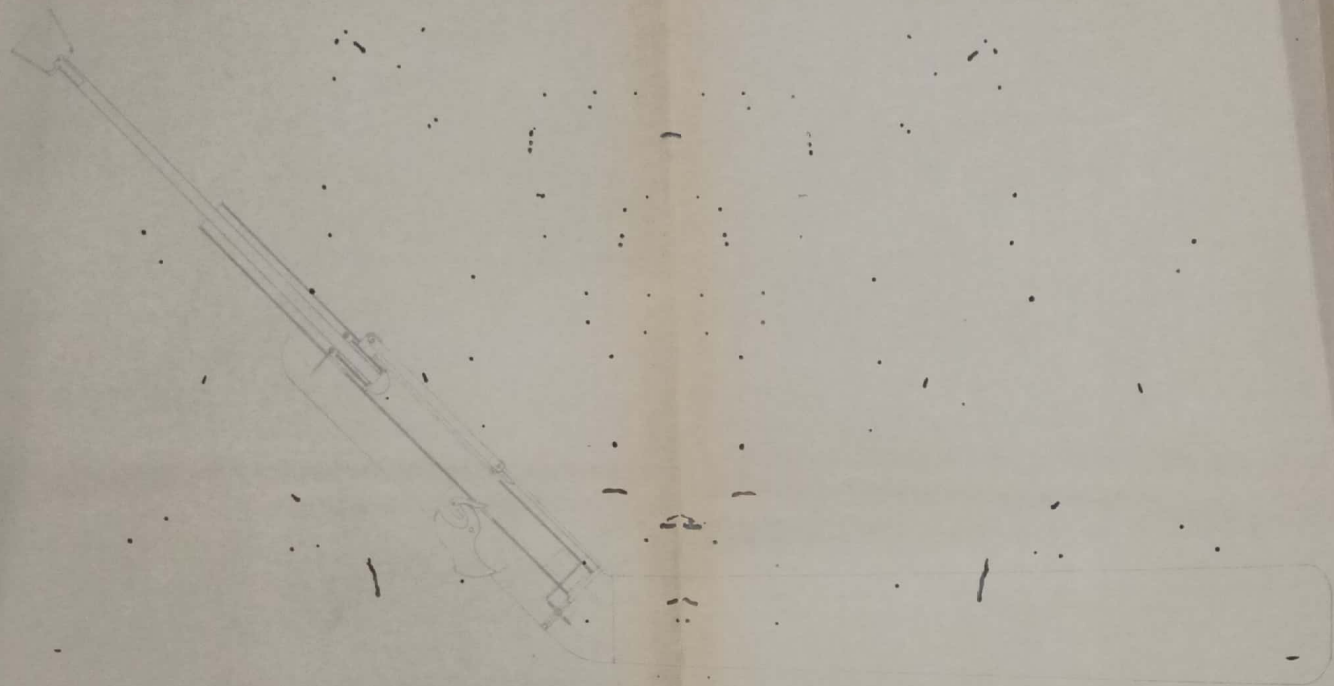


BIRD-SCARER



COMPARATIVE STUDY

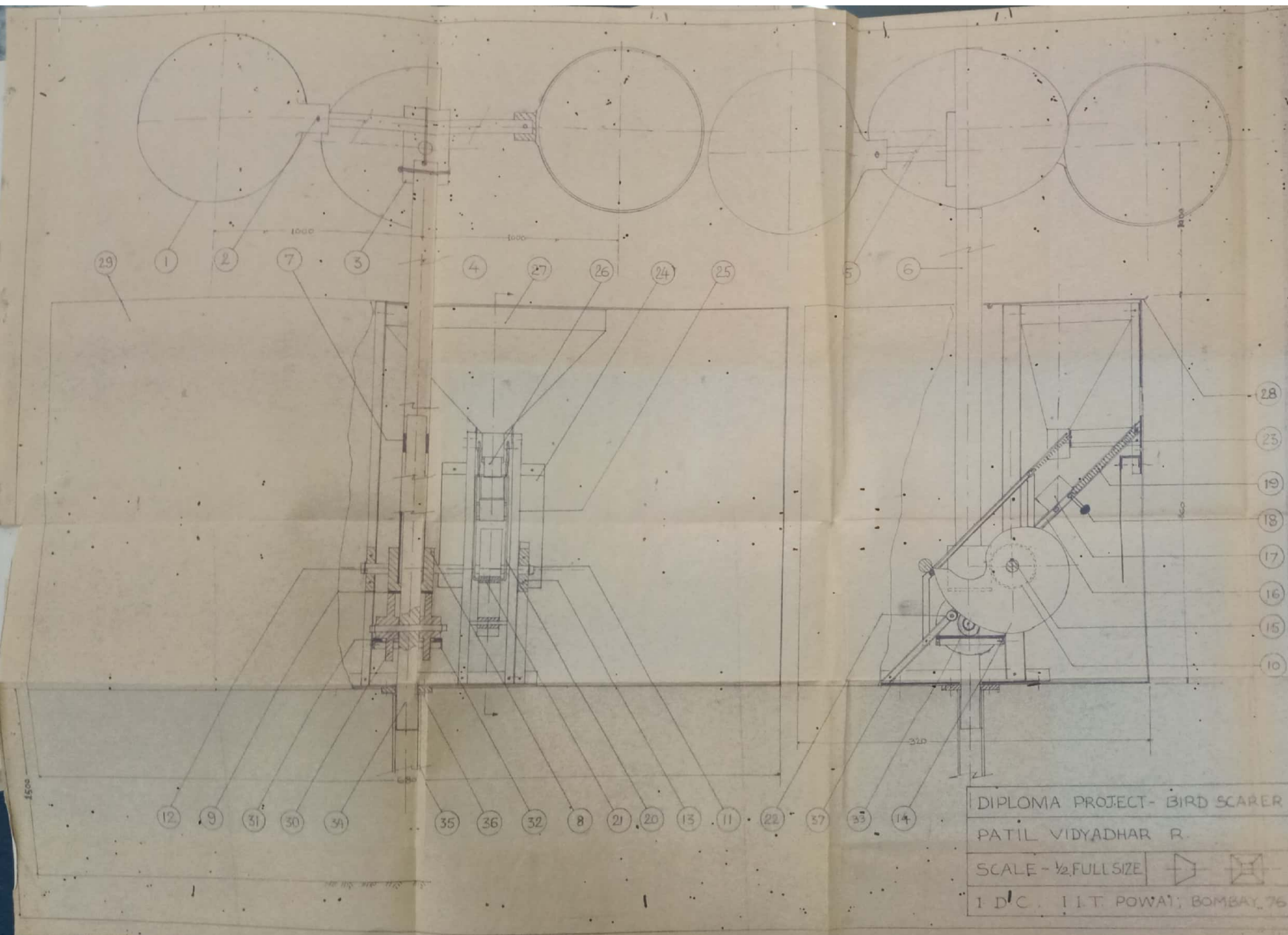
NO.	NAME	POWER USED	PRINCIPLE	SCARING METHOD		COVERAGE IN ACRES	COST IN Rs.		REMARKS
				NOISE	SPRAY		INITIAL	RUNNING	
1	SLING	MAN	CENTRIFUGAL FORCE	NO	YES	HALF	15	6	
2	MECHANICAL BIRD SCARER	CALCIUM CARBIDE	COMBUSTION OF C_2H_2 GAS	YES	-	THREE	125	2	BIRDS GET HABITUATED
3	NYLON NETTINGS	-	COVERING	-	-	ONE	10000	-	COSTLY BUT RELIABLE
4	STATIONARY MACHINE	MAN	CENTRIFUGAL FORCE	YES	YES	ONE	10	3	
5	TWISTED PLATES	-	REFLECTION OF LIGHT	-	-	ONE	20	-	EFFECTIVE WITH DANGER STIMULI
6	WIND OPERATED	WIND	A PELLET- BOW	YES	YES	HALF	250	-	MAN WATCH IS ESSENTIAL WHEN NO WIND
7	POLYETHYLENE NETTINGS	-	COVERING	-	-	ONE	2000	-	RELIABLE & LESS COSTLY
8	PORTABLE MACHINE	MAN	SPRING FORCE	-	YES	ONE	20	3	



430

CE

WILSON & SONS
NEW YORK
NEW YORK



DIPLOMA PROJECT- BIRD SCARER
 PATIL VIDYADHAR R.
 SCALE - 1/2 FULL SIZE
 1 D.C. I.I.T. POWAI, BOMBAY, 76

S.NO	DESCRIPTION	QTY	MATERIAL
38	NUTS AND BOLTS	-	M.S
37	FRAME	2	ALUMINIUM
36	BEARING	1	NYLON
35	SUPPORT	1	M.S
34	SHAFT	1	M.S
33	SHAFT	1	ALUMINIUM
32	RING SUPPORT	1	ALUMINIUM
31	FRICTION RING	1	RUBBER
30	FRICTION WHEELS	2	NYLON
29	WINDMILL COVER	1	M.S
28	LID	2	M.S
27	HOPPER	2	M.S
26	SLIDING VALVE	2	ALUMINIUM
25	GUIDING GROOVES	8	ALUMINIUM
24	SOUND PLATE	2	M.S SHEET
23	SPRING	4	SPRING STEEL
22	ROLLER	2	NYLON
21	ROLLER	2	NYLON
20	LOADING VALVE SLIDER	2	ALUMINIUM
19	SPRING	4	SPRING STEEL
18	KNOB	2	RUBBER
17	BOX	2	ALUMINIUM
16	SLIDER	2	ALUMINIUM
15	KEY	4	M.S
14	CAM	2	NYLON
13	BUSHES	4	NYLON
12	CIRCLIPS	4	M.S
11	SHAFT	2	ALUMINIUM
10	WHEEL	2	NYLON
9	FRICTION RING	1	RUBBER
8	WORM	1	C-I
7	NYLON BUSH	1	NYLON
6	SHAFT	1	M.S [TUBE]
5	ARMS	4	M.S [TUBES]
4	SPLIT PINS	2	M.S
3	ARM BUSH	1	C-I
2	SPLIT PINS	4	M.S
1	WIND CUPS	4	ALUMINIUM

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