July 21, 1959 M. VON RABENAU 2,895,258

WRITING DOLL

Filed April 15, 1957 2 Sheets-Sheet 1

FIG. 1

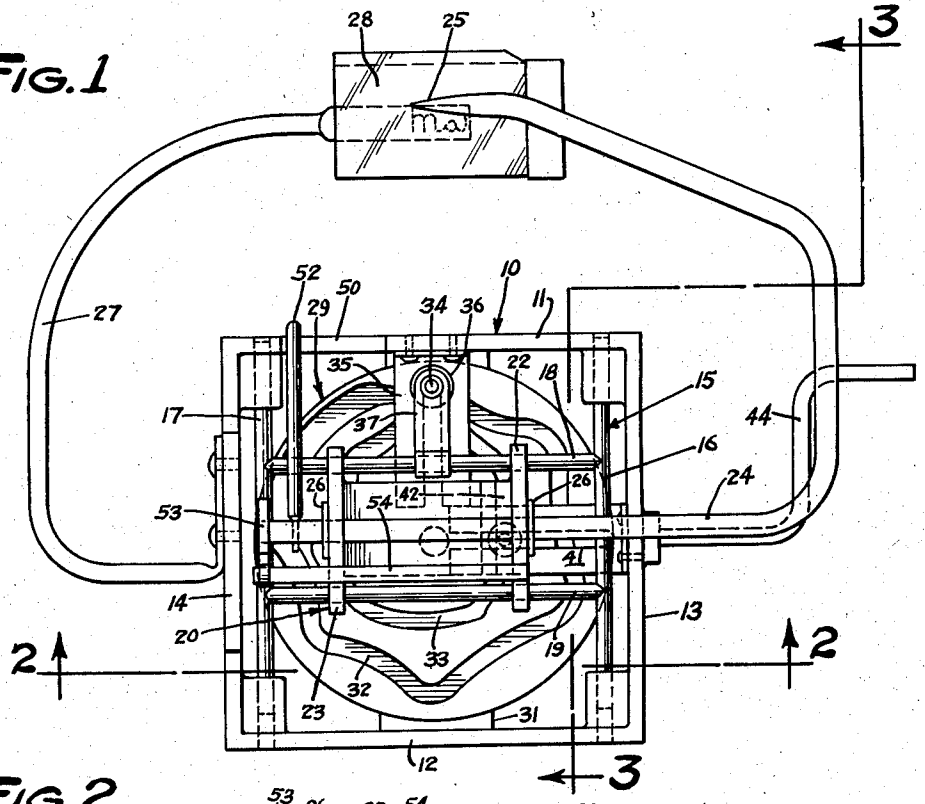
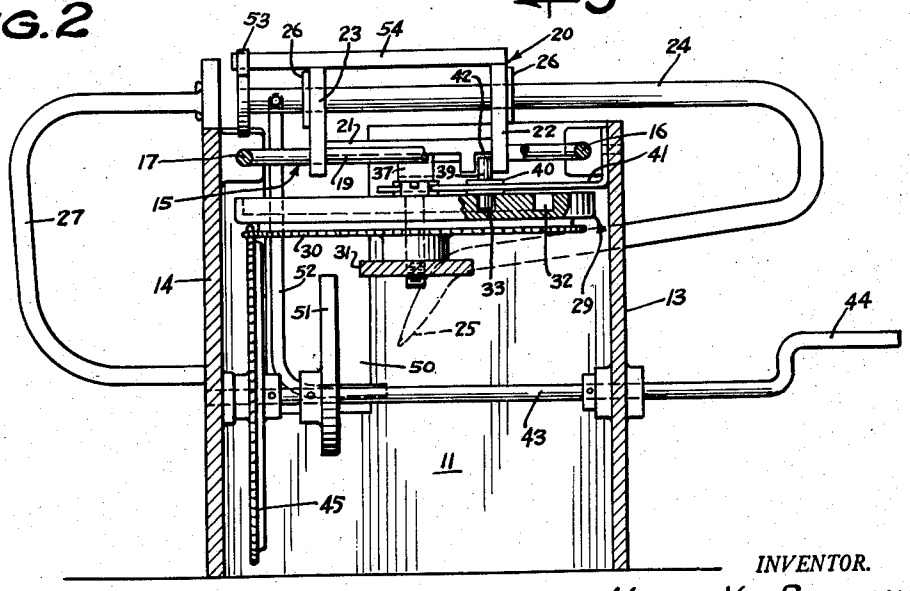


FIG. 2



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Filed April 15, 1957 2 Sheets-Sheet 2

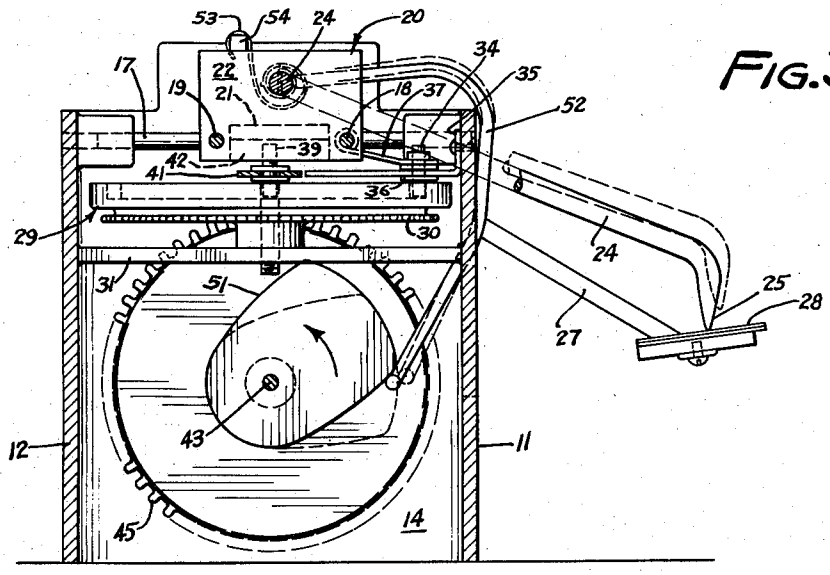


FIG. 3

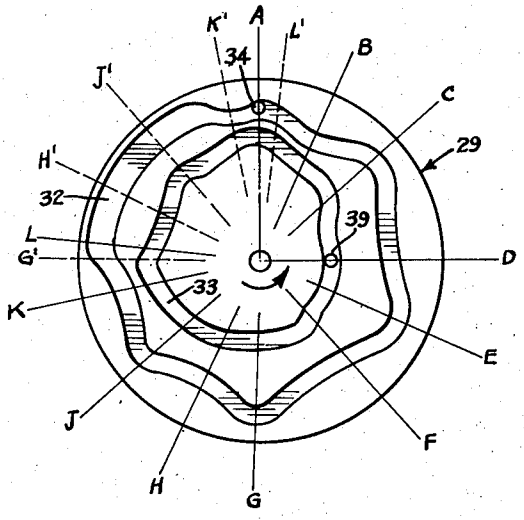


FIG. 4

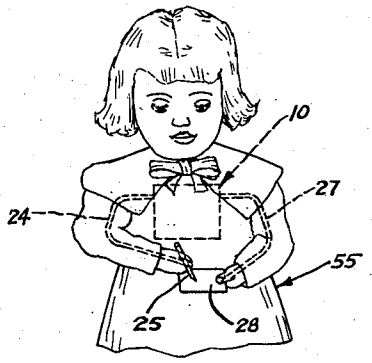


FIG. 5

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United States Patent Office 2,895,258 Patented July 21, 1959

2,895,258

WRITING DOLL

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Application April 15, 1957, Serial No. 652,787

11 Claims. (Cl. 46—119)

This invention relates to a motion conversion device by which rotary motion is utilized to impart predetermined longitudinal and transverse movement to a carrying arm. More particularly, this invention relates to a motion conversion device for installation in the body and arms of a doll whereby rotary motion may be utilized to impart a predetermined longitudinal and transverse movement to a carrier arm to enable the doll to draw or write.

The principal object of this invention is to provide a motion converter including a double track cam which upon rotation imparts a predetermined longitudinal and transverse movement to a carrier arm guided by cam followers in the tracks of said cam.

It is a further object of this invention to provide a mechanical writing doll having a motion conversion device installed in its body and including a double acting cam which upon rotation imparts predetermined longitudinal and transverse movement to a carrier arm guided by followers in the tracks of said cam and extending through one of the arms of the doll to a hand holding a stylus with which a predetermined written message or drawn figure may be scribed.

Other objects of the invention will become apparent as the description proceeds.

To the accomplishment of the foregoing and related ends, this invention then comprises the features hereinafter fully described and particularly pointed out in the claims, the following description setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principles of the invention may be employed.

The invention is illustrated by the drawings in which the same numerals refer to corresponding parts and in which:

Figure 1 is a top plan view of the motion converter of this invention;

Figure 2 is a rear elevation, partly in section, of the device of this invention;

Figure 3 is a right end elevation, partly in section, of the motion conversion device;

Figure 4 is a plan view of a double track cam showing the configuration of the tracks for the writing of the word "Ma" by a doll in which the device is installed; and

Figure 5 is a representation of a doll showing schematically the manner in which the unit of this invention is incorporated in the doll's body to produce a mechanical writing doll.

Referring to the drawings, and particularly to Figures 1, 2, and 3, there is shown a box-like frame or housing indicated generally at **10** and including a front wall **11**, a rear wall **12**, a right end wall **13**, and a left end wall **14**. Jounalled for reciprocatory motion in the upper portion of the housing frame **10** between the front wall **11** and the rear wall **12** is a lateral or transverse motion carrier indicated generally at **15**. The lateral or transverse motion carrier **15** includes a righthand horizontal bar or rod **16** slidably supported in openings in the front

and rear walls of the housing and a lefthand bar or rod **17** similarly mounted and parallel to the first. Rods **16** and **17** are connected by a pair of spaced parallel horizontal bars or rods **18** and **19** to form a rigid transversely reciprocating unit.

Supported on the front and rear rods **18** and **19** of the transverse motion carrier **15** is a longitudinal motion carrier indicated generally at **20**. The longitudinal motion carrier **20** includes a carrier base **21**, a righthand end member **22** secured to the base, and a left end member **23** secured to the opposite end of the base. The end members **22** and **23** are provided with guide ways for rods **18** and **19** so that the entire carrier **20** is slidably movable longitudinally along rods **18** and **19** while movable transversely with the transverse carrier frame **15**.

A relatively long curved rigid carrier arm **24** is mounted in the right and left end members **22** and **23** for longitudinal movement with the longitudinal motion carrier **20**. Carrier arm **24** carries a stylus **25** at its outer extremity. Arm **24** is journalled in the end members **22** and **23** for slight pivotal or rotational movement with respect to the longitudinal motion carrier **20** but it is secured by means of locking collars **26** so as to move longitudinally with the carrier **20**.

Another arm **27** is fixedly secured to the housing **10** on the side opposite from the movable carrier arm **24**. Arm **27** carries a pad **28** at its outer extremity. Pad **28** is so positioned that its upper surface and stylus **25** are in contact during operation of the motion conversion device.

Movement is imparted to the carriers **15** and **20** by means of a double track disk cam indicated generally at **29**. Cam **29** is mounted to rotate with a gear wheel **30**. Cam **29** and gear **30** are supported for rotation in a horizontal plane on a cross member **31** positioned between the front and rear walls of the housing **10** below transverse motion carrier **15**. Cam **29** is provided with two tracks on its upper surface, an outer track **32** which controls transverse movement of both of the carriers **15** and **20** and carrier arm **24** and an inner track **33** which controls longitudinal movement of longitudinal carrier **20** and the carrier arm.

Transverse movement is imparted to the carriers **15** and **20** and carrier arm **24** by means of an outside cam follower **34** which is supported in a slotted bracket **35** supported on the inside of front wall **11** of the housing above the top surface of the cam disk. Cam follower **34** is restrained against vertical movement and held within the confines of the slot in bracket **35** by means of suitable collars **36**. An arm **37** extends from the upper end of the cam follower **34** to the transverse motion carrier **15**. The inner end of arm **37** is secured to the front horizontal bar **18** of the transverse motion carrier. It will be apparent that the same transverse motion imparted to carrier **15** will likewise be imparted to the longitudinal motion carrier **20**.

Longitudinal motion is imparted to the longitudinal motion carrier **20** and arm **24** by means of inside cam follower **39** moving in the inner track **33** of the cam **29**. Cam follower **39** is supported by means of collars **40** in a slotted bracket **41**. The upper end of cam follower **39** moves in a transverse slot **42** on the lower surface of the base **21** of the longitudinal motion carrier **20** to permit simultaneous transverse and longitudinal movement of carrier **20**.

Exemplary means for providing rotational motion to the gear wheel **30** and cam **29** are provided as follows: A horizontal shaft **43** provided with a crank handle **44** is journalled in the end walls **13** and **14** of the housing **10** below the cam disk and gear wheel **30**. A gear wheel **45** having teeth which mesh at right angles with the teeth of gear wheel **30** is keyed to shaft **43**. Rotation of crank

44 causes rotation of the horizontal shaft 43 and the gear wheel 45. This in turn causes rotation in a horizontal plane of gear wheel 30 and cam 29.

As the cam 29 rotates the outer cam follower 34 rides in the outside cam track 32. The movement of the cam follower 34 is limited by the slot in bracket 35 in which the cam follower is held by collars 36. Accordingly, the movement of cam follower 34 is restricted to a path in a horizontal plane. That path is parallel to the side walls 13 and 14 of the housing and perpendicular to the front wall 11. By means of the arm 37 which connects the upper end of the cam follower 34 to the lateral motion carrier 15 that carrier is reciprocated in a lateral or transverse direction while sliding on the ends of the rods 16 and 17.

Simultaneously with the movement of the outside cam follower 34 in the outside track the inner cam follower 39 is moved as it runs in the inside track 33 of the cam 29. It will be noted that the slot in bracket 41 is in the same plane as the slot in bracket 35 and disposed at a right angle thereto. The inner cam follower 39 is supported in the slot in bracket 41 and its movement is restricted to a back and forth movement in a horizontal plane in a direction parallel to the front and rear walls 11 and 12 of the housing and perpendicular to the end wall 13.

The upper end of the inner cam follower 39 rides in a transverse slot 42 in the bottom of the carrier base 21 of the longitudinal motion carrier. Thus, as the transverse motion carrier 15 is reciprocated back and forth under influence of outer cam follower 34 and the outer track 32 of the cam the upper end of cam follower 39 moves freely in slot 42. When a longitudinal movement is simultaneously imparted to the longitudinal motion carrier 20 by means of inside cam follower 39 riding in the inside cam track 33, the entire longitudinal motion carrier 20 slides on parallel rods 18 and 19 of the lateral motion carrier 15. As the longitudinal motion carrier is thus moved in both a lateral and simultaneous longitudinal direction the carrier arm 24 and the stylus 25 are moved laterally and longitudinally so as to inscribe a predetermined inscription.

In the illustrated embodiment of the invention the configuration of the cam tracks 32 and 33, as shown most clearly in Figure 4, will cause the stylus 25 to inscribe the word "Ma." The cam and the stylus are shown in their starting position. In this position the outside cam follower 34 is positioned at line A and the inside cam follower 39 is displaced by 90° at line D. As the cam rotates counter-clockwise the distance between line A and line B the outer cam follower 34 is pulled inwardly as it rides in the slotted bracket 35 and pushes the entire transverse motion carrier 15 inwardly and along with it the entire longitudinal motion carrier 20 and the carrier arm 24 and stylus 25. The result of this motion is to cause the stylus to form the initial downstroke of the script "M." The motion is virtually entirely transverse with little or no longitudinal motion.

As the cam rotates counter-clockwise a further distance represented by the space between lines B and C the first upstroke of the "M" is formed. As the outer cam track moves relative to the cam follower the distance from line B to line C, the follower 34 moves outwardly in the slotted bracket and pulls with it the transverse carrier 15 and along with carrier 15 the longitudinal motion carrier, carrier arm and stylus. At the same time the inner cam track 33 is being moved relative to the cam follower 39 a distance from line E to line F. As line F is approached the follower 39 is engaged by a protuberance on the outer edge of the inside cam track and a slight simultaneous longitudinal motion is superimposed upon the transverse motion to form half of the arc of the first loop of the script "M."

As the cam disk is rotated farther the outside cam follower 34 is moved relative to the cam between line C and line D and at the same time the inside cam follower 39 is moved relative to the cam from line F to line G. Initially in this segment of the cam there is imparted a simultaneous longitudinal and transverse motion to form the descending arc on the first loop of the script "M" and thereafter there is transverse movement only while the second downstroke is formed. As the outside cam follower 34 is moved relative to the cam track from line D to line E to line F the inside cam follower 39 is moved relative to the cam disk from line G to line H to line J and the second complete loop of the script "M" is formed.

As the outside cam follower 34 is moved relative to the cam disk from line F to line G the inside cam follower 39 is moved from line J to line G′ and the first upstroke of the small script "*a*" is formed. This involves both transverse and longitudinal motion as the stylus inscribes an upwardly sweeping curve. The first half of the loop of the letter "*a*" is formed while cam follower 34 moves from line G to line H and inside cam follower 39 moves from G′ to H′. Formation of this half loop involves a backward longitudinal motion imparted by inside follower 39 simultaneously with a transverse downstroke.

The loop of the letter "*a*" is completed as the outer cam follower moves from H to J and the inner follower from H′ to J′. The finishing downstroke of the "*a*" is formed as the outer cam follower 34 moves from J to K and the inner follower 39 from J′ to K′ and the letter "*a*" is finished with an upstroke as follower 34 moves from K to L and follower 39 from K′ to L′. The stylus is returned to starting position by means of a backward longitudinal movement imparted as follower 34 is moved from L back to A relative to the cam disk and follower 39 is moved from L′ back to D.

As the stylus is returned to its starting position it is desirably lifted from the surface of the pad. This is accomplished by the following means: An opening 50 is provided in the front wall 11 of the housing 10. A cam 51 is keyed to horizontal shaft 43 for rotation with the shaft and the gear wheel 45. A curved arm 52 is secured at one end to carrier arm 24 adjacent to where it is journalled for pivotal movement in the end members 22 and 23 of the longitudinal motion carrier 20. The arm 52 extends outwardly over the transverse motion carrier and the cam mechanism and curves downwardly through the opening 50 in front wall 11 and into the path of cam 51.

The carrier arm 24 is maintained under constant spring tension in order to insure contact between the stylus 25 and the surface of pad 28 during the scribing of a word or figure. Tension is maintained by a flat spiral spring 53 one end of which is secured to the end of carrier arm 24 and the other end of which is supported by a bar 54 extending across the top of the longitudinal motion carrier 20. The cam 51 is so positioned on shaft 43 that at the end of the inscription the cam engages arm 52 and moves its upwardly against the tension of spring 53 to lift the carrier arm and the stylus during the backward return stroke. In the exemplary illustration, as the cam 29 moves through the distance represented by the segment from L to A, the arm 52 is engaged by cam 50 and the stylus is lifted off the pad.

In Figure 5 there is shown the motion conversion unit of this invention installed in the body and arms of a doll indicated generally at 55. The housing 10 is installed in the upper chest portion of the doll's body. Carrier arm 24 extends out through the right shoulder and down through the right arm to the right hand of the doll which holds a suitable stylus. Similarly, the stationary arm 27 extends through the left shoulder and the left arm of the doll down to the left hand which holds a suitable pad 28. Obviously the mechanism can be reversed to produce a lefthanded doll if so desired.

In the exemplary illustration the mechanism of this invention is designed to inscribe the word "Ma." By merely substituting another double track cam wherein the outer track and inner track have different configurations other short words and simple designs and figures may be inscribed by a stylus. The stylus may be, for example, a pencil, a ballpoint pen, or the like and the pad **28** may be simply a pad of paper supported by a suitable rigid backing. In the preferred embodiment of the invention, however, it is preferred that the stylus be simply a dull, non-marking point and that the pad be a so-called "Magic Slate."

As is well known, such a tablet or pad comprises an opaque backing sheet having a waxy coating overlaid by a semi-opaque or translucent sheet. This last sheet may also desirably be covered by a transparent film. As an inscription is formed by the pressure of the stylus against the top surface of the pad the semi-opaque sheet is forced into intimate contact with the waxy surface of the opaque backing. Because of the very slight tackiness of the waxy coating the semi-opaque sheet adheres to the opaque backing along the line where pressure was applied so that the opaque backing is visible through the semi-opaque sheet at those points. The whole inscription is erased by merely lifting the translucent sheet from the backing and breaking the temporary bond between it and the backing sheet.

It will be apparent that a variety of types of rotary motion means may be employed to impart rotary motion to the double track cam **29** and the invention is by no means limited to the crank and gear wheel system shown. Other exemplary means include spring motors and the like.

It is apparent that many modifications and variations of this invention as hereinbefore set forth may be made without departing from the spirit and scope thereof. The specific embodiments described are given by way of example only and the invention is limited only by the terms of the appended claims.

I claim:

1. A mechanical writing doll, said doll including at least a body portion, a pair of arms, and a pair of hands, a device for converting rotary motion to transverse and longitudinal motion in a plane mounted in the upper body portion of said doll, said device comprising a supporting frame, a transverse motion carrier mounted for reciprocatory motion in said frame between the front and back of said doll body portion, a longitudinal motion carrier mounted on said transverse carrier for transverse movement with said carrier and longitudinal motion relative thereto, said longitudinal motion being in the direction from side to side of said doll body, a double track disk cam, a cam follower disposed in each of said cam tracks, a slotted guide member for each of said cam followers, the slots in said guide members being disposed at right angles with respect to each other, means connecting one of said cam followers to said transverse motion carrier to impart transverse motion to said carrier, means connecting the other of said cam followers to said longitudinal motion carrier to impart longitudinal motion thereto, a rigid carrier arm mounted on said longitudinal motion carrier for movement therewith, said arm extending outwardly from said motion conversion device and extending through one arm of said doll and terminating in one hand of said doll, a stylus at the outer extremity of said rigid carrier arm held in the hand of said doll, a rigid stationary arm mounted on said supporting frame opposite to said movable carrier arm, said stationary arm extending outwardly from said motion conversion device and extending through said other arm of said doll and terminating at the other hand of said doll, a flat pad at the outer extremity of said stationary arm held in the hand of said doll in the plane of movement of said stylus, and means for rotating said cam whereby transverse and longitudinal motion is imparted to said carriers and transmitted to said carrier arm supporting said stylus to trace an inscription on said pad.

2. A mechanical writing doll according to claim 1 further characterized in that said transverse motion carrier comprises a pair of spaced parallel horizontal slide members mounted at each end in said supporting frame for reciprocation in a transverse direction between the front and back of said doll body portion.

3. A mechanical writing doll according to claim 2 further characterized in that said transverse motion carrier includes a second pair of spaced parallel horizontal slide members perpendicular to the first pair of slide members and connected thereto.

4. A mechanical writing doll according to claim 3 further characterized in that said longitudinal motion carrier is supported on said second pair of slide members.

5. A mechanical writing doll according to claim 3 further characterized in that the guide member slot for the cam follower connected to the transverse motion carrier is parallel to said first pair of slide members.

6. A mechanical writing doll according to claim 5 further characterized in that the means connecting the other of said cam followers to said longitudinal motion carrier comprises a slot in the bottom of said carrier parallel to the first pair of slide members.

7. A mechanical writing doll according to claim 1 further characterized in that said cam disk is provided with a pair of non-intersecting eccentric cam tracks disposed about the center of said disk, the inner track governing longitudinal movement of the longitudinal motion carrier and the outer track governing transverse movement of the transverse motion carrier and longitudinal motion carrier.

8. A mechanical writing doll according to claim 1 further characterized in that said means for rotating said cam includes a horizontal gear wheel supported for rotation with said cam, a horizontal shaft journalled in said supporting frame below said horizontal gear wheel, one end of said horizontal shaft extending through the body portion of said doll and having turning means secured thereto, a vertical gear wheel on said shaft having teeth meshing with said horizontal gear wheel and a second cam on said shaft operative to lift said carrier arm and stylus from the surface of said pad.

9. A mechanical writing doll, said doll including at least a body portion, a pair of arms connected thereto, and a pair of hands connected to said arms, a device for converting rotary motion to transverse and longitudinal motion in a plane mounted in the upper body portion of said doll, said motion conversion device comprising a supporting frame, a transverse motion carrier comprising a pair of parallel horizontal slide members mounted in said frame for reciprocation in a transverse direction and a second pair of parallel horizontal slide members perpendicular to the first pair of slide members and connected thereto, a longitudinal motion carrier mounted on said second pair of slide members of said transverse carrier for transverse movement with said carrier and longitudinal motion relative thereto, a horizontal double-track cam disc supported for horizontal rotation in said frame below said carriers, said cam being provided with a pair of non-intersecting eccentric cam tracks disposed about the center of said disc, the inner track governing longitudinal motion of the longitudinal motion carrier and the outer track governing transverse movement of the transverse carrier and longitudinal motion carrier, a cam follower disposed in said outer cam track, a slotted guide member for said cam follower secured to said frame above the cam disc, the slot of said guide being parallel to the first pair of horizontal slide members of said transverse motion carrier, means connecting said cam follower to said transverse motion carrier whereby transverse motion of said cam follower upon rotation of

said cam is imparted to said carrier, a second cam follower disposed in said inner cam track, a second slotted guide member for said second cam follower secured to said frame above the cam disc, the slot of said guide being disposed at right angles to said first guide slot, means connecting said second cam follower to said longitudinal motion carrier whereby longitudinal motion of said cam follower upon rotation of said cam is imparted to said carrier, a rigid carrier arm having a stylus at its outer extremity mounted for movement with said longitudinal motion carrier, said carrier arm extending outwardly from said motion conversion device through one arm of said doll and terminating in the corresponding hand of said doll, said stylus at the outer extremity of said carrier arm being held in that hand of said doll, a rigid stationary arm mounted on said supporting frame, said arm having a flat pad at its outer extremity held in the plane of movement of the tip of the stylus, said stationary arm extending outwardly from said motion conversion device and extending through said other arm of the doll and terminating at the doll's other hand, the pad at the outer extremity of said stationary arm being held in that hand of the doll, and means for rotating said cam.

10. A mechanical writing doll, said doll including at least a body portion, a pair of arms, and a pair of hands, a device for converting rotary motion to transverse and longitudinal motion in a plane mounted in an upper body portion of said doll, said motion conversion device including a longitudinal motion carrier operable through cam followers from a double-track cam means, a carrier arm mounted on the longitudinal motion carrier for movement therewith, said arm extending outwardly from said motion conversion device and extending through one arm of said doll and terminating in the corresponding hand of said doll, a stylus at the outer extremity of said carrier arm held in the hand of said doll, a stationary arm through said other arm of said doll and terminating at the other hand of said doll, a flat pad at the outer extremity of said stationary arm held in the hand of said doll in the plane of movement of the tip of said stylus and means for rotating said cam means, whereby transverse and longitudinal motion is imparted to said carrier and transmitted to said carrier arm supporting said stylus to trace an inscription on said pad.

11. A mechanical writing doll, said doll including at least a body portion, a pair of arms, and a pair of hands, a device for converting rotary motion to transverse and longitudinal motion in a plane mounted in the upper body portion of said doll, a carrier arm mounted on said motion conversion device for movement thereby and extending outwardly from the motion conversion device through one arm of said doll and terminating in the corresponding hand of said doll, a stylus at the outer extremity of the carrier arm held in the hand of the doll, a stationary arm extending through said other arm of the doll terminating at the other hand of said doll, a flat pad at the outer extremity of said stationary arm held in the hand of said doll in the plane of movement of the tip of said stylus, and means for imparting rotary motion to said motion conversion device whereby transverse and longitudinal motion is transmitted to said carrier arm supporting said stylus to trace an inscription on said pad.

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