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**TECHNOLOGY DIFFUSION & SUPPORT PROGRAMME (TDSP)
FOR SMALL SCALE INDUSTRIES**

SF/GLO/02/013

UNIDO CONTRACT NO: 16001093

Mechanization of DICO Locks Production

FINAL report on the above contract:

By the Contractor

DICO

The Dindigul Lock workers' Industrial Co-op. Society

Located at Soundararaja Mills Road, Dindigul, Tamilnadu-624 003,

India

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Submitted to

United Nations Industrial Development Organization

Vienna

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III. Background information

Locks are being manufactured in Dindigul, Tamilnadu, India for over 100 years. There are about 50 tiny units which are mainly run by the artisans. The locks are handmade. The production of the locks is being overseen and coordinated by the DICO. Upgrading of this artisan based Lock manufacturing cluster is one of the major Project deliverables of the National Programme for Development of the Indian Lock Industry (NPDLI).

III. Aim of the Activity

To support the process of mechanization and enhance the production of Kavalan, Sentinel and Door Locks by

- a. Strengthening capacity building of DICO by providing need based training, raw materials and tooling.
- b. Providing Marketing support and exposure through participation of artisans in domestic hardware exhibitions.

IV. Services provided and Deliveries made as per the TOR

a. Material for trial

The specifications and quantity of the raw material for manufacturing 100 locks each of Sentinel, Kavalan and Door Lock were worked out as follows:

- Brass rolled sheets 60 x 40 composition, thickness upto 3 mm.....320 Kg
- Brass Billets 60 x 40 composition 300Kg.

The materials were procured in full compliance with the rules of the Tamilnadu Government. These materials were used to make the parts for the Kavalan and Sentinel Locks. The specifications of the materials worked out very well with tools designed and fabricated. This will ensure continuous production of the parts for the locks.

2. Mechanization of Lock components production.

2.1 The parts for the second set of tools for completing the mechanized production of "Sentinel" and "Kavalan" locks have been identified in consultation with DICO artisans , Dindigul and the National expert Mr S.Vasantha Kumar and Government tool room Bangalore.

2.1.1 These are listed as per Annex-1

These are successfully completed. The parts made from these tools mounted on the existing machines at DICO are perfectly fitting in to the direct assembly of the Locks. The tools are physically shown as per Annex-4. Comparison of quality between hand made and mechanical made lock as per Annex-5. The assembled locks are shown as Annex-7

2.1.2 298 numbers of spares for various tools earlier supplied and the ones that are listed above are supplied. This stock of spares will assure continuous production of the Lock components.

2.1.3 Component drawings and Tool drawings in AUTOCAD is supplied. Sample CAD drawing as per Annex-3.

2.1.4 The various tools for the mechanisation of Parts for Door Lock is as per Annex-6. All the tools have been delivered. Parts were produced using these tools (Annex-8). They were checked by directly assembling the components and checking the functionalities. The tools are accepted.

3. On Job Training of artisans in use of tools for mechanized production of Lock components (Annex-9)

The training programme designed and conducted are detailed as per Annex-9 for the production of various components required for the assembly of Locks.

In this the first few parts are produced by the Tools supplier directly demonstrating the topics detailed in the Annex -9 and followed by the artisans themselves with the tool supplier watching behind and correcting the mistakes. The artisans of DICO feel confident at the end of training.

The training for maintenance of the tools in disassembly and assembly of tools is also imparted to the artisans. Annex-10.

4. Participation in Exhibition

DICO participated in the INTEC-2006, International Industrial Trade Fair from INTEC-2006, International Industrial Trade Fair at Codissia Trade Fair Complex, Coimbatore, Tamilnadu, INDIA

Two lock technicians and one officer participated in the Exhibition(Annex-11)

The following are the result of the participation in the exhibition.

There was a good response for the different kind of DICO locks in the exhibition , particularly Australia lock and Excise lock.

Higher response was received for low price locks such as sentinel , kavalan and Door locks and also high price locks.

All the locks manufactured by DICO were displayed in the INTECH -2006 and the Speciality of the locks were explained in person to the visitors, for operating the Excise lock, trick lock, double lock etc.

Pamphlets (Annex-12 & 12.1) of the locks manufactured by DICO printed for the exhibition was widely collected by the visitors to help them decide on enquiries in future.

Counter sales was also done in the Exhibition. Direct sales of locks were Rs. 11,715/- Further, based on the enquiry in the exhibition,

Locks for the sum of Rs. 13,791/- was sold at DICO Dindigul to a lock dealer living in Pothanur near Coimbatore.

The participation in the exhibition with the UNIDO assistance has greatly helped in the exposure of the DICO manufactured locks for a bigger audience in the International trade fair. This is expected to yield bigger orders in the future which can be easily and confidently met by the increased productivity from the mechanization of lock production. The Annex-13 shows there is a steady increase in the output of the DICO after the mechanization.

The participation in the exhibition with the UNIDO assistance has greatly helped in the exposure of the DICO manufactured locks for a bigger audience in the International trade fair. This is expected to yield bigger orders in the future which can be easily and confidently met by the increased productivity from the mechanization of lock production.

IV

Summary & Conclusions:

- The artisans of DICO have accepted to the mechanization process of the Lock production only after the benefits was physically shown to them.
- At the least the output could be increased by a factor of 10 and it could be much more. The artisans being basically very poor this could be a very successful project especially in the direction of Poverty alleviation.
- Quality of locks, standardization of Lock components, rationalized design of Locks etc are the clear benefits from the project as compared to handmade locks.
- Even women workers could also be used for the assembly of locks like in Watch industries.
- If proactive marketing thrust is given and there is a sudden demand for the locks DICO can meet the demand confidently and in addition the cost could also be decreased.
- DICO can also think of exporting their locks to other countries.

For The Dindigul Lock Workers' Industrial
Co-operative Society Ltd., IND, No. 150


Special Officer.

Annex -1

Tools Designed and Supplied for the Sentinel and Kavalan locks' components Identification of the tools with the components alongwith the machine loading chart

A. Sentinel Lock

| S/No | Tool Description | To Load on |
|------|--|------------------|
| 1 | Blanking Tool (common tool for Top and Bottom Plate) | 80 Ton Press |
| 2 | Piercing tool for Top Plate | 80 Ton Press |
| 3 | Piercing tool for Bottom Plate | 80 Ton Press |
| 4 | Precision wirecut Metal sand casting pattern for casting Body | Foundry at DICO |
| 5 | Progressive Tool for Locking Bolt | 20 Ton Press |
| 6 | Blanking Tool for Key Blank | 80 Ton Press |
| 7 | Stamping Tool for stamping DICO emblem (common for Sentinel and Kavalan locks. | 80 Ton Press |
| 8 | Stamping Tool to stamp SENTINEL | 80 Ton Press |
| 9 | Progressive Tool for Cover plate for Levers | 20 Ton Press |
| 10 | Blanking tool for stop piece for shackle | 20 Ton Press |
| 11 | Drill Jig for Body | Drilling machine |
| 12 | Stamping Tool to stamp LEVER emblem (common for Sentinel and Kavalan lock) | 80 Ton Press |

Operations at sl nos 1,2,3,7,8 above are done in 1 Progressive tool

B. Kavalan Lock

| S/No | Tool Description | |
|------|---|------------------|
| 1 | Blanking Tool (common tool for Top and Bottom Plate) | 80 Ton Press |
| 2 | Piercing tool for Top Plate | 80 Ton Press |
| 3 | Piercing tool for Bottom Plate | 80 Ton Press |
| 4 | Precision wirecut Metal sand casting pattern for casting Body | Foundry at DICO |
| 5 | Drill Jig for Body | Drilling machine |
| 6 | Progressive Tool for Locking Bolt | 20 Ton Press |
| 7 | Stiffner Blanking Tool with Die set | Fly Press |
| 8 | Notching tool for levers | 20 Ton Press |
| 9 | Stamping Tool to stamp KAVALAN | 80 Ton Press |
| 10 | Shackle guide -Progressive Tool | 20 Ton Press |
| 11 | Stop Piece - Blanking Tool | 20 Ton Press |
| 12 | Spring Guide- Blanking Tool | 20 Ton Press |

| | | |
|------|-------------------------------------|-----------|
| Item | Lever cover plate- Progressive Tool | Fly Press |
| Item | Locking Bolt Wiping tool | Fly Press |

Operations at sl nrs 1,2,3,9 were done in one Progressive tool

For The Diadigal Lock Workers' Industrial
Co-operative Society Ltd., INB, No. 100


Special Officer

Annex -2

Training of Lock Artisans in the Setting and production of Sentinel and Kavalan and Door locks' components for manufacturing 100 locks each.

A.

- Understanding of Press
- Safety on Press
- Operation of Mechanical Press
- Loading and Unloading of Tools on Press.
- Adjustments and setting on the machine for the different strokes for the various tools
- Clamping methods used on a Press
- Loading of tools with Clamping
- Stroke adjustment
- Strip feed.
- Loading of all tools of Sentinel and Kavalan Locks on the Press sequentially for the following operations:
 - ..Clamping Methods
 - ..Feeding methods and Stop positions
 - ..Problems faced during Feeding
 - ..Removal of components out of die when stuck
 - ..Trial of all tools were carried by DICO artisans with guidance and supervision.
- Shearing strips to required size.

- Loading Top and Bottom plate of Sentinel Lock and locking bolt. Tool Tryouts by DICO artisans.
- Tryout and production using Sentinel Lever tools, wiping tool and small tools on the Fly Press.
- Trouble shooting while tryouts.
- Kavalan lock top and bottom plate and progressive tool of Locking bolt total tryout and production by DICO artisans.
- Sentinel wiping tool tryout and production by DICO artisans.
- Tool handling, maintenance of tools, importance of tools clamping, tie bar .
- 2 major tools (for Top and Bottom Plates) dismantling , reassembling, precautions and assembly techniques rehearsal by DICO artisans under the guidance and supervision of the GTTC .

DICO artisans were guided to produce totally components for 100 locks each for Sentinel, Kavalan and Door Lock and assembled 2 locks each to check the validity and correctness of the components produced straight from the machines without any handwork. It was found to be acceptable.

For The Dinadigal Lock Workers' Industrial
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Special Officer.

Session on Standardisation to DICO artisans

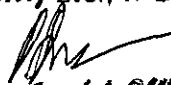
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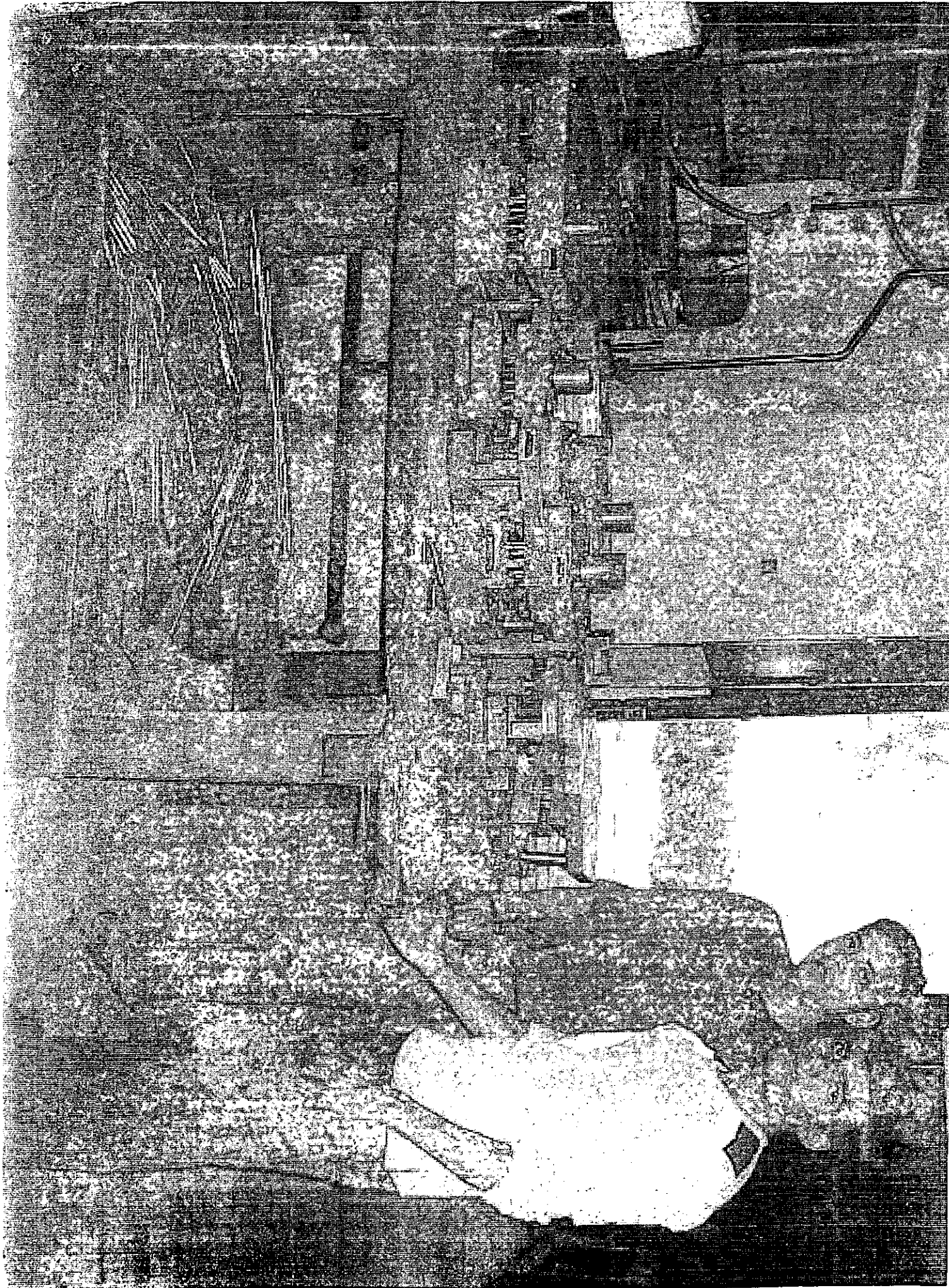
The following aspects of standardization was dealt with and demonstrated with respect to the Sentinel and Kavalan lock components production:

As the artisans are illiterate they have to be communicated only in the shop floor on the job so that they can understand the importance of the topic.

1. What is standardization.
2. Advantages of Standardisation.
3. What are the standards to be followed for the basic raw materials acceptance from vendors for the parts of the above locks.
4. What are the tolerances for the cut raw materials to be fed into the tools for the parts to be produced under the press. This was clearly demonstrated and felt by them as for some strips of brass which they cut werenot smoothly getting into the press tools.
5. What are the fits and tolerances used for the assembly of the tools for producing the locks' components and checking them when the tools are dismantled for any repairs if the tools are damaged.
6. Instruments to be used and methodology of using them for achieving the standard components.
7. Quality Control procedures in Lock production including Lock tools maintenance.

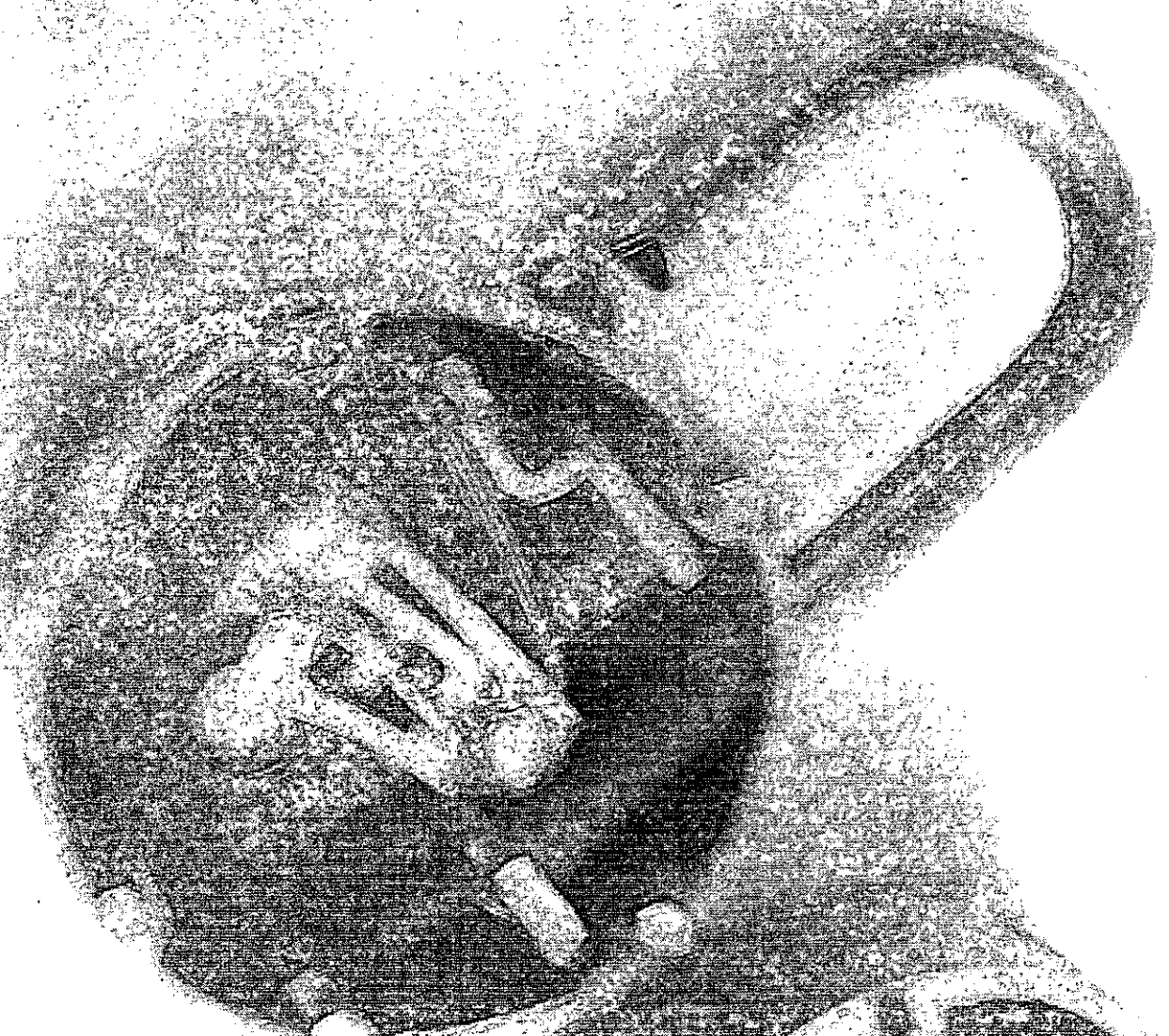
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Secretary

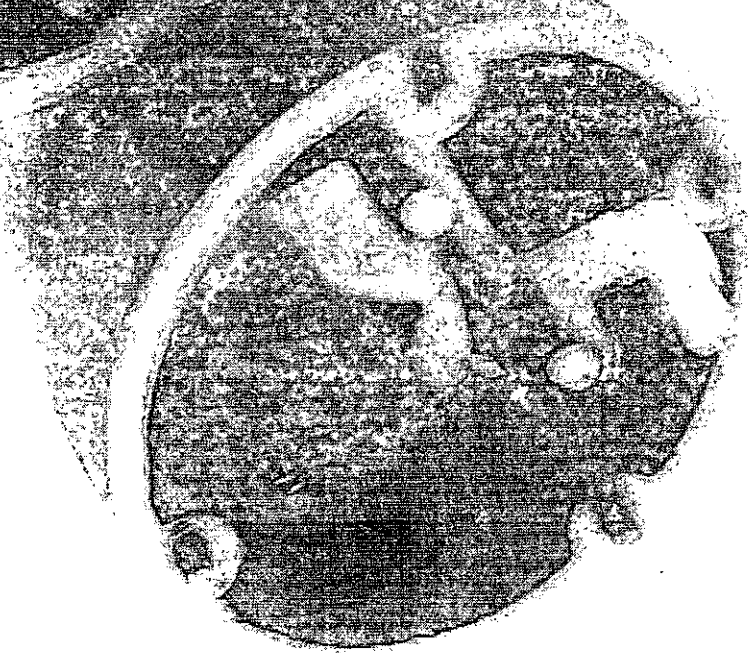


Annex - 4

HANDMADE KAVVALAN FROM DICCO



MECHANISED KAVVALAN LOCK



COMPARISON OF HAND MADE LOCK & MECHANISED LOCK, ILLUSTRATIVE SAMPLE

Annex-6
List of Tools for mechanized production of Door Lock Tools

| Sl No. | Items | Qty(nos) | Unit Price | No of Tools | |
|--------|---|-------------|------------|-------------|--|
| 1 | BOTTOM PLATE a) Piercing b) V.Bending Punch | 1 1 | | 1 1 | |
| 2 | TOP COVER a) Knotching b) Piercing c) Piercing | 1 1 1 | | 1 1 1 | |
| 3 | LEVERS a) Blanking Tool b) Piercing Tool | 1 1 | | 3 5 | |
| 4 | LOCKING BOLT a) Piercing - I b) Piercing - II c) Square Piercing | 1 1 1 | | 1 1 1 | |
| 5 | FACE PLATE a) Piercing b) Stamping | 1 1 | | 1 1 | |
| 6 | CLAMP a) 'L' Bending tool | 1 | | 1 | |
| 7 | KEY COVER a) Progressive tool | 1 | | 1 | |
| 8 | SHEARING TOOL | 1 | | 1 | |
| 9 | KEY a) Blanking tool b) Blanking tool | 1 1 | | 1 1 | |
| | TOTAL | | | 23 | |

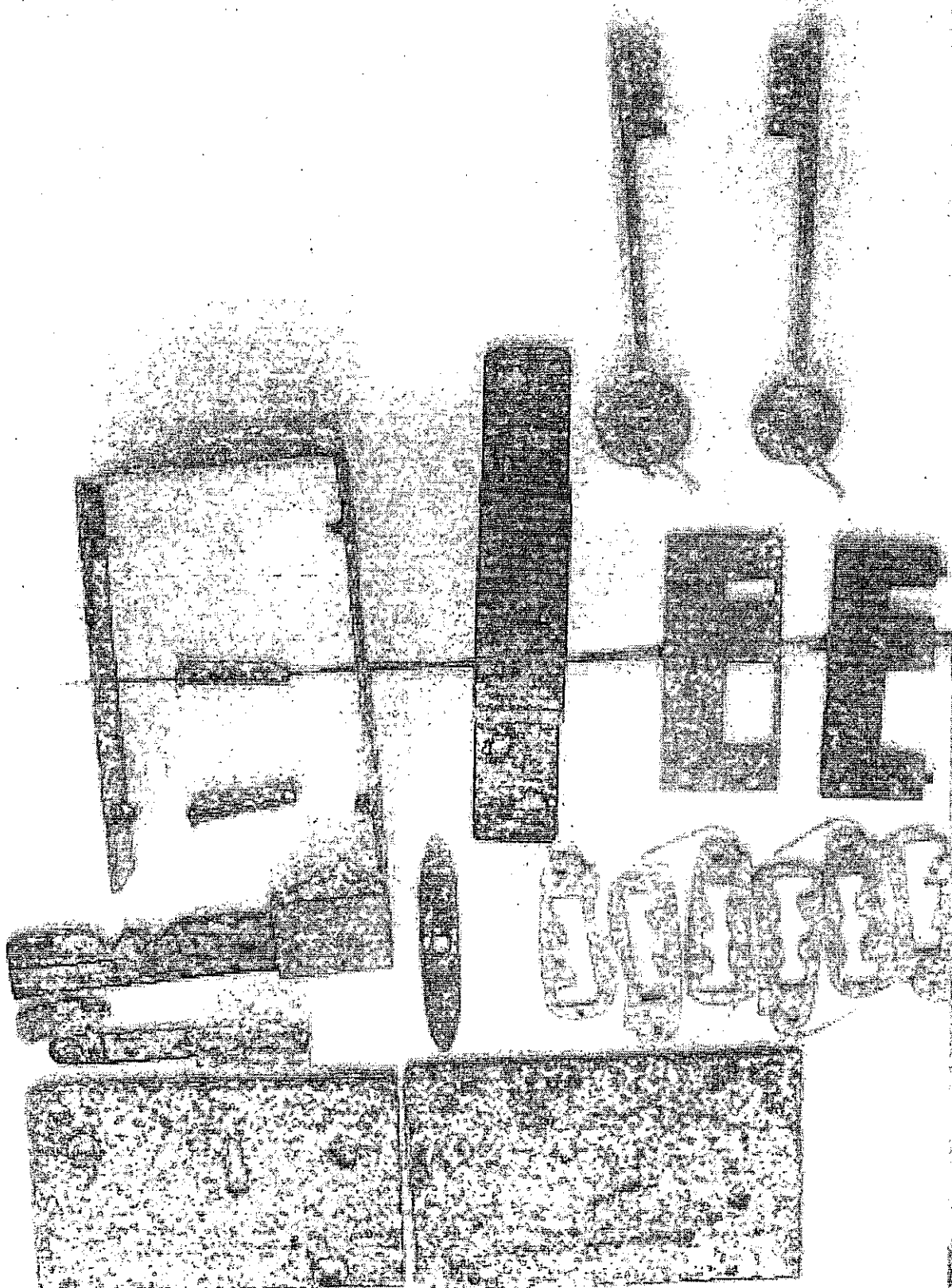
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Co-operative Society Ltd., I.D. No. 150**


General Manager



ANNEX - 7

Annex-8



Annex -9

Training of Lock Artisans in the Setting and production of Sentinel and Kavalan locks' and Door Lock components for manufacturing 100 locks each.

A.

- **Understanding of Press**
- **Safety on Press**
- **Operation of Mechanical Press**
- **Loading and Unloading of Tools on Press.**
- **Adjustments and setting on the machine for the different strokes for the various tools**
- **Clamping methods used on a Press**
- **Loading of tools with Clamping**
- **Stroke adjustment**
- **Strip feed.**
- **Loading of all tools of Sentinel and Kavalan Locks on the Press sequentially for the following operations:**
 - a) **Clamping Methods**
 - b) **Feeding methods and Stop positions**
 - c) **Problems faced during Feeding**
 - d) **Removal of components out of die when stuck**
 - e) **Trial of all tools were carried by DICO artisans with guidance and supervision.**
- **Shearing strips to required size.**
- **Loading Top and Bottom plate of Sentinel Lock and locking bolt. Tool Tryouts by DICO artisans.**

- Tryout and production using Sentinel Lever tools, wiping tool and small tools on the Fly Press.
- Trouble shooting while tryouts.
- Kavalan lock top and bottom plate and progressive tool of Locking bolt total tryout and production by DICO artisans.
- Sentinel wiping tool tryout and production by DICO artisans.
- Tool handling, maintenance of tools, importance of tools clamping, tie bar .
- 2 major tools (for Top and Bottom Plates) dismantling , reassembling, precautions and assembly techniques rehearsal by DICO artisans under the guidance and supervision of the GTTC & Mr S.Vasantha kumar (expert) .

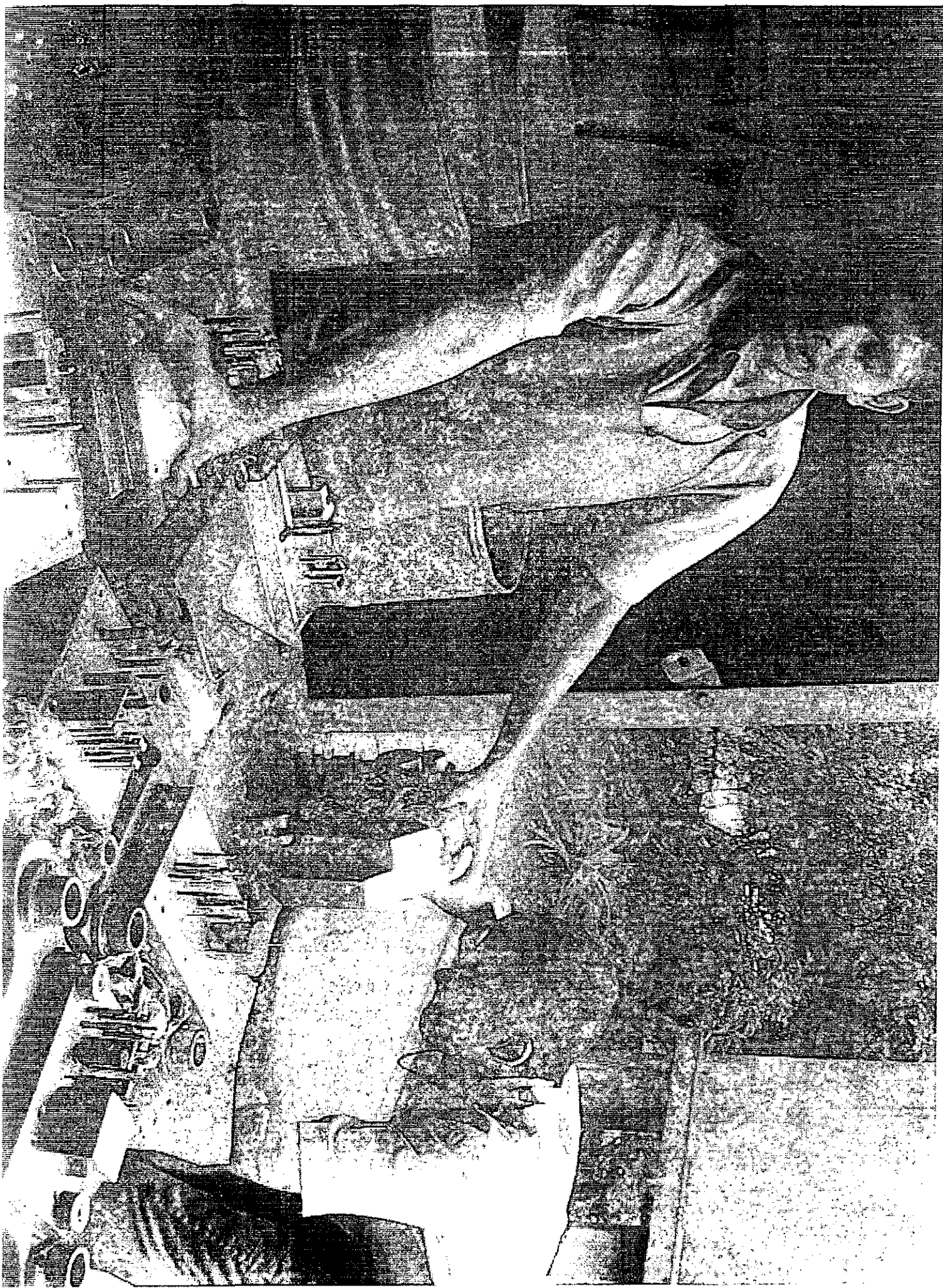
DICO artisans were guided to produce totally components for 100 locks each to check the validity and correctness of the components produced straight from the machines without any handwork. It was found to be acceptable.

The training of assembly and disassembly of tools for maintenance in future have also been recorded and given to the artisans. (Annex-10)

The replacement of the punches in future can be done with the help of drawings prepared and given to DICO.

For The Sindigaal Lock Workers' Industrial
Co-operative Society Ltd., I.D. No. 150


Special Officer.



100-1-77

Annex -11

**INTEC-2006, International Industrial Trade Fair, Codissia
Trade Fair Complex, Coimbatore, Tamilnadu. India**

7th July to 12th July 2006



STUDIOS

STUDIO 1

STUDIO 2

STUDIO 3

STUDIO 4

STUDIO 5

STUDIO 6

STUDIO 7

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Annex-13

Production and Sales of Locks by DICO

| Year | Production | | Sales | |
|----------------------------|--------------|-------------|--------------|-------------|
| | Quantity Nos | Value in Rs | Quantity Nos | Value in Rs |
| 2005-2006 | 7210 | 11,55,494 | 8164 | 14,76,308 |
| 2006-2007 | 8010 | 13,53,403 | 8685 | 15,90,468 |
| 2007-2008 | 7059 | 15,74,485 | 8711 | 21,70,720 |
| 2008-2009 upto 31.10.08 | 3581 | 9,46,723 | 3603 | 8,98,851 |

Summary of the above: The Mechanization of Lock Production has helped the DICO in increasing their Production & Sales year to year.

For The Diadigal Lock Workers' Industrial
Co-operative Society Ltd., IND. No. 150


Special Officer