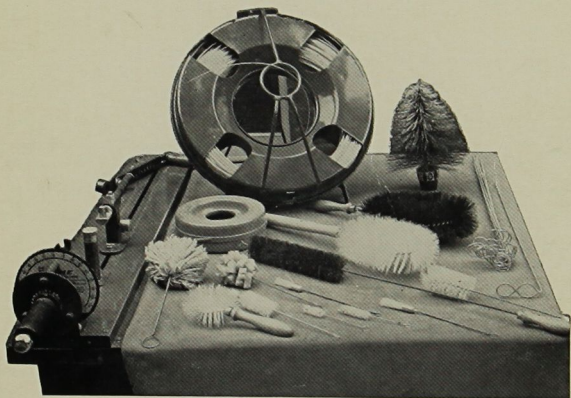
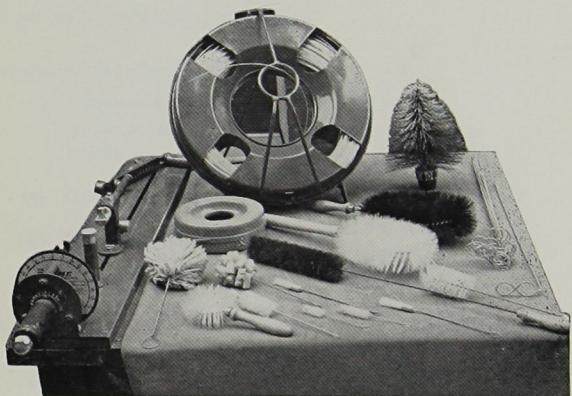


The 'Thame' Wire Twisting Machine



By PAMELA EVERETT, M.A.O.T., M.C.S.P.

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The Wire Twisting Brush Machine

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by PAMELA EVERETT, M.A.O.T., M.C.S.P.

(Diploma Chelsea College of Education)

(London University Diploma in Theory and Practice of Physical Education)

INTRODUCTION

It was an honour to be asked by Mrs. M. S. Jones, and Nottingham Handcraft Company to assist in the Production of the explanatory booklet for the Wire Twisting Brush Machine. Nevertheless, I accepted the request with mixed feelings, learning at the same time of Mrs. Jones' retirement. In view of this, she did not feel able to complete the final details of verification, necessary for the script without a Department and patients easily available. Therefore, I agreed to complete a project, already well on its way, with the co-operation and help of the Staff and Patients of the Occupational Therapy Department at St. Benedict's Hospital.

The first Wire Twisting Machine was made in Mrs. Jones' Department at Farnham Park and was described in the "British Journal of Physical Medicine" April 1953, June 1955 and again in her book "An Approach to Occupational Therapy" 1960. It was earlier put on the market by Verinder and Sons, Ltd., who unfortunately were unable to continue production.

In answer to the demand by Occupational Therapists, the Nottingham Handcraft Company, with the co-operation of Messrs. H. C. Webb & Company Limited, Birmingham, have embarked on the production of another model, incorporating many improvements.

I have much pleasure in writing the booklet and hope it will help Occupational Therapists to use the Machine to the best advantage.

I would like to thank Dr. N. S. Craig, Physician-in-Charge of Physical Medicine at St. Benedict's Hospital, for his help and support, and also Mr. D. J. Eacott, O.T.T.I., for his advice and assistance in some of the final technical engineering details.

PAMELA EVERETT

UNPACKING, ASSEMBLY AND MAINTENANCE.

Unpacking.

After opening the lid of the case, remove the six wood-screws holding the table of the machine to the case and lift out. The Push button handle complete with two alternative springs is attached to the inside of the lid and can be freed by slightly releasing the strap, enabling it to slide outwards. The Spade Handle and two alternative grips, as well as the Long Handle and extension with pin and wing nut are securely wrapped underneath the machine.

The Ball Joint Handle Grip and Rigid Handle Grip are both fitted to the Long Handle extension for packing purposes. The pin "A" will be in its place in the end of the spindle head.

The spare locating stud will be in its packing place in the tailstock casting.

The spanner is held in its clip.

The Wire Control Column will be screwed in position between the Spindle Head and the Tailstock Sliding Unit.

The wire control plug will be resting in the wire control column.

MAIN PARTS OF MACHINE :— See Fig. 1 Plan and Key to names of parts. (Page 8 and 9).

The Spindle Head.

This is the fixture, to which the special handles are attached. It holds a parking boss for Pin "A", the Break Screws (8), the Wire Holder (7), and the Clamp (6).

The Wire Holder.

(7) Takes the ends of the wire which are held firm by the clamp screw (6) during twisting.

The Tailstock Sliding Unit.

The distance of the tailstock sliding unit from the spindle head can be adjusted by unscrewing the adjustment nuts (14) and sliding the tailstock forward or back. Two locating studs are supplied, the 1" diameter for flower supports, etc., (11) and the $\frac{1}{2}$ " diameter for smaller brushwork (13). The one not in use can be screwed in the hole in the tailstock casting.

The slotted pin with locknut (12) is the key to keep the spring loaded sliding rod (12A) from turning, while leaving it free to slide, and as it is set before despatching should not be touched.

The Wire Control Column.

Can be placed in any position between the spindle head and the tail stock sliding unit by loosening the adjustment nut (10) and sliding the column along the central slot. The wire control plug (9) should rest in the column when not in use. It acts as a peg to hold the bristles between the wires, during the initial stages of twisting.

The Brake.

This is adjustable by a large knurled knob (8) and gives a wide range of resistance. It will reach a maximum efficiency when the friction pads have been in use for a short time.

The Spanner

This clips on to the machine and fits all nuts which require moving during the operation of the machine. All other nuts should require occasional adjustment only, for maintenance purposes.

The Wire Containers.

There are two wire containers, one for the larger coils and the other for the small coils. The loading instructions are as follows:—

Large Container.

The top catch is lifted up and the front of the container is removed; the back of the container is then laid on the floor and the coil of wire, after the paper has been removed, is then laid in the container with the binding wires opposite to the four openings. It is important that the container is laid in this position so that the wire pulls away from the container in a clockwise direction. The top of the container is then replaced, the binding wires are cut and the wire is then pulled through the centre ring ready for use. If the coil of wire is to be removed from the container, binding wire should be first inserted through the four openings, and only when the coil is bound should it be removed from the container.

Small container.

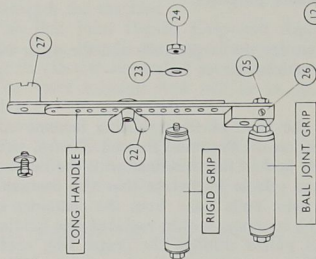
The top of the container is removed and the coil of wire is laid in the bottom half. The binding wires are then cut and the wire is held in the container with the left hand, the lid of the container is then lowered on to the container and fastened. At the same time the wire is pulled through the centre aperture. Here again the wire is pulled out in a clockwise direction.

ASSEMBLY OF SPECIAL HANDLES

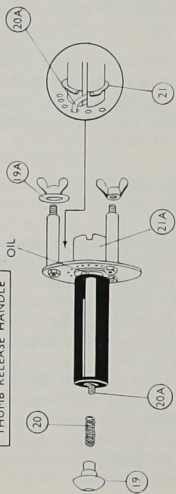
The Long Handle.

Disengage the non-return ratchet pawl by pulling out the pawl knob (1) and leaving the peg across the slot. Then fit handle boss (27) to the spindle (3) engaging teeth. Remove pin "A" from its parting boss in the spindle head, and screw in pin "A" to fix handle. The ratchet can be engaged for clockwise or anti-clockwise movement by turning the pawl knob in either direction, until the peg registers in the slot. The handle length is adjustable with two overlapping pieces fixed by Wing Pin 22, or by using one half only. The rigid grip and the ball joint grip are interchangeable, the first is fixed to the long handle by a lock nut (24) and the second by a hexagon headed locking pin (25). The ball joint grip should be attached and detached as a unit. The slotted adjustment screws (26), with locknuts, are for adjusting the mobility of the ball joint only and should NOT be altered when interchanging the handle grips.

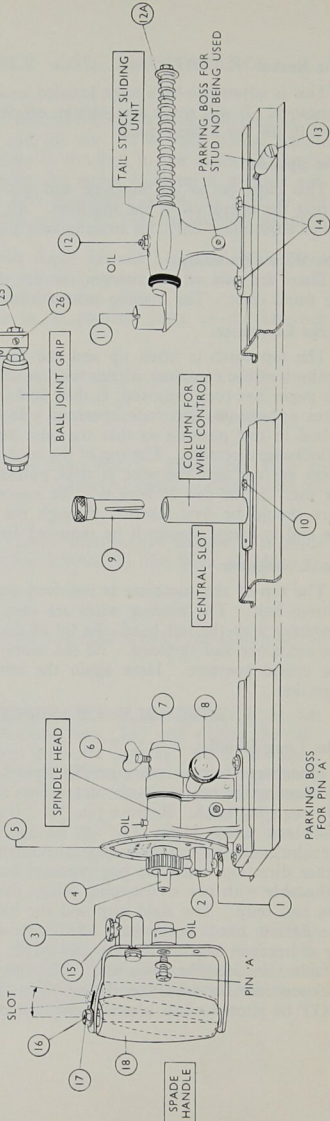
PIN 'A'



THUMB RELEASE HANDLE



OIL



OIL

SPADE HANDLE

PARKING BOSS FOR PIN 'A'

*Illustration
No.*

Description

SPINDLE HEAD UNIT

1. Pawl Knob for Non-Return Ratchet
2. Body for Non-Return Ratchet
3. Spindle
4. Ratchet
5. Graduated Plate
6. Clamp Screw
7. Wire Holder
8. Brake Adjuster Nut Knurled

WIRE CONTROL UNIT

9. Wire Control Plug
10. Nut for Wire Control Column

TAIL-STOCK SLIDING UNIT

11. Locating Stud Large
12. Adjusting Screw with Locknut
- 12A. Spring loaded Sliding Rod
13. Locating Stud Small
14. Nuts for Tail-Stock Adjustment

SPADE GRIP

15. Knob for Return Ratchet Pawl on Spade Grip
16. Long Bolt for Hand Grip
17. Locknut for Long Bolt
18. Wooden Grip (Large, Medium or Small)

THUMB RELEASE

19. Push-Button Knob for Thumb Action
- 19A. Wing Nuts and Washers
20. Spring (Strong, Medium or Weak)
- 20A. Release Spindle
21. Locking Ring
- 21A. Centre Body

LONG HANDLE AND RIGID GRIP

22. Wing Pin
23. Washer for Rigid Grip
24. Locknut for Rigid Grip
25. Hexagon Headed Locking Pin
26. Slotted Adjustment Screw
27. Handle Boss

The Spade Handle.

Disengage the non-return ratchet pawl (1) on the spindle head and the return ratchet pawl on the handle (15), and slide the handle over the spindle (3). Screw in Pin "A" to fix handle, as for long handle. The ratchet can now be engaged for clockwise or anti-clockwise movements, by turning the pawl knobs in either direction until the pegs register in the slots. The three sizes of wooden grips can be interchanged by undoing the lock nut (17) on the bolt (16) running through the grips in use and transferring the bolt to the size grip required. At the same time lock the grip to the angle required by sliding the bolt along the slot in the top arm of the spade handle. This slot allows an angle adjustment of from 77° to 90°.

The Push Button Handle.

Pin "A" is not required for this handle and to prevent loss it should be screwed into the parking boss provided under the spindle head. Now take off the three small wing nuts and washers (19A) and slide the stud ends through the three holes in the graduated plate (5) checking that the two teeth engage on the centre body (21A) and ratchet (4).

Refit wing nuts and tighten.

Two springs of alternative pressure are supplied for the thumb action. To change springs, unscrew the Push button knob for the thumb action (19) and the springs (20) can be extracted and replaced.

The locking ring (21) can be used to lock back the release spindle (20A) when the thumb action is not required.

Maintenance

Very little "Maintenance" is required except for keeping the moving parts suitably lubricated.

After considerable use the spring loaded sliding rod (12A) in the tailstock may "Bed Down" and can be adjusted as follows:—

Release locknut (12) lightly screw the stud downwards till it stops against the ball bearing, then release $\frac{1}{4}$ th turn (45°) of screwdriver and lock the nut. The rod should now be free to slide but without appreciable twisting movement.

Oiling Points.

"Flip-Flap" oiler on spindle head.

Oil hole on top of tailstock.

Oil hole in the centre boss of the spade handle.

Oil hole in the centre of the perforated plate for the Thumb-Release handle.

All the above points have "Compo" oil-retaining bushes and only need occasional oiling.

A drop of oil on the Pawls and Ratchets from time to time will reduce the ratchet sound.

TREATMENT POSSIBILITIES

(1) Movements in relation to the various special Handles.

The machine can be adjusted to improve the functions of the joints and muscle groups which produce the following movements of the upper extremity :— rotation of the shoulder, flexion and extension of shoulder and elbow, pronation and supination of the forearm, flexion and extension and circumduction of the wrist, flexion of the fingers, abduction and opposition of the thumb, and various types of gripping movements. At the same time improvement in co-ordination and strength of the whole upper limb, and the necessary stabilising muscles in the rest of the body, can be promoted when using any of the handles. The range of movement, and the degree of effort can be graded in various ways.

Here is a description of how to use the different handles :—

(a) Long Handle.

This handle is mainly useful for shoulder and elbow movements and circumduction of the wrist. It can be turned in two directions by adjustment of the non-return ratchet pawl knob 1, thus using either a pushing, or pulling movement. When the operator sits sideways to the machine flexion and extension of shoulder and elbow are then obtained. The forearm is held naturally in pronation while pushing the handle away from the body, (Plate 2) and may be held in supination while pulling the handle towards the body, i.e. if biceps action needs stimulating. (Plate 3).



Plate 2. A left hemiplegic patient exercising a spastic arm with the long handle

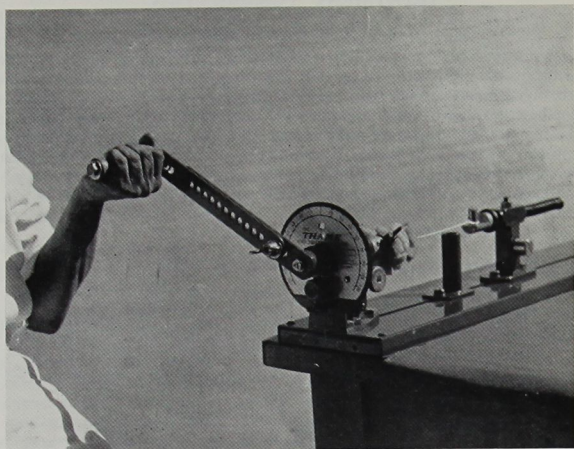


Plate 3. Using long handle to exercise biceps muscles

If the patient faces the machine while turning the handle a rotary movement of the shoulder, either inwards or outwards, occurs in a frontal plane (Plate 4). Either the fixed or moveable ball joint handle may be held with long handle, and the latter stimulates circumduction of the wrist. (Plate 4).

Ranges of movement in shoulder and elbow may be increased or decreased by lengthening or shortening the handle from 7" — 19". (See notes on assembly).

From the foregoing it is already obvious that movements will also be modified by altering the position of the machine in relation to the position of the patient, i.e. by

- (1) Raising or lowering the machine,
- (2) having the patient sitting or standing,
- (3) altering the seating height,
- (4) having the patient sideways to, or facing the machine.

If strong movement is required the brake resistance can be used in addition to the stronger wire, remembering that the long leverage of this handle may need counteracting if strength needs developing in addition to the range of movement.



Plate 4. Rotation of the shoulder and circumduction of the wrist using fully extended long handle combined with movable ball joint handle

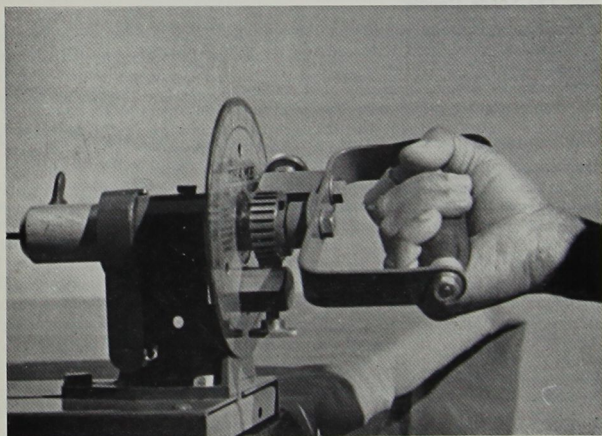


Plate 5. Spade handle showing position of hand in supination of forearm

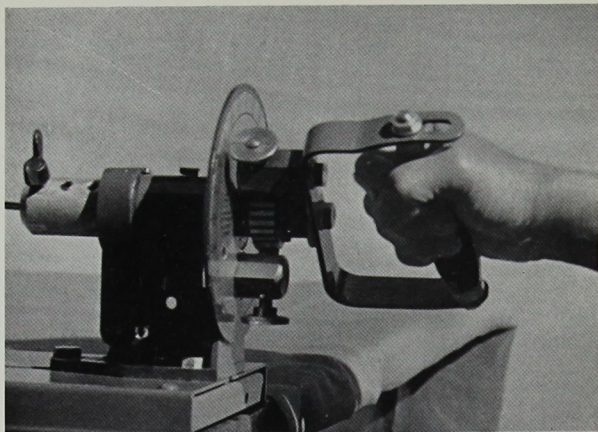


Plate 6. Spade handle showing position of hand in pronation of forearm

(b) **The Spade Handle.**

This handle is mainly useful for developing pronation and supination of the forearm, combined with grip and ulnar deviation of the wrist. (Plates 5 and 6).

In order to obtain pronation and supination of the forearm without other compensatory movements, the position of the operator in relation to the machine must be such that the forearm is rotating in the same axis as the twisting wire when the elbow is touching the side with the forearm horizontal. (Plates 7 and 8). To make this possible, the machine must either be put on the same horizontal level as the forearm, or the operator must adjust his working level to the height of the machine. He should either stand, or sit on a seat of suitable height.

The Return Ratchet.

(i) The adjustment of the return ratchet pawl makes it possible to use pronation to twist the wire with a return action of supination, or alternatively, supination to twist the wire with a return action of pronation, thus giving the emphasis in strength to either pronation or supination. It enables the patient to use the full range of movement possible in pronation and supination without compensatory shoulder and trunk movement. The patient can work with a rhythmical repetitive movement of pronation and supination within the range of forearm mobility watching his progress on the dial as he becomes "limbered up" with exercise. The patient should

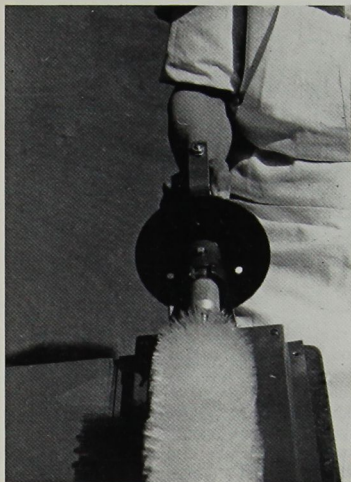


Plate 7. Shows correct alignment of forearm using spade handle.

be encouraged to keep the elbow close into his side throughout the operation, and the resistance should be adjusted so that he can turn the handle with forearm movement only, without the assistance of shoulder movement and lifting the elbow from the side.

Adjustable Angle.

(ii) Ulnar deviation of the wrist occurs naturally during strong gripping movements and this is accounted for by the adjustable angle of the spade handle. (Plate 9). In view of the fact that ulnar deviation increases in proportion to the size of the object grasped, the angle on the handle can be graded according to the size of the handle used, from 77° to 90° . Three different sized interchangeable grips are provided with the Machine. The larger sizes are useful when finger flexion is limited after injury, or when flexor contraction of fingers must be counteracted.

(c) Push Button Handle.

This may be used for localized abduction and opposition of the thumb combined with gripping and flexion and extension of the wrist, altering direction for either flexion or extension with the pawl knob on the ratchet. (Plates 10 and 11). If a pure cylinder grip without specific thumb movement is required, the push button may be suspended from action by holding



Plate 8. Shows correct alignment of forearm using spade handle

the release spindle in the locking ring. If, however, the specific movements of thumb abduction and opposition are desired, the release spindle may be slipped out of the locking ring, and the push button knob brought into action. Bringing the release spindle into action makes it impossible to turn the handle without first abducting and opposing the thumb on the push button, thus ensuring exercise for the thumb muscles (Plate 12). Using the push button before turning the handle also demands a higher degree of concentration and co-ordination, and stronger stabilising work by the wrist extensors. When the wrist is weak and painful, and the patient is being initiated to the machine, it has been found easier for the patient if the push button is not used, particularly when gripping combined with wrist extension is the main consideration, e.g. in early stages of treatment for Colles fracture.

(ii) **Grading Strength.**

In using all the handles, strength can be graded either by increasing the thickness of the wire used or by tightening the brake screw. The wire becomes harder to twist at the final stages of twisting, and tension on the brake can then be reduced if necessary. The press button handle and the spade handle have very little leverage advantage, but the long handle has a big leverage advantage. These facts should be considered in relation to the effort required for the individual patient according to the handle and the wire he is using. It is likely that the brake screw will not be required when using heavy gauge wire with either the push button or spade handle, and that if only light effort is needed thinner wire is best used with these two handles.

(iii) **Co-ordination and Control.**

The manipulation of the machine requires a certain amount of technical skill and concentration on the part of the patient; its use may therefore prove unsuitable for those patients who are confused, or unable to con-

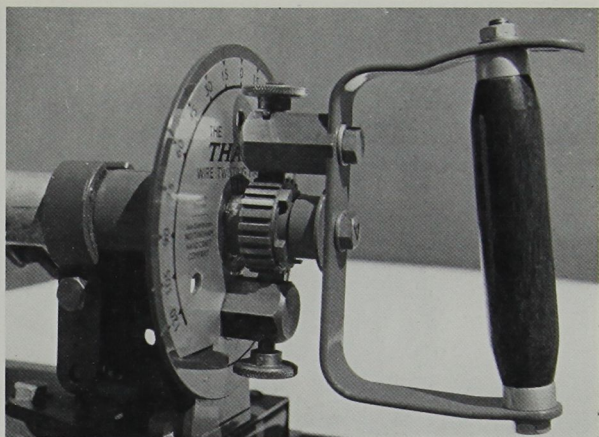


Plate 9. Spade handle showing adjustable angle

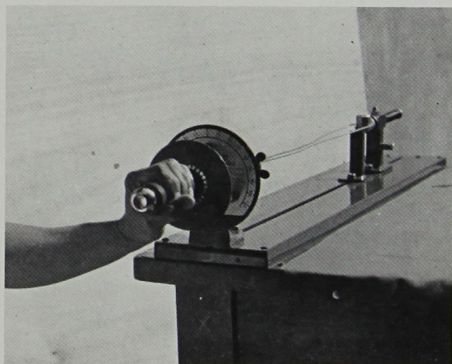


Plate 10. Push button handle giving a cylinder grip and wrist extension with push button disengaged.

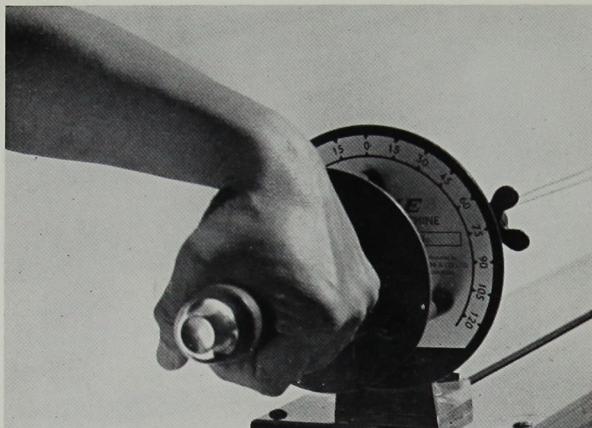


Plate 11. Push button handle giving a cylinder grip and wrist extension with push button disengaged

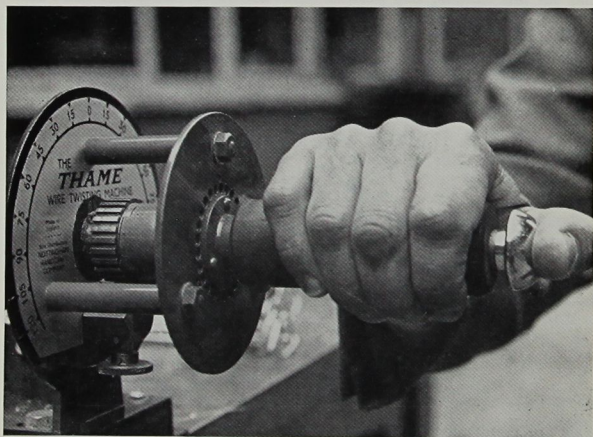


Plate 12. Push button handle showing opposition and abduction of the thumb



Plate 13. Two patients using the machine, each gaining specific treatment

concentrate. However, it is possible to grade the amount of concentration and control required by careful supervision and by the choice of adaptations and materials. In the department at St. Benedicts Hospital, patients have enjoyed trying to use their affected hands in manipulating nuts, screws and spanners when interchanging handles. One patient, previously a doctor of medicine, had severe sensory loss of the right hand after a cerebro vascular accident. He disciplined himself to control and interchange the various handles, and also to use the affected hand to insert fine bristles in making a variety of brushes. He had no spasticity of the hand but used sight to compensate for sensory loss and this required intense concentration of effort.

It is possible to have two patients working together on the machine, e.g. one, a spastic hemiplegic gaining specific exercise on a special handle, and the other patient inserting the bristles to improve fine finger control. (Plate 13).

(iv) Seating and Work Levels.

It is well known, in all types of work that the relationship of seating height to work level, has a marked influence on the muscle work, and control required for a particular job. Of course this principle also applies to work on the brush machine, and as has been previously mentioned in describing the therapeutic uses of the handles, one can either alter the height of the seat used, or have the height of the machine adjustable. The machine

might, for example be mounted on an adjustable bench, and could be used in conjunction with various available adjustable seats. An adjustable bicycle saddle is often the most comfortable and convenient, such as the "Camden" Multi-purpose Stool, now available from the Nottingham Handcraft Company. Alternatively the "Oliver" Seat Cradle, or an hydraulically operated saddle seat like the ones developed at St. Benedicts Hospital could also serve the purpose. If a high stool or chair with an ordinary more conventional seat is needed, one should remember to put a foot stool under the patient's feet to make him relaxed and comfortable; and to avoid pressure of the edge of the chair, under the thighs. **Note** the booklet "Seats for Workers in Factories" published by H.M.S.O. gives some excellent advice on seating and footstools, and two useful booklets are now available from British Standards; "The Anatomical, Physiological, and Anthropomorphic Principles in the use of Office Chairs and Tables".



THINGS TO MAKE

This machine may be employed for many purposes while giving various forms of occupational therapy to the upper limb. The range includes small light brushes for tea-pot spouts or electric shaving machines to long straight brushes for cleaning out the awkward angles round the bend of the lavatory or chimney, or many types of brushes for scrubbing out the corners of pots and pans, and also washing up mops made with foam rubber or dish cloth cotton. More frivolous ideas may be served by making Christmas Trees out of bristles dyed green or wreaths for decoration out of real or artificial flowers and greenery, for all these, bristles or other suitable material are inserted at right angles to the twisting wire. If small pipe cleaners are used, instead of wire for twisting, toy animals may be made on a small scale. Larger toys can be made, by incorporating thick rough string length-wise, along the twisting wire.

(i) Instructions for Making a Bottle Brush.

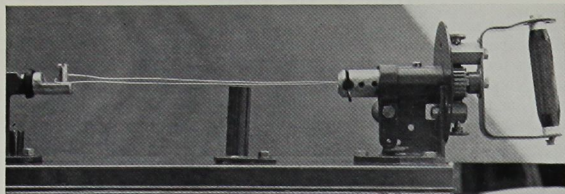
Take a length of wire just over twice the required length of the finished Brush. Allowance must be made for the fact that the wires shorten during twisting. The gauge of wire required and bristles will depend on the ultimate purpose of the brush. Bend wire in half and fix the two cut ends of wire in the wire holder by tightening the clamp screw. Place loop of wire over locating stud and adjust the position of the tailstock sliding unit so that there is a very slight tension on the spring and therefore on the wire. (Plate 14, Stage 1).

Having decided relative lengths of brush and handle, feed bristles in small bundles at a time in between and at right angles to the wires, starting as close as possible to wire holder and working towards the locating stud, (Plate 14, Stage 2).

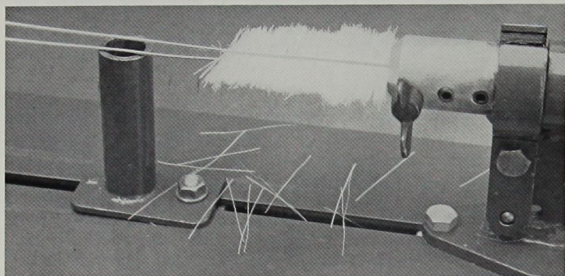
Put the wire control plug into wire control column, close to bristles, spread the bristles out so that they are evenly spaced; this is important. (Plate 14, Stage 3). Then start twisting the wire using the appropriate handle. Twist until the bristles are well nipped into position by the twisted wire. (Plate 14, Stage 4), then lift off wire control plug and continue twisting wire, until brush and handle have both the required consistency of twist, (Plate 14, Stage 5). Release the tailstock Sliding Unit by slackening off nuts, release wire from wire holder and lift brush out of machine for final finishing.

Note 1. It is not possible to make a brush of more than approximately four inches long without resorting to the method in stages described below for clothes, bath and lavatory brushes.

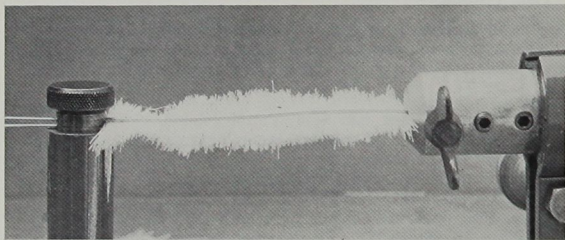
Note 2. The tension on the wire increases considerably as it twists and shortens and it has been found advisable to ease the tension on the sliding unit before the wire is fully twisted. The required amount of twisting of the bristles before lifting the wire control plug to twist the handle wire will be learned with experience.



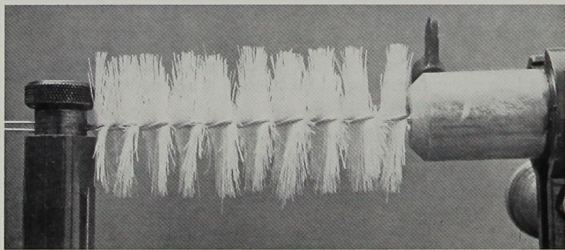
Stage 1



Stage 2

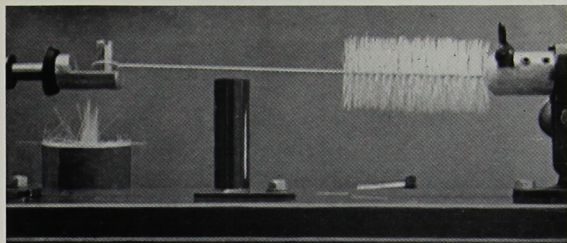


Stage 3

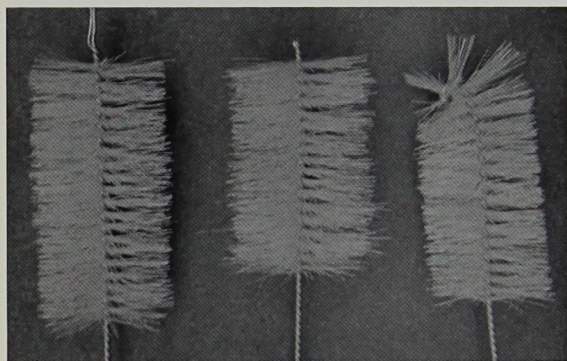


Stage 4

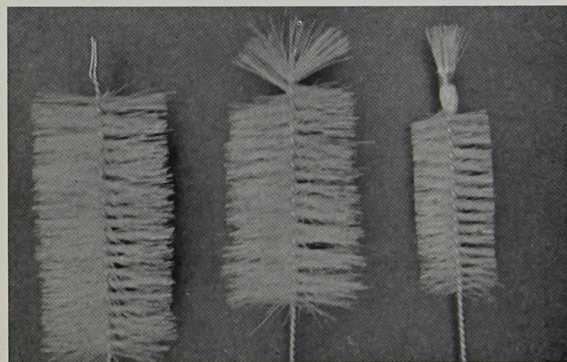
Plate 14. Stages in making a Bottle Brush.



Stage 5



Stage 6



Stage 7

Plate 15. Stages in making a Bottle Brush

Finish of Brush may be (a) rounded, or (b) tufted.

(a) **Rounded Finish.** (Plate 14, Stage 6).

Trim end wires to about $\frac{1}{2}$ ", bend over with round nosed pliers and nip into position, allowing the end bristles to fan out and project from the end of the brush.

(b) **Tufted Finish.** (Plate 14, Stage 7).

Trim end wires to approx. $\frac{1}{2}$ inch, bend back last $\frac{3}{4}$ inch approx. of bristles to cover wire ends, and bind bristles in position with binding wire to form tuft. To make a good tuft use long bristles. Shorter bristles may be used for the rest of the brush or the bristles may be trimmed down to required length at finish.

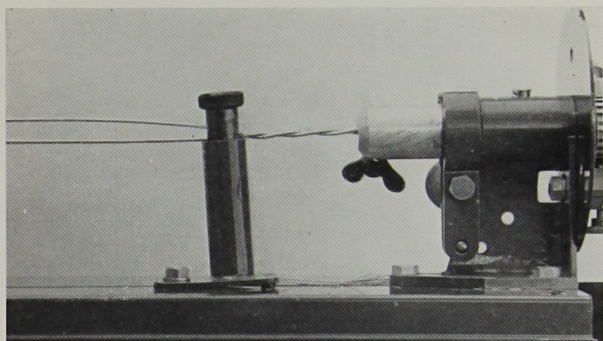
(ii) **How to make a Bath Brush, Lavatory Brush or Clothes Brush.**

To make these brushes or any brush longer than about 4 inches the whole length of wire must be filled by bristles in stages, with the aid of the wire control plug, but about 2" of wire should be twisted before inserting bristles. First of all place the required length of wire in position as for bottle brush. Place wire control plug in position about 2" from wire holder, twist wire lightly and then remove wire control plug. (Plate 15, Stage 1). Then place the bristles between and at right angles to the wire as described for a bottle brush to a length of about 4". Hold the bristles lightly in a loose spiral, by twisting the wire a few times, (Plate 15, Stage 2), then take out the wire control plug and repeat the process, (Plate 15, Stage 3), until the length of wire is filled with bristles, up to 2" from the tail stock unit. Then remove the wire control plug completely, and continue twisting wire and bristles until the required amount of twist is obtained, (Plate 15, Stage 4). Release twisted wire and bristles from locating stud and clamp screw, and bend into shape required for the brush after trimming bristles. Trim ends of wire and insert into a wooden handle, with a ferrule, to prevent the wood splitting, (Plate 15, Stage 5). The above basic methods for making bottle brushes and clothes brushes, can be adapted to make various shapes and sizes of brushes and also for Christmas trees, trees for model-making, etc.

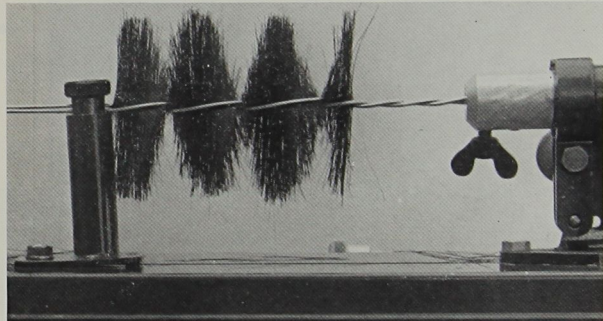
(iii) **How to make Washing-up Mops** (use 15 to 16 gauge Wire).

(a) **With Dish Cloth Cotton.** After fixing wire in wire holder and over locating stud, insert lengths of dish cloth cotton between the wires close to the wire holder. Twist until cotton is firmly held and handle well twisted. Release wire ends, trim to $\frac{1}{2}$ " and bend over with round nosed pliers, burying the ends in the cotton. (See cover). Foam rubber and cotton are easier to manage than bristles in the early stages of treatment for patients who find bristles difficult to control.

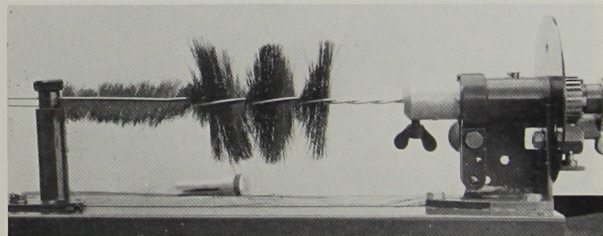
(b) **With Foam Rubber Sheeting.** Cut 3 or 4 rectangles 3" x 2 $\frac{1}{2}$ " of $\frac{3}{8}$ " to $\frac{1}{2}$ " foam rubber sheeting. Cut each rectangle with scissors as indicated by dotted lines in Plate 16. Roll up each piece of foam rubber into



Stage 1

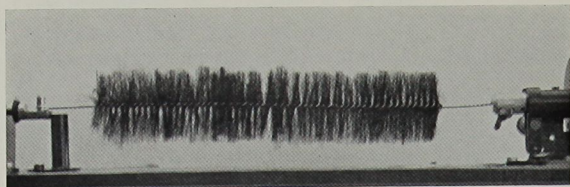


Stage 2



Stage 3

Plate 15. Stages in making a Clothes Brush



Stage 4



Stage 5

Plate 15. Stages in making a Clothes Brush

cylinder lengthwise, and insert between two pieces of wire fixed in wire holder. Place wire control plug over wire close to pieces of foam, (Plate 17), twist lightly, remove wire control plug and continue twisting. Release mop and cut ends of wire to approximately $\frac{1}{2}$ " and bend over with round nosed pliers to bury in foam rubber, (Plate 16).

(iv) **How to make Flower Holders.**

Flower Holders may be in demand by gardeners for staking and are very simple to make. As thick wire is used, however, 13-14 gauge, a fair amount of strength is required to twist it and also to cut and bend the wire into the shape that holds the flower stem.

A large sized one inch diameter locating stud is used to make the flower holders, which will be found screwed into the sliding unit, and



Plate 16. Foam Rubber cut and rolled for washing-up Mop (*centre*); Mop before trimming wire (*right*); finished Mop (*left*).

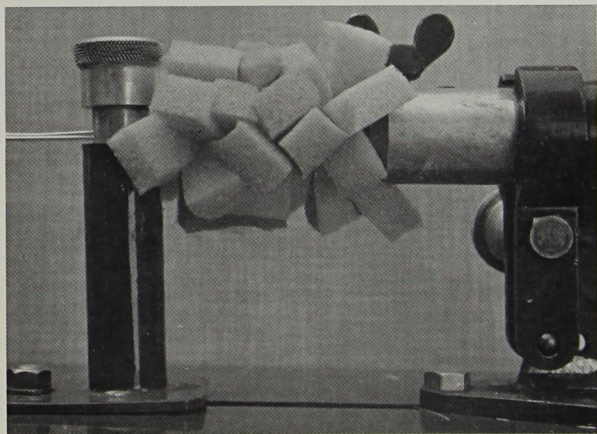


Plate 17. Foam Rubber placed between wire prior to twisting

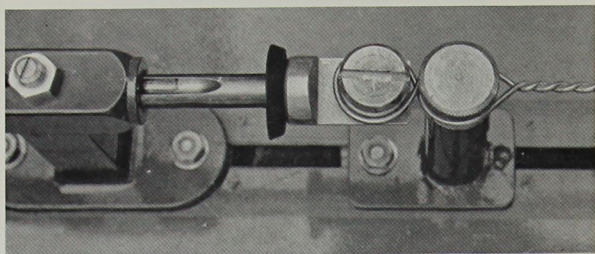


Plate 18. Position of locating stud and wire control column after twisting wire for flower holder

may be interchanged for the $\frac{1}{2}$ " locating stud used for other articles. Cut wire to over twice the length of the finished holder, allowing for shortening during twisting (suggested finished length approximately 2' 6"). Fix the two ends of the wire in the wire holder, and loop wire in a long figure of 8 between the locating stud, and wire control column. Now push wire control plug along the groove to within $1\frac{1}{2}$ " of locating stud, diminishing the size of the figure of 8 and tighten the adjustment nut of the wire control column. Now twist the wire. To complete the twisting, loosen the adjustment nuts on the sliding unit, and wire control column, (Plate 18). Release the wire at the clamp screw and locating stud. Bend the figure of 8 at right angles to the twisted wire with the aid of a vice and cut wire at loop formed by locating stud, (Plate 19). The figure of 8 allows a pinching action to take place, opening the ring which holds the flower by pressing the ring of wire formed by the wire control column. The fact that no manipulation of bristles is required makes flower holders a useful introduction to the machine for certain patients, providing the patient has the strength to twist the heavier gauge wire.

(v) **How to make a Pastry Brush.**

Using fine nylon bristles and 16 gauge wire, make a brush about 1" long with a 5" handle. Use the same method as for the bottle brush, but thread a ferrule through the wire, before fixing the wire in the wire holder, or inserting the bristles, (Plate 20). Release and trim wire and push ferrule over bristles, as shown in Plate 21. Trim the bristles.

(vi) **Breaking Down Work Processes.**

The processes involved in making different articles may be broken down and given to various patients as an industrial or group project, or to suit individual specific treatment requirements. Some of the

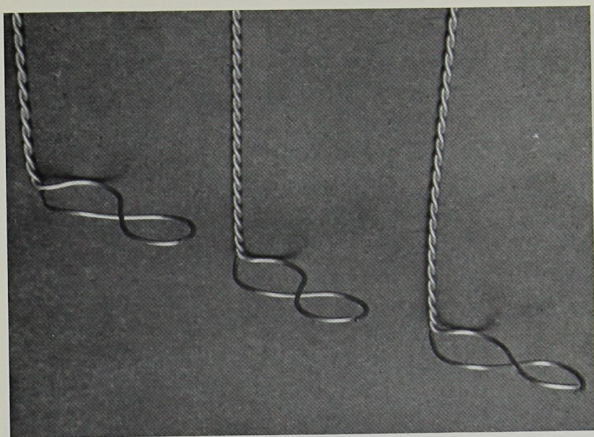


Plate 19. Completed flower holders, bent and cut

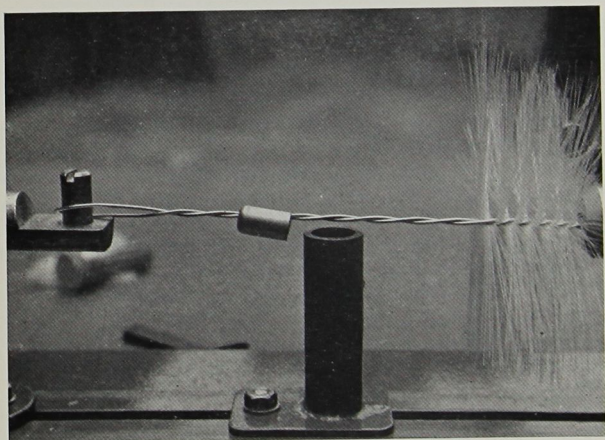


Plate 20. Pastry brush on machine showing ferrule in position

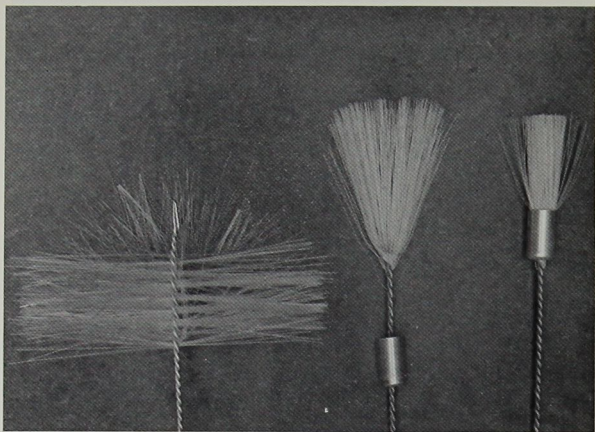


Plate 21. Finishing stages of pastry brushes

processes used in the manufacture of articles, apart from the wire twisting with the special handles are listed below:—

Cutting wires to length.

Cutting loops of flower holders, bending ends of flower holders in a vice.

Trimming and bending wire to finish brushes, mops, trees, toys, etc.

Making tufts on bottle brushes.

Trimming and shaping bristles and foam rubber to finish brushes, washing up mops, etc.

Inserting twisted wire into brush handles and fixing.

Cutting strips of foam rubber with scissors for washing-up mops.

Turning brush handles or tree tubs on the wood turning lathe.

Sawing, filing, and finishing metal tubes for ferrules.

Varnishing of handles.

Decorating and painting of tree tubs, etc.

Tools.

The following tools will be found useful:—

Round nosed pliers, toggle jointed wire clippers, guillotine for wire cutting, tailors shears for trimming, brushes.

OTHER PUBLICATIONS

THE 'OLIVER' REHABILITATION MACHINE at 4/6
by Edward R. Oliver, M.A.O.T.

THE 'FARNHAM' REHABILITATION LATHE at 4/6
by Wenona Keane, M.A.O.T.

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NOTES

