

July 8, 1969

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3,453,774

MECHANICAL HAND

Filed July 7, 1966

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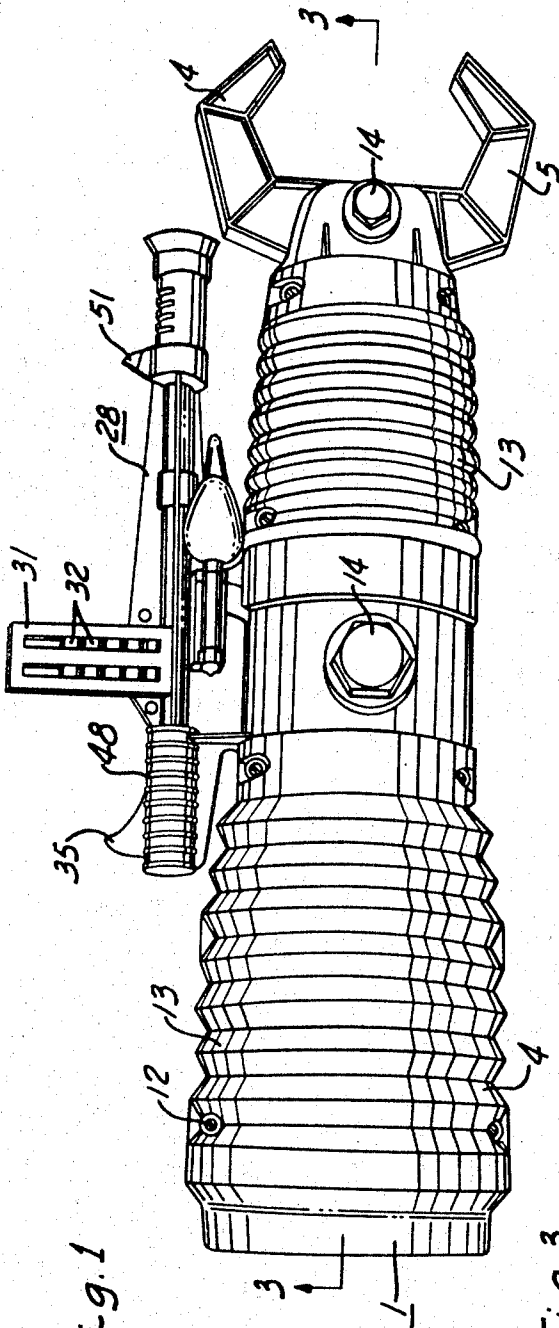


Fig. 1

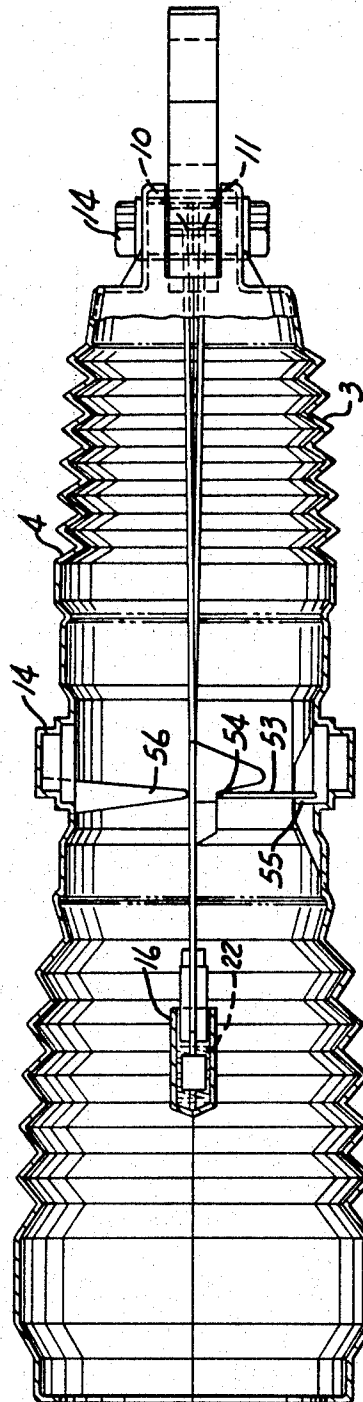


Fig. 3

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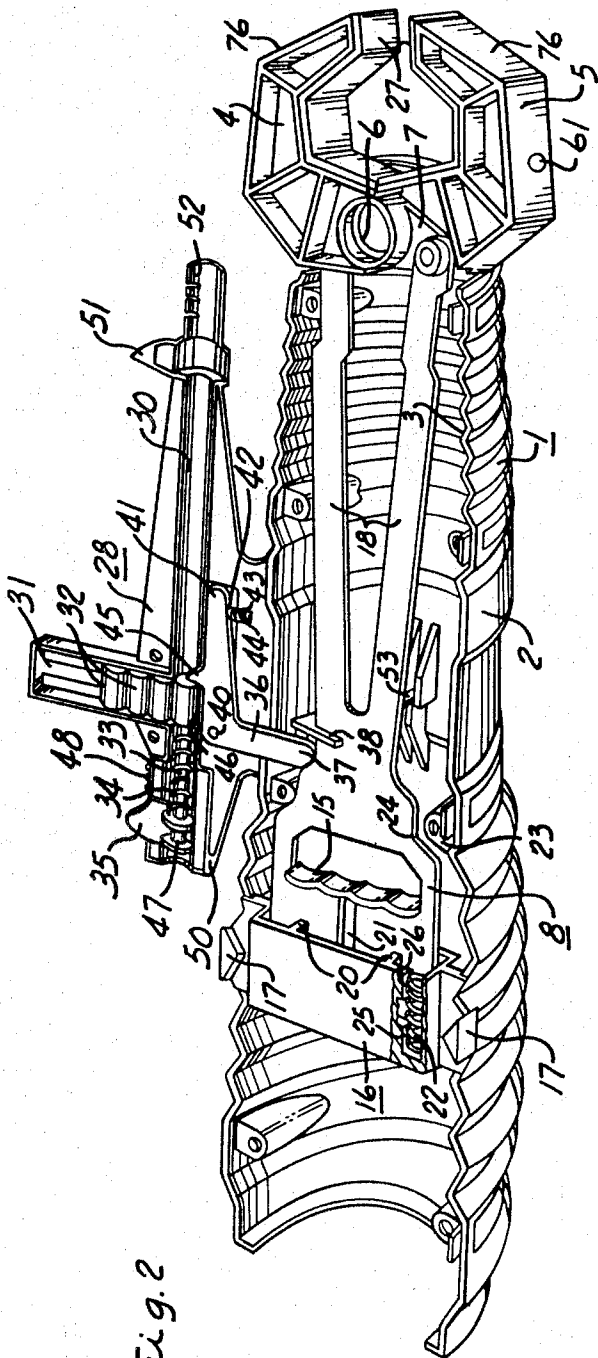


Fig. 2

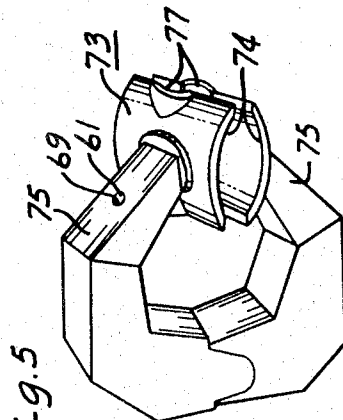


Fig. 5

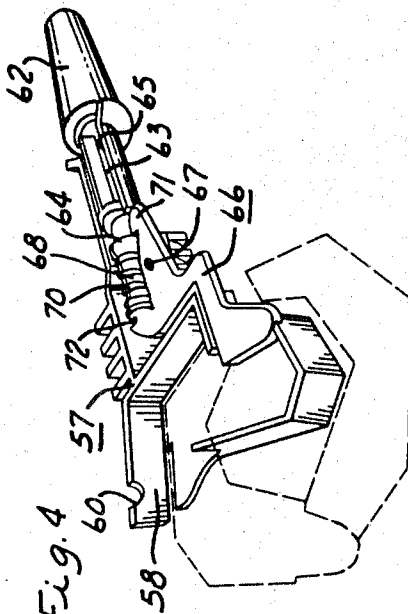


Fig. 4

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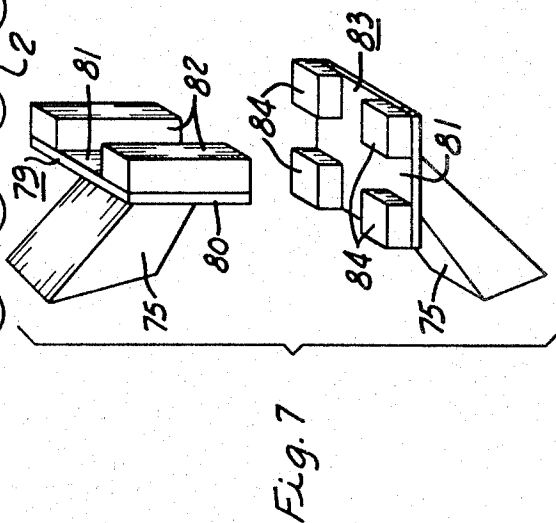
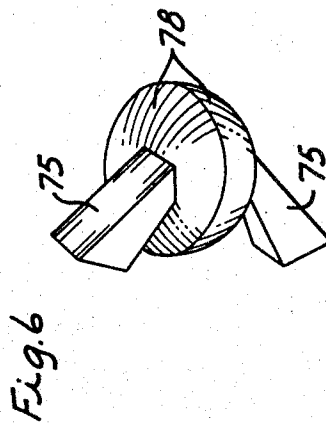
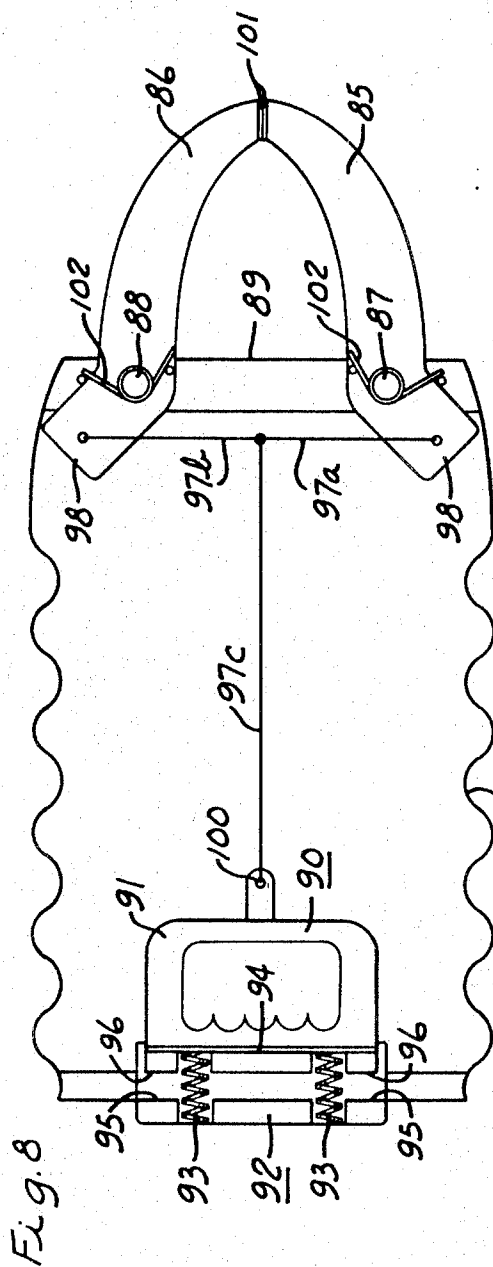
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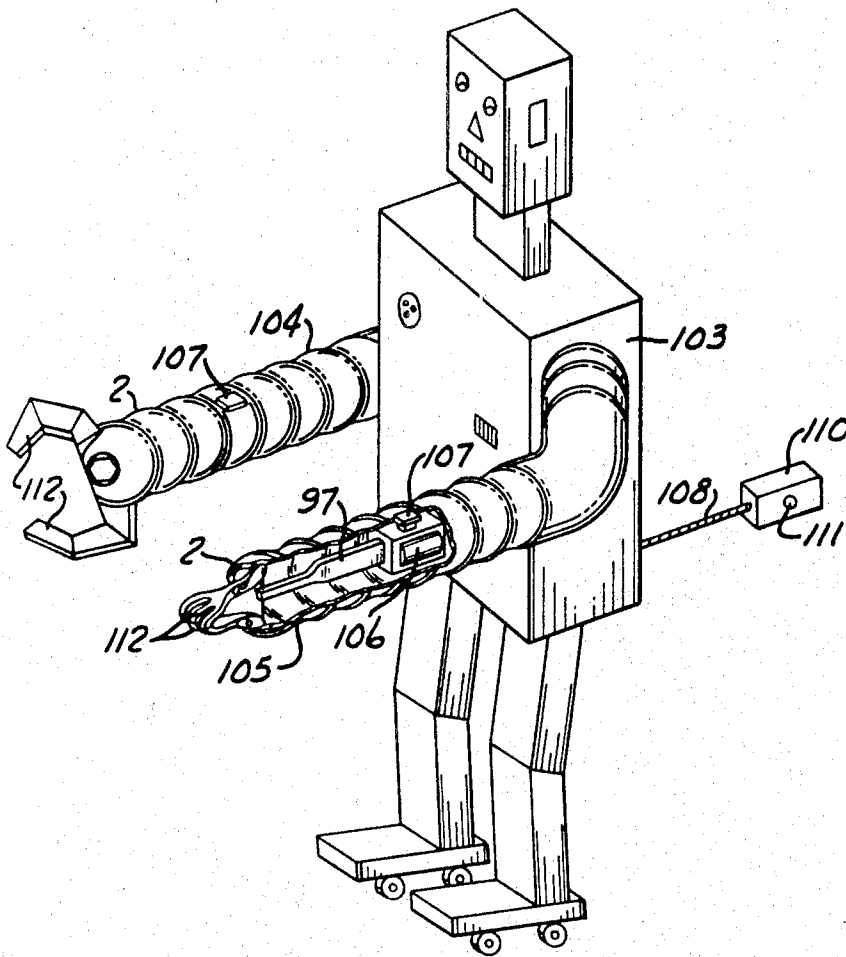
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Fig. 9



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MECHANICAL HAND

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U.S. Cl. 46—245

20 Claims

ABSTRACT OF THE DISCLOSURE

A mechanical hand having a body or housing section at the forward end of which there is secured a pair of opposed jaw members which may be pivotally juxtaposed in such a way that the ends of the jaw members come in contact when pivoted toward one another by activator means supported within the housing section. The jaw members may be utilized as a vice grip for grasping and picking up an object intended to be grasped by the members. Gripper attachment members with gripping surfaces having a configuration to conform with the surface configuration of the object to be grasped may be provided for insertion over the ends of each or either of the opposed jaw members.

This invention relates generally to mechanical limbs and more particularly to a mechanical hand which may be a child's toy as well as suitable for handling materials of potential harm to the human skin or body.

The principle object of this invention is the provision of a mechanical hand which has opposed jaw members which act as a vice for grasping and picking up an object. The jaw members are supported on the forward end of the arm housing of the mechanical hand and are pivotally juxtaposed in such a way that the ends of the jaw members come in contact when pivoted toward one another. On the other hand, each jaw member may be pivoted independently rather than juxtaposed, on the forward end of the arm housing so that their ends will come in contact upon closing. A spring means may be provided in either case to normally bias the jaw members in an openly opposed or spread position or in a closed position with jaw member ends in contact.

Another object of the present invention is the provision of an activator means connected to the jaw members to pivotally open and close the same. As mentioned above, spring means may be provided in the guide housing supporting the activator means during its reciprocal motion to normally bias the activator means in a direction which either maintains the jaw members in an openly opposed or spread condition or maintains their ends in contact.

The operator upon grasping the handle trigger grip of the activator means in the arm housing will cause the jaw members, pivotally supported on the forward end of the arm housing, to pivot toward one another to securely grasp an object to be picked up or transferred by the mechanical hand. One will note, however, that in the case where the jaw members are biased in a "closed" condition, the jaw members are ineffectual in grasping securely an object to be picked up or moved from one place to another. The "closed" condition arrangement has utility on those figure wheeled toy devices in the form of, for example, a robot where the toy moves about opening and closing the hands of its extended mechanical arms.

An object comprising this invention is the provision of various attachment members for insertion over the ends of the opposed jaw members which have gripping surfaces that conform to the surface configuration of the object to be handled or gripped by the attachment members. Thus the surface configuration of the attachment

members may be arcuate or boxed U-shaped to handle rounded surface objects such as cylindrical items. Surface configuration of the attachment members may also be spherical for picking up and handling spherical objects such as an orange.

Other examples of attachment surface configuration are conical sectors or finger groups simulating the human hands for grasping various shapes of articles or objects.

Another object comprising this invention is the provision of a mechanical spring loaded missile launcher which is novel in being insertable over an end of one of the opposed jaw members. The trigger of the missile launcher is fired upon closing of the opposed jaw members, the other of said jaw members contacting the trigger mechanism. When aiming the attached missile launcher, the missile will proceed in the properly aimed direction since upon closing of the jaw members, the missile launcher per se is brought down into the line of sight as the lower jaw member moves upwards to position itself against the trigger of the launcher and fires the same when the missile launcher is brought into the line of sight.

The spring loaded missile launcher consists of a trigger structure pivotally supported on the body of the gun. One part of the trigger structure is provided with a finger in alignment with the barrel of the gun upon which is supported the firing pin. The trigger structure also has a shoulder or sear which engages the shoulder on the end of a missile upon the latter being inserted into the barrel of the gun. The end missile compresses the firing spring and is held in position by the trigger sear until its release.

Another object comprising this invention is the provision of a mechanical spring loaded rifle supported on the arm housing which has a trigger mechanism extended into the arm housing actuated by operation of the activator means operating the opposed jaw members. The rifle is provided with a barrel, a firing chamber fed by a magazine and a firing pin over which a firing spring is positioned. The firing pin lever is moved forward to compress the spring between the lever and one end of a bullet. The lever is then moved forward and rotated to fit in a notch in the firing pin housing. The bullets are cylindrical in shape, closed at one end and opened at the other to permit the insertion of the firing pin into the interior of the bullet. The closed end of the bullet is held in position by the sear and trigger spring.

Upon firing of the trigger, the sear is removed from the forward and closed end of the bullet, permitting the firing spring to expel the bullet from the chamber and out through the barrel of the rifle.

Other objects and advantages appear hereinafter in the following description and claims.

The accompanying drawings show for the purpose of exemplification without limiting this invention or the claims thereto, certain practical embodiments illustrating the principles of this invention; wherein—

FIG. 1 is a perspective view of the mechanical hand structure comprising this invention.

FIG. 2 is a perspective sectional view showing the interior of the mechanical hand structure.

FIG. 3 is a sectional view of the mechanical hand structure along the line 3—3 of FIG. 1.

FIG. 4 is a perspective sectional view of a mechanical spring loaded missile launcher for attachment to the mechanical hand structure.

FIG. 5 is a perspective view of accurate shaped gripper attachment members for attachment on the jaw members of the mechanical hand structure comprising this invention.

FIG. 6 is a modified form of gripper attachment members.

FIG. 7 is another modified form of gripper attachment members.

FIG. 8 is a diagrammatic view of a modified form of the mechanical hand structure of FIG. 2.

FIG. 9 depicts the utilization of the mechanical hand structure comprising this invention in a mechanical robot structure.

Referring now to FIGS. 1 and 2 there is shown the mechanical hand structure comprising this invention. The mechanical hand 1 consists of a mechanical arm housing tube 2 which are substantially identical arm halves 3 and 4. The jaw members 4 and 5 are pivotally supported on the forward end of the arm housing tube on cylindrical shaft 6 in juxtaposed relationship. Each of the jaw members 4 and 5 is provided with a corresponding lever arm 7 for connection with the actuator or activator means 8.

As shown in FIG. 3 the jaw members 4 and 5 have opposed shoulder members 10 and 11 which act as stops to limit the outward extent of the jaw members 4 and 5.

As noted in FIGS. 1 and 2, the arm housing halves 3 and 4 are connected together by suitable fastening members such as the stove bolts 12 to enclose and support the operation of the actuator means 8 and provide a mechanical arm appearance. The outside appearance of the arm housing tube was made to simulate the arm of a robot, the accordion appearance 13 of the arm housing halves 3 and 4 being characteristic of the space age. The accordion structure 13 of the arm housing 2 may consist of a flexible material to give the mechanical hand more flexibility in manipulation and use. Thus, while generally the major portions of the mechanical hand structure may be made of hard plastic material and accordion structure 13 may be made of softer plastic materials such as polyethylene or other suitable resilient material. The arm housing 2 may also have other space age or mechanical characteristics such as the simulated bolt heads 14.

As noted in FIG. 2 the activator means 8 consists of a finger grip 15 slideably supported in the guide housing means 16. The guide housing means 16 is supported by either both or one of the arm housing halves 3 and 4 and may be fastened to the housing half in any suitable means. The guide housing means 16 is shown in FIG. 2 to be fastened by the interconnecting flange members 17 which not only support the housing means 16 in the mechanical arm 1 but also prevent any possible longitudinal movement or rotary movement within the arm housing 2.

The guide housing means 16 is provided with the guide ribs 20 to properly function as a guide for the forward and rearward movement of the activator means 8. The handle trigger grip 15 may also be provided with guide ribs such as shown at 21 to perform the same function. The interior of the guide housing means 16 is provided with the trigger bias springs 22 which are supported by shoulders 25 and 26 of the housing means 16 and trigger grip 15 respectively. They function to bias the activator means in its forward most position as shown in FIG. 2. A stop may be provided to limit the forward movement of the activator means and prevent the finger trigger grip 15 from completely withdrawing from the inside guide housing means 16 through the use of a marginal lip as illustrated in FIG. 8 or by utilizing the off sets 23 for supporting the fasteners 12 as shown in FIG. 2. The off sets 23 may limit the forward movement of the activator means 8 by engaging the shoulders 24 of finger trigger grip 15.

The forward end of the activator means 8 is provided with the connection rods 18, the ends of which are respectively pivotally connected to each of the lever arms 7 of the jaw members 4 and 5.

It is readily apparent that upon operation of the finger trigger grip 15 the connection rods 18 will pivotally move the jaw members 4 and 5 toward or away from one another. By compression of the biasing springs 22 by the trigger grip 15, the jaw members 4 and 5 are pivoted toward one another until the grip surfaces 27 will come

in contact. Upon releasing of the trigger grip 15 by the operator, the finger trigger grip 15 will be guided forwardly in the housing means 16 until its forward movement is arrested by the shoulders 24 engaging the off sets 23.

As shown in FIGS. 1 and 2 the arm housing 2 may be provided with an additional structure such as the rifle 28 for the purposes of employing the mechanical hand structure comprising this invention as a toy. The rifle 28 has a barrel 30, a magazine 31 for storing the bullets 32, a firing pin 33, a firing spring 34 and a firing pin lever 35. The rifle also possesses the trigger 36, the lever end 37 of which extends into the arm housing 2 in order to be engaged by the activator means 8 through the use of the trip pin 38 on the activator means.

The trigger 36 is pivotally supported at 40 and thus functions as a crank arm. The other end 41 of the trigger 36 has an abutment 42 to receive the end of the trigger spring 43 which is housed in the socket 44 of the rifle 28. The trigger end 41 also possesses an abutment in the form of a sear 45 which maintains a bullet 32 in the firing chamber 46 until actuation of the trigger 36.

Each of the bullets 32 are cylindrical in shape and the forward end in contact with the sear 45 may be closed. The other end of the bullets 32 are open to receive the forward end of the firing pin 33. Thus, upon moving the firing pin lever 35 forward, the firing spring 34 is compressed between the shoulder 47 of the firing pin 33 and the rearward end of the bullet 32. The forward end of the firing pin 33 within the bullet 32 acts as a guide for the bullet 32 at its initial moment upon releasing of the sear 45 from the forward end of the same. The lever 35 maintains the firing spring in compressed state by rotating the lever 35 to catch on the notch 48 in the firing pin housing 50.

The rifle 28 may be made in any suitable manner for purposes of appearance and saleability, such as the simulation of sight 51 on the forward end of the barrel 30 as well as a choke 52.

As noted in FIGS. 2 and 3 for employment as an effective toy, the activator means 8 may be provided with a tick-tack spring member 53 which is secured to the activator means 8 at 54. The shoulder 55 being part of the arm housing 2 causes the tick-tack spring member 53 to bend upon rearward movement of the activator means 8 which in turn causes a clicking noise and thus simulates the sound of a trigger mechanism being activated. Upon the return of the activating means to its normally forward biased position, the tick-tack spring member 53 again produces a clicking sound in returning to its original normal position as shown in FIG. 3.

The arm housing 2 may be provided with the finger 56 in order to aid in guiding the activator means 8 in its reciprocal motion in the arm housing.

In order to increase the utility of the mechanical hand comprising this invention, the jaw members 4 and 5 of the mechanical hand structure may be provided with certain attachments. Such attachments are shown and illustrated in FIGS. 4, 5, 6 and 7.

In FIG. 4 there is shown the missile gun 57 which has the chamber 58 for engagement over one of the jaw members of the mechanical arm structure 1, preferably the jaw member 4. The chamber 58 is provided with the aperture 60 to receive the button member 61 on either the jaw members 4 or 5 in order to securely maintain the missile gun 57 on the jaw member selected.

The missile 62 may take the form of a variety of shapes and is provided with the stem 63 which has a shoulder 64. The stem 63 aids in guiding the missile 62 upon being propelled from the barrel 65 of the missile gun 57.

The trigger 66 of the missile gun 57 is pivotally supported at 67 and has the finger member 68 for supporting the firing spring 70. The trigger 66 also has the sear 71 for engagement with the shoulder 64 of the missile 62. Thus, upon insertion of the stem 63 of the missile 62

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into the barrel 65 of the missile gun, the end of the stem 63 will compress the firing spring 70 on the finger member 68 and the shoulder 64 will be engaged by the sear 71. Upon actuation of the trigger 66, the sear 71 will disengage from the shoulder 64 permitting the compressed spring 70 to propel the missile 62 from the missile gun 57. It should be noted that the firing spring 70 will not spring from the finger member 68 since the end of the spring 70 is secured in the notch 72 provided at the rearward extent of the finger member.

Upon insertion of the missile gun 57 under the jaw member 4 or 5, being maintained thereon by the button member 61, it is interesting to note that upon aiming the mechanical arm 1, the missile 62 is fired upon contact of the jaw member with the trigger 66 as shown in FIG. 4. Thus the missile gun 57 upon being aimed and the activator means 8 being drawn rearwardly within the arm housing 2, the missile gun 57 is brought into alignment with the line of sight, at which time the opposing jaw member comes in contact with the trigger 66 to release the sear member 71 to permit the missile to proceed from the missile gun 57 along the line of sight to the target. The structure comprising the missile gun 57 is unique and novel in combination with the jaw member 45 which not only fire the missile gun 57 but also brings the missile gun 57 into the line of sight simultaneously with the time of firing of the missile.

FIGS. 5, 6 and 7 demonstrate various shapes of gripper attachment members for attachment to the jaw members 4 and 5 of the mechanical hand structure 1. It may be necessary to grasp objects of different shapes and sizes and therefore the grip surfaces 27 are not suitable for grasping or engaging many objects in view of the surface configurations of the objects to be grasped. Thus, the gripper attachment members may be provided in order that the object to be grasped by the mechanical arm structure may be properly engaged by the jaw members 4 and 5. It should be noted that the attachment members disclosed are merely for the purposes of illustration and the use of such attachment members is not to be limited to the structures as shown since it is obvious that the surface configurations of the attachment members may be varied in order to properly engage the surfaces of the article or object to be gripped by the jaw members 4 and 5.

In FIG. 5 there is shown the gripper attachment members 73 which have the arcuate gripping surfaces 74 for grasping articles of cylindrical or arcuate shape. The gripper attachment members are provided with the sockets 75 which receive the end sections 76 of the jaw members 4 and 5. Since the end sections 76 increase in size starting from the grip surfaces 74, the sockets 75 of the gripper attachment members 73 may be of corresponding configuration and snugly fit under the sections 76 in order to insure that the gripper attachment members 73 remain on the jaw members 4 and 5 during the use and manipulation of the former. In this connection, an aperture 69 may be provided in the sockets 75 to be received by the holding button member 61.

It should be noted that the arcuate surfaces 74 may be transverse of the longitudinal extent of the arm housing 2 or may be in alignment therewith as both illustrated together in FIG. 5. The arcuate surfaces 74 are shown in transverse relationship to the longitudinal extent of the arm housing 2 and are provided with the arcuate offsets 77 which may be aligned in a transverse direction. Thus the arcuate gripper attachment members 73 may employ a combination of arcuate surfaces as demonstrated in FIG. 5 so that these attachment members may be used to approach and grasp various arcuate or cylindrical shaped articles of varying configuration no matter what direction the article or object to be grasped is approached from, or in what position the article or object may be in at the time of initial grasping with the jaw members 4 and 5.

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In FIG. 6 there is shown a modified form of the gripper attachment members which have spherical gripping surfaces 78 for articles having substantially spherical surfaces such as a ball or orange.

In FIG. 7 there is shown a further modification of gripper attachment members. The gripper attachment member 79 is provided with a socket 75 for insertion over the end section 76 of either of the jaw members 4 and 5. The flat surface member 81 has secured thereto the rail sections 82. The use of the surface 81 and the rail sections 82 permit the grasping of a number of variety of objects with peculiar surface configurations, such objects are flat sided articles, such as a block, or rounded articles, such as a cylindrical body.

As shown further in FIG. 7 the gripper attachment member 83 may be provided with the flat surface member 81, but instead of the rail members 82, the blocks 84 may be provided permitting further utility of the gripper attachment member 83 in grasping various flat sided and rounded objects such as described above.

In describing the various combinations of the gripper attachment members as shown and disclosed in FIGS. 5, 6 and 7, it is readily apparent that any combination of such gripper attachment members may be employed on the end sections 76 of the jaw members 4 and 5. For an example, one of the gripper attachment members 73 as shown in FIG. 5 may be employed on one of the jaw members 4 and 5 together with the gripper attachment member 83 as shown in FIG. 7 on the other of said jaw members in order to produce a suitable combination of gripper attachment members for properly grasping an object between the jaw members 4 and 5.

FIG. 8 is a diagrammatic view of a modified form of the jaw members and actuator means as disclosed in FIG. 2. It will be noted that the jaw members 85 and 86 are independently, pivotally supported at 87 and 88, respectively on forward arm housing support bar 89. The activator means 90 comprises the trigger grip 91 which is slideably housed within the guide housing means 92. The guide housing means 92 is similar in structure to that shown in FIG. 2 and employs the trigger bias springs 93 which maintain the trigger grip 91 in a normally forward biased position against the lip or flange 94 of the housing means 92. The trigger bias springs 93 are maintained in proper position by the shoulders 95 and 96. The shoulders 95 are part of the housing means 92 whereas the shoulders 96 are part of the handle grip 91.

Instead of using connection rods in FIG. 2, in the structure comprising the modification shown in FIG. 8, a wire 97 of Y configuration may be employed with two ends of wire portions 97a and 97b connected to the lever arms 98 of each of the jaw members 85 and 86 and the other single wire portion 97c connected at the projection 100 of the trigger grip 91.

It can readily be seen that the jaw members, being independently supported, are maintained in a normally closed position with gripper ends 101 in connection with one another through the utilization of the coil springs 102 on the pivotal supports 87 and 88. Upon movement rearwardly or activator means 90, the jaw members 85 and 86 are pivotally moved away from one another in order that the ends of 101 may be sufficiently spread to permit the grasping of an article.

The springs 102 may very well be used in the structure shown in FIG. 2 on the shaft 6 and thus eliminate the need of the biasing trigger springs 22.

In FIG. 8, the ends of the lever arms 98 may be utilized in conjunction with the forward end of the arm housing 2 to function as a stop and thus normally maintain the gripper surfaces 101 of each of the jaw members 85 and 86 from coming in direct contact or as a means of equalizing the tension on each of the members 85 and 86 due to possible differences of the spring tension in the spring members 102 as well as differences in wire lengths of wire portions 97a and 97b.

It is readily apparent that the modification structure shown in FIG. 8 cannot be utilized in grasping objects firmly since actuation of the activator means 90 spreads the jaw members 85 and 86 apart. Thus the grasping effect of the jaw members 85 and 86 is independent upon the tension of the spring members 102. In view of this the modified structure as shown in FIG. 8 has its greatest utility in connection with the use of a mechanical hand in a mechanical man such as a robot. To illustrate such a utilization, in FIG. 9 there is shown the mechanical man 103, which, for purposes of explanation, has the mechanical arm structure 1 as shown in FIG. 2 as the right arm designated as 104 in FIG. 9. The left arm 105 illustrates the structure shown in FIG. 8. Both structures of the arms 104 and 105 are operated electrically through the use of spring operated solenoid 106. The solenoid 106 are supported in the arm housing 2 by the brace supports 107 and electrically connected from the robot arms and the mechanical robot 103 through the wire 108 to the control box 110 which has the power supply to operate the solenoids 107 as well as an operating push button 111.

The mechanical robot 103 may be of the kind that is propelled through an external control box such as 110. The control box may contain the controls for movement of the robot as well as arms 104 and 105. One may propel the mechanical robot 103 along a surface and manipulate the jaw members 112 of mechanical arms 104 and 105 to grasp objects to which the mechanical robot 103 may be confronted with along its path of movement.

The jaw members 112 as shown in FIG. 9 are still another illustration of the use of various surface configurations as the jaw members, or attachment members thereto, in permitting the use of the desired configuration to meet the immediate needs for grasping and maintaining a firm grip on an article to be grasped and held by the mechanical arm comprising this invention. Thus, the jaw members 112 simulate the human hand and, as previously mentioned, permit the mechanical robot 103 to grasp various articles to which the mechanical robot may be confronted with during the course of its movement.

We claim:

1. In a mechanical hand, a housing, opposed jaw members pivotally secured on the forward end of said housing, activator means supported in said housing and connected to each of said jaw members to pivotally move the same toward and away from each other to permit the engagement and disengagement of an object to be grasped by said members, said mechanical hand characterized in that said opposed jaw members are crank arms, the forward end of said crank arms forming opposed gripper arms, said activator means comprising a handle trigger grip, a guide housing to slideably receive said handle trigger grip and guide said activator means in reciprocal movement in said housing and a connector means to connect said handle trigger grip to the rearward extent of said crank arms.

2. The mechanical hand of claim 1 characterized in that said activator means is a spring operated solenoid supported in said housing and connected to each of said pivotally supported jaw members and power supply and circuit means to energize and operate said solenoid to reciprocally move said pivotally supported jaw members to permit the engagement and disengagement of an object by said jaw members.

3. The mechanical hand of claim 1 characterized by gripper attachment members for insertion over the ends of said opposed jaw members having gripping surfaces of a configuration to conform with surface configuration of the object to be gripped by the same.

4. The gripper attachment members of claim 3 characterized by arcuate gripping surfaces, transverse arcuate offsets in said arcuate surfaces.

5. The gripper attachment members of claim 3 characterized by spherical sector gripping surfaces.

6. The gripper attachment members of claim 3 characterized by flat gripper surfaces having marginal rail members on at least two marginal edges thereof.

7. The gripper attachment members of claim 3 characterized in that said gripper attachment members are in the form of multiple fingers.

8. The mechanical hand of claim 1 characterized in that said opposed jaw members are pivotally supported on the forward end of said housing in juxtaposed relation, spring means in said guide housing to normally bias said connection means in its forward-most position to maintain said opposed jaw members in their most openly extended position, said connection means being a ridged member.

9. The mechanical hand of claim 8 characterized by stop means in said housing to arrest the forward movement of said activator means within said housing.

10. The mechanical hand of claim 1 characterized in that said opposed jaw members are independently, pivotally relation, spring means on each of said opposed jaw members to normally bias the ends of said members in contact with one another, said connector means being a wire member.

11. The mechanical hand of claim 10 characterized by stop means on the said guide housing to arrest the forward movement of said handle trigger grip within said mechanical hand housing.

12. A mechanical hand comprising a housing, pivotally juxtaposed gripper members supported by said housing and each having two crank arms, jaw members representing the first of said crank arms extending forwardly of said housing to operate in opposed relation, connecting extensions representing the second of said crank arms, activator means slideably supported in said housing, forwardly extended arm members on said activator means, one connected to each of said connecting extensions to pivotally move said jaw members toward and away from each other to engage upon and disengage from an object to be gripped by the mechanical hand.

13. The mechanical hand of claim 12 characterized in that said activator means comprises a rearwardly positioned handle grip in said housing, a handle guide housing supported by said housing to slidably receive said handle grip and guide the forward and rearward longitudinal movement of said handle grip in said housing and connector means in said housing connecting said handle grip with said connecting extensions.

14. The mechanical hand of claim 13 is characterized by spring means to normally bias said activator means in its forward-most position to normally maintain the ends of said jaw members at their outer-most extended position, stop means within said housing to limit the forward movement of said activator means in said housing.

15. The mechanical hand of claim 14 characterized in that said stop means are abutment surfaces on the inner surface of said housing to engage said handle grip and limit the forward extent thereof in said housing.

16. The mechanical hand of claim 14 characterized in that said handle guide housing has an open face to receive said spring means and said handle grips, said stop means is a perimetral flange at said open face to retain said handle guide in said handle guide housing.

17. The mechanical hand of claim 13 characterized by rib means on said handle grip and the inner surfaces said handle guide housing to support and guide said handle grip during its forward and rearward movement therein.

18. The mechanical hand of claim 12 characterized by a tick-tack spring member in said housing to be sprung upon reciprocal movement of said activator means.

19. The mechanical hand of claim 1 characterized by a mechanical spring loaded missile launcher having a chamber at its rearward end to receive one of the ends of either of said opposed jaw members, a missile barrel secured to the forward end of said missile launcher, a trigger pivotally secured to said launcher rearward of said

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barrel and having a finger positioned in alignment with said barrel, a sear on said trigger extending transversely into said barrel to engage the forward end of a missile positioned therein, and a spring on said finger to propel the missile from said barrel upon disengagement of said sear, said trigger being actuated by the other of said jaw members upon operation of said activator means to close said jaw members.

20. The mechanical hand of claim 1 characterized by a mechanical spring loaded rifle supported on said housing, a rifle barrel secured to the forward end of said rifle, a trigger pivotally secured to said rifle and having a trigger lever extending into said housing to said connector means, a sear on said trigger extending transversely into said barrel to engage the forward end of a rifle bullet positioned therein, a firing pin housed within the

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rearward end of said barrel and having firing spring positioned thereon to engage the rearward end of the rifle bullet, and a trip pin secured to said connector means to engage said trigger lever upon operation of said activator means.

References Cited

UNITED STATES PATENTS

2,493,108 1/1950 Casey ----- 294—19

10 LOUIS G. MANCENE, *Primary Examiner*.

R. F. CUTTING, *Assistant Examiner*.

U.S. Cl. X.R.

15 46—175; 394—19