

Appendix B1

U.S. Patent No. 11,938,082 (“the ’082 Patent”) Invalidity Chart Based On Primary Reference U.S. Patent No. 4,513,737 (“Mabuchi”)

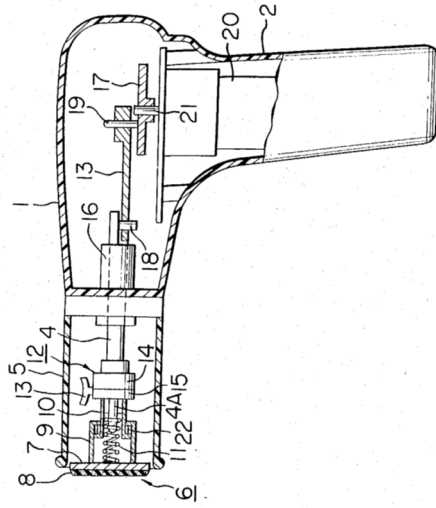
<u>Asserted Claims</u>	<u>Exemplary Disclosures</u>
Claim 1	
1[pre] A percussive massager comprising:	To the extent the preamble is limiting, Mabuchi discloses and/or renders obvious “[a] percussive massager” recited in Claim 1. For example, Mabuchi discloses that “[t]his invention relates generally to a beauty treatment device, and more specifically to a beauty treatment device having a space guide that permits an actuator to repeatedly reciprocate and controls the motion of the actuator wherein a patten repeatedly pats a skin surface being treated at a given rate.” Mabuchi at 1:6-12. A person of ordinary skill would understand that by causing the “actuator to repeatedly reciprocate,” the device is a percussive device. Furthermore, Mabuchi discloses that the device can “remove subcutaneous fat, stimulate subcutaneous muscular tissues and prevent the skin from loosening or wrinkling by patting the skin surface with the patten assembly 6,” and that the patten can be changed “in accordance with the portion being treated or the purpose of treatment.” <i>Id.</i> at 5:52-60. Accordingly, a person of ordinary skill would understand that Mabuchi teaches a percussive massager.
1[a] a housing;	Mabuchi discloses and/or renders obvious “a housing.” For example, Mabuchi discloses that “the invention comprises a housing 2 with a crank member in the form of disk 17 with crank shaft 19 rotatably mounted about a center of rotation at motor shaft 21. An actuator in the form of actuator 4 and connecting shaft 13, has one end rotatably mounted on crank shaft 19, at an eccentric radial location on crank member 17, with an opposite end of the actuator slidably mounted with respect to the housing 2 for motion in a linear stroke with rotation of the crank member 17.” Mabuchi at 4:58-66. <i>See also id.</i> at Fig. 1:

Asserted Claims

Exemplary Disclosures

1[b] a piston having a proximal end and a distal end, the distal end of the piston having a bore;

FIG. 1



Mabuchi discloses and/or renders obvious “a piston having a proximal end and a distal end, the distal end of the piston having a bore.” For example, Mabuchi’s actuator 4 is a piston and has a proximal and distal end. Mabuchi discloses a distal end attached to patten 6 by the patten connection mechanism 12. Mabuchi at 2:55-58. A person of ordinary skill would understand the “proximal end” of the piston to refer to the region near an interior end of the piston, and the “distal end” of the piston to refer to the region near an exterior end of the piston. Mabuchi also discloses that “as the rotating disc 17 rotates, the actuator 4 is caused to reciprocate within an actuator bearing 16 via the rod 3.” *Id.* at 2:50-52.

The “patten connecting mechanism” in Mabuchi’s Figures 18 and 19 (shown below) includes a piston comprising an actuator 4 and coupling 14 on a distal end, the coupling having a bore into which magnet 43 and yoke core 45 are disposed. The actuator 4 is further adapted to engage a bore in patten slide tube 10 to stabilize an impact head 6 upon attachment to the percussion massager.

FIG. 18

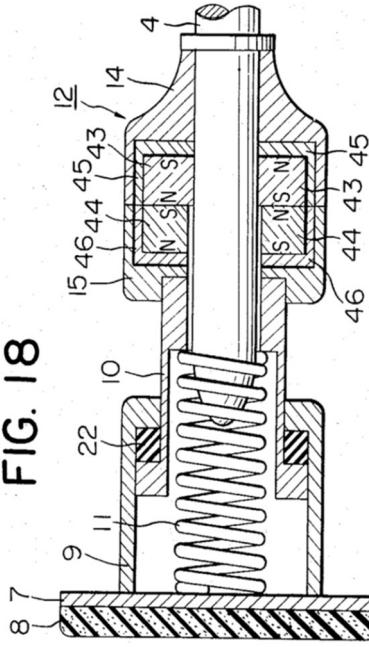
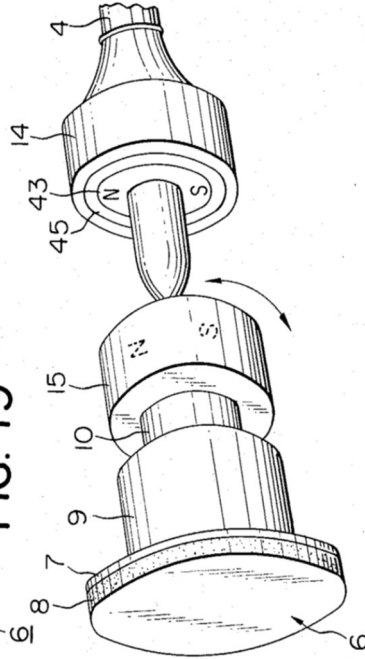


FIG. 19



To the extent Mabuchi does not expressly disclose the distal end of the piston having a bore, U.S. Publication No. 2007/0150004 ("Colloca") teaches a plunger having a proximal end and a distal end comprising a plunger rod 151 and nose piece 130, corresponding to Mabuchi's piston 4. Nose piece 130 on the distal end includes a bore 139.

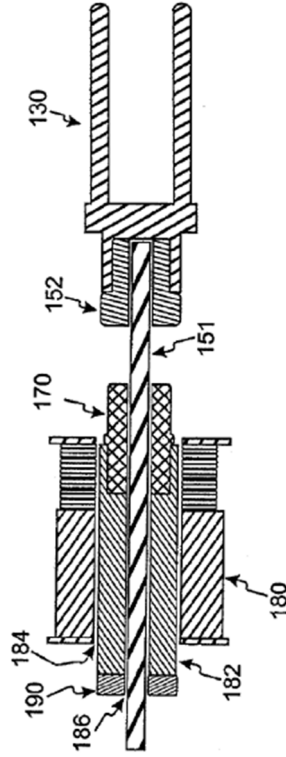


Fig. 9

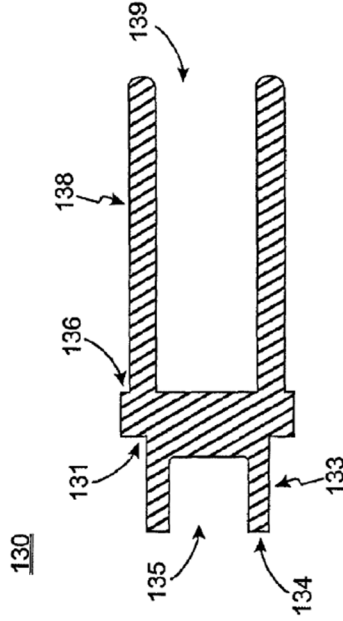
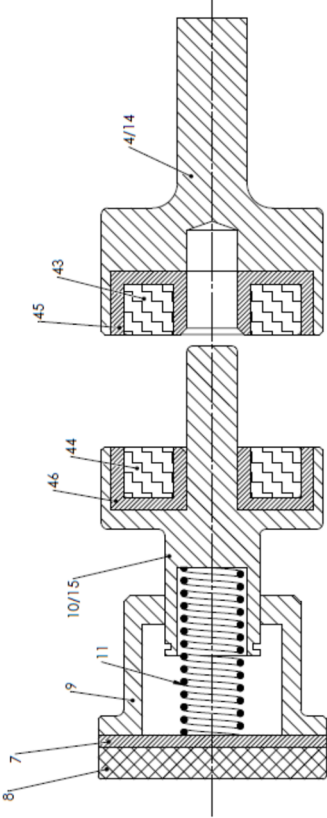


Fig. 10

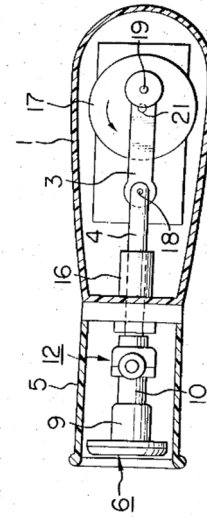
As shown in Figures 9 and 10 above, thrust nose piece 130 “includes an outer end 136, an outer end shank 138 adapted to couple to at least one impact head 70.” Colloca at [0034]. Colloca also teaches that thrust nose piece 130 includes a bore 139 that is “adapted to the at least one impact head 70.” *Id.* The outer end shank 138 of thrust nose piece 130 “extends through the opening 20” in the housing 12 of Colloca’s instrument 10, as shown in Figure 2. An “impact coupler” 78, such as an o-ring, on the impact head 70 “form[s] a press fit with the thrust nose piece 130.” *Id.* at [0056].

A person of ordinary skill in the art would understand that it would have been a simple design choice to modify Mabuchi’s patter connection mechanism to make coupling 14 integral with actuator 4, like the thrust nose piece 130 formed integral with the plunger 150, and incorporating a bore in the distal end of actuator 4 and coupling 14 that, like Colloca’s integral preload switch plunger 150 and thrust nose piece 130, was adapted to accept the shanks of a patter. A diagram of Mabuchi’s patter connection mechanism, as modified by the teachings of Colloca, is shown below.

<u>Asserted Claims</u>	<u>Exemplary Disclosures</u>
1[c] a motor operatively connected to the proximal end of the piston, wherein the motor is configured to cause the piston to reciprocate at a first speed;	 Mabuchi FIG. 18 modified in view of Colloca Mabuchi discloses and/or renders obvious “a motor operatively connected to the proximal end of the piston.” For example, Mabuchi discloses that a motor 20 with motor output shaft 21 is operatively connected to the proximal end of actuator 4 (the piston), and causes it to reciprocate at a first speed. Mabuchi discloses that motor 20 causes motor output shaft 21 “to rotate via a reduction gear (not shown),” and the output shaft 21 “in turn causes the rotating disc 17 to rotate.” Mabuchi at 2:43-47. A rod 3 has one end fitted to crankshaft 19 on rotating disc 17, and the other end connected to actuator 4. <i>Id.</i> at 2:47-49. Further, Mabuchi discloses that the speed of the reciprocation of actuator 4 depends in part on the angular velocity ω of rotating disc 17, which is caused in turn by the rotation of motor output shaft 21. <i>Id.</i> at 3:38-57. Mabuchi discloses and/or renders obvious “wherein the motor is configured to cause the piston to reciprocate at a first speed.” For example, Mabuchi discloses that “as the rotating disc 17 rotates, the actuator 4 is caused to reciprocate within an actuator bearing 16 via the rod 3.” Mabuchi at 2:50-52. The “rotation of the motor 20 is transmitted to the actuator 4 in the form of reciprocating motion, which is in turn transmitted to the plate member 7 and the cushion member 8.” <i>Id.</i> at 3:30-33. Further, Mabuchi discloses that the speed of the actuator 4’s reciprocation is based on factors including the angular velocity of the rotating disk 17, which is controlled by the speed of the motor. Mabuchi discloses: In general, the velocity v of the actuator 4 is given by the following equation. $V \approx r\{\sin \theta - (\lambda/2) \sin 2\theta\}\omega$ where: r: radius of crankshaft 19

<u>Asserted Claims</u>	<u>Exemplary Disclosures</u>
1[d] a drive mechanism that controls a predetermined stroke length of the piston; and	1: length of rod 3 θ: rotating angle of rotating disc 17 (the rotating angle θ in a state where the patten assembly 6 is retracted farthest from the open end of the space guide 5 is assumed to be 0.) ω: angular velocity of rotating disc 17 λ: $r/1$ Mabuchi at 3:38-51. Mabuchi discloses and/or renders obvious “a drive mechanism that controls a predetermined stroke length of the piston.” For example, Mabuchi discloses that “rotating disc 17 is fixed to the motor output shaft 21, which in turn causes the rotating disc 17 to rotate. A rod 3 is fitted at an end thereof to a crankshaft 19 provided on the rotating disc 17, the other end thereof being connected to an actuator 4 via a rod shaft 18. Consequently, as the rotating disc 17 rotates, the actuator 4 is caused to reciprocate within an actuator bearing 16 via the rod 3.” Mabuchi at 2:45-52. A person of ordinary skill in the art would understand that the location of crankshaft 19 on rotating disc 17 and rod 3 controls the predetermined stroke length of actuator 4. As shown below in Mabuchi’s Figures 2-5, the rotating disc 17 and corresponding reciprocation rotates along a stroke length of actuator 4. Specifically, as rotating disc 17 rotates in a counterclockwise direction, crankshaft 19 rotates around a circumference of a circle that is defined as $\pi \cdot r2$, where r is the offset of crankshaft 19 from flywheel axis 21. As a result of this movement, rod 3 pushes actuator 4 forward (Figs. 3-4) then backwards (Figs. 2, 5) at a predetermined stroke length.

FIG. 2



Asserted Claims

Exemplary Disclosures

FIG. 3

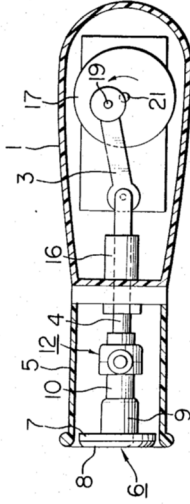


FIG. 4

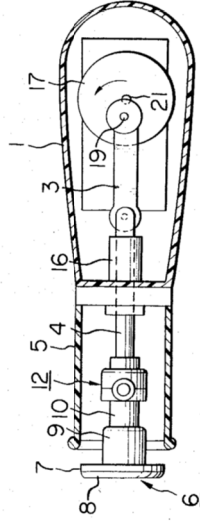
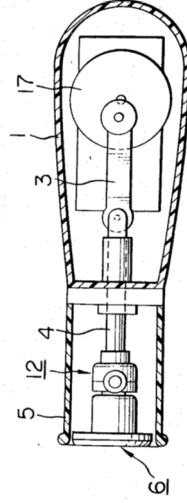


FIG. 5



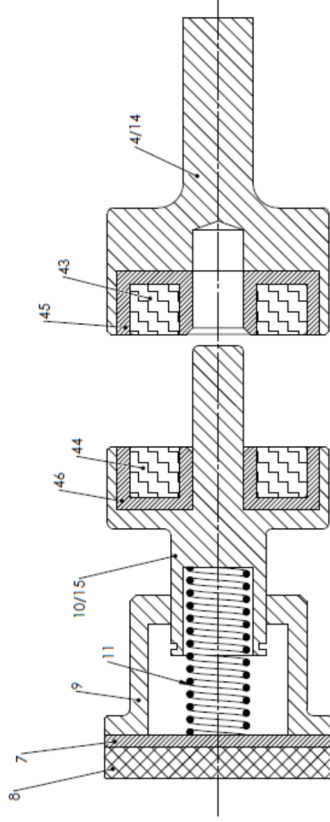
1[e] a quick-connect system comprising the distal end of the piston and a first massaging head, wherein the quick-connect system is configured to have a proximal end of the first massaging head inserted into or removed from the bore while the piston reciprocates

Mabuchi in view of Colloca discloses and/or renders obvious “a quick release connector at the distal end of the piston and a first massaging head.” For example, the “patter connecting mechanism” in Mabuchi’s Figures 18 and 19 (shown below as modified by the teachings of Colloca, includes magnet 43 implanted in the integrated actuator 4 and coupling 14. Mabuchi at 7:67-8:10. Along with patter assembly 6 (i.e., the “first massaging head”), a person of ordinary skill would understand this mechanism is a quick-connect system: “The changing of the patter assembly 6 can be easily accomplished since the actuator 4 and the patter assembly 6 are automatically disconnected merely by turning each other.” *Id.* at 8:40-43.

Asserted Claims

the predetermined stroke length at the first speed.

Exemplary Disclosures



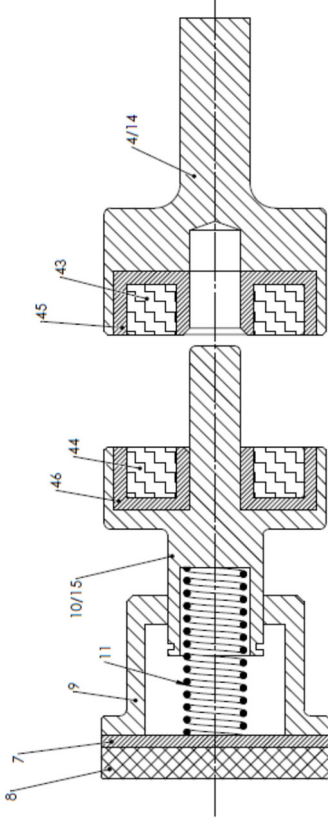
Mabuchi FIG. 18 modified in view of Colloca

Mabuchi, as modified with the teachings of Colloca, also discloses and/or renders obvious “wherein the quick-connect system is configured to have a proximal end of the first massaging head inserted into or removed from the bore while the piston reciprocates the predetermined stroke length at the first speed.”

Mabuchi discloses that the purpose of the patter connecting mechanism is to allow for it to be quickly changed during treatment, i.e., “changing the shape or patting intensity of the patter assembly 6 . . . in accordance with the portion being treated or the purpose of treatment,” and thus patter assembly 6 must be “interchangeable” while also “securely connected to the actuator 4 to prevent unwanted disengagement.” Mabuchi at 5:52-64. The specific patter connecting mechanism of Figures 18 and 19 relies on the “attracting force caused by different polarities on the two magnets 43 and 44.” *Id.* at 8:11-15. Because Mabuchi’s patter connecting mechanism as modified in view of Colloca would still include the magnets 43 and 44, these magnets would function in the same manner to “ensure[] positive connection of the actuator 4 and the pattern assembly 6, both of which are subjected to vibrations caused by high-speed reciprocating motion.” *Id.* at 8:33-37.

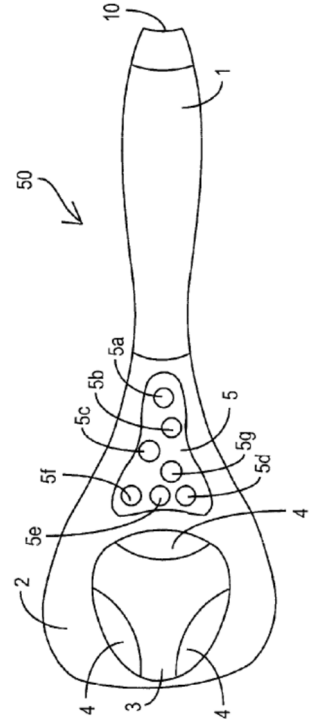
Colloca discloses “a thrust nose piece 130” where the thrust nose piece 130 includes “an outer end 136,” “an outer end shank 138 adapted to couple to at least one impact head 70,” and “a bore 139 adapted to the at least one impact head 70.” Colloca at [0034]; *see also id.* at Figs. 9-10. It would have been a simple design choice to modify Mabuchi by combining actuator 4 and coupling 14, and incorporating a bore to accept a massaging head shank.

Further, Mabuchi discloses that, by using a patter connecting mechanism with magnets 43 and 44, a “positive connection can be ensured ***without positioning*** the actuator 4 and the patter assembly 6.” *Id.* at 8:33-39 (emphasis added). Configuring the connecting mechanism to ensure a positive connection without positioning the actuator 4 and the patter assembly 6 suggests to a person of ordinary skill that the connecting mechanism is configured to

<u>Asserted Claims</u>	<u>Exemplary Disclosures</u>
	have the patter assembly 6 (the first massaging head) inserted into or removed from the piston while actuator 4 reciprocates a predetermined stroke length at the first speed. Because the connecting mechanism is configured such that a user does not need to carefully control the angular orientation or spatial positioning of the patter assembly in relation to head of the actuator during attachment, a person of ordinary skill would understand that it is configured to be inserted or removed while the actuator was reciprocating. A person of ordinary skill in the art would understand that the Mabuchi/Colloca quick-connect system with its self-aligning actuator 4 (i.e., ensuring positive connection without the need for positioning actuator 4 and patter assembly 6), is configured to have a proximal end (the flange 15 and magnet 44) of the first massaging head inserted into or removed from the bore 139 formed by outer end shank 138 while the piston reciprocates the predetermined stroke length at the first speed. This self-aligning feature of the actuator 4 and magnet 44 inside flange 15 in combination with magnetic coupling between magnets 43 and 44 facilitate attaching the massage head at a variety of speeds and stroke lengths because the user does not need to carefully control the angular orientation or spatial positioning of the massage head in relation to the massage tool during attachment. Similarly, a POSA would understand that modifying Mabuchi in view of Colloca as described above would provide the same functionality in that the mating of the massage head shank into the piston's bore provides spatial positioning of the massage head in relation to the massage tool during operation.  <u>Mabuchi FIG. 18 modified in view of Colloca</u>
Claim 2 2. The percussive massager of claim 1, wherein the motor	Mabuchi in view of Colloca discloses and/or renders obvious a “percussive massager . . . wherein the motor is configured to cause the piston to reciprocate the predetermined stroke length at a second speed.” For example,

<u>Asserted Claims</u>	<u>Exemplary Disclosures</u>
is configured to cause the piston to reciprocate at a second speed.	Mabuchi discloses that “the beauty treatment device of this invention makes it possible to stimulate subcutaneous muscular tissues and prevent the loosening of the skin by repeatedly patting the skin surface at a given speed.” Mabuchi at 9:14-18. Mabuchi also discloses that the speed of the actuator 4 is controlled by the angular velocity ω of the rotating disk 17. <i>Id.</i> at 3:38-57. Accordingly, one of skill in the art would understand that Mabuchi discloses causing the piston to reciprocate at multiple speeds. To the extent that Mabuchi does not expressly disclose that the motor is configured to cause the piston to reciprocate the predetermined stroke length at a second speed, U.S. Patent No. 6,432,072 (“Harris”) discloses a percussive massager with a control panel 5 that includes “a plurality of touch sensitive control buttons or switches, including power control button 5a, speed setting control button 5b, LED speed indicator 5c, and various massage program buttons 5d-g for setting massage sensation, intensity and frequency of the vibrations of the percussive massage nodes 20 and vibratory massage head 3.” Harris at 2:49-57. Harris further discloses that the “[a]s power to the motor 40 increases, the rotational speed of cylindrical eccentric cams 8 driven by rotary drives 6 and rotary drive arms 7 increases, increasing the speed of the stroke cycle of spacers 21 striking surfaces.” <i>Id.</i> at 3:36-40.
Claim 3 3. The percussive massager of claim 1, further comprising: a control panel positioned on an exterior of the housing.	Mabuchi and Colloca, further in view of Harris discloses and/or renders obvious a “percussive massager” with “a control panel positioned on an exterior of the housing.” For example, Harris discloses a percussive massager with a “control panel 5” that “preferably comprises a capacitive switch having an elastomeric membrane activator, sealed to the handle, and covering a plurality of touch sensitive control buttons or switches, including power control button 5a, speed setting control button 5b, LED speed indicator 5c, and various massage program buttons 5d-g for setting massage sensation, intensity and frequency of the vibrations of the percussive massage nodes 20 and vibratory massage head 3.” Harris at 2:49-57; <i>see also id.</i> at Fig. 1.

FIG. 1



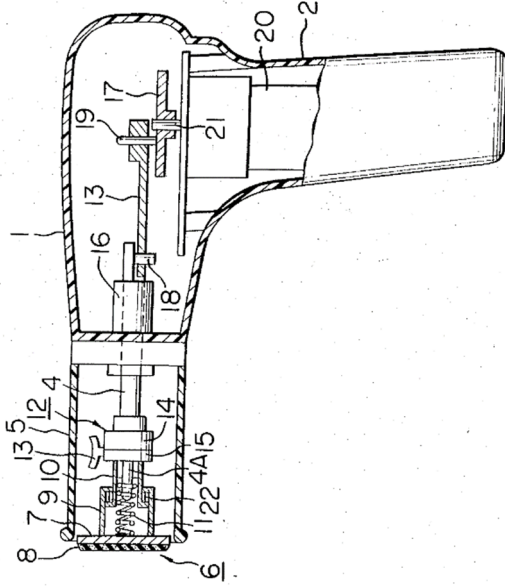
<u>Asserted Claims</u>	<u>Exemplary Disclosures</u>
Claim 4	
4. The percussive massager of claim 3, wherein the control panel is configured to display one or more visual indicators.	Mabuchi and Colloca further in view of Harris discloses and/or renders obvious a “percussive massager . . . wherein the control panel is configured to display one or more visual indicators.” For example, Harris discloses that the control panel 5 includes an “LED speed indicator 5c.” Harris at 2:49-57.
Claim 7	
7. The percussive massager of claim 1, wherein the motor has an output shaft configured to rotate about a rotation axis, and wherein the drive mechanism comprises: a flywheel operatively connected to the output shaft a flywheel operatively connected to the output shaft of the motor to rotate about a flywheel axis, the output shaft extending into the flywheel along the flywheel axis; and wherein the drive mechanism comprises: a flywheel operatively connected to the output shaft of the motor to rotate about a flywheel axis, the output shaft extending into the flywheel along the flywheel axis; and a crank pin extending from the flywheel, the crank pin being operatively connected to the piston.	Mabuchi discloses and/or renders obvious a “percussive massager . . . wherein the motor has an output shaft configured to rotate about a rotation axis, and wherein the drive mechanism comprises: a flywheel operatively connected to the output shaft of the motor to rotate about a flywheel axis, the output shaft extending into the flywheel along the flywheel axis; and a crank pin extending from the flywheel, the crank pin being operatively connected to the piston.” For example, Mabuchi discloses that motor 20 “causes a motor output shaft 21 to rotate via a reduction gear (not shown) fitted thereto as necessary. A rotating disc 17 is fixed to the motor output shaft 21, which in turn causes the rotating disc 17 to rotate. A rod 3 is fitted at an end thereof to a crankshaft 19 provided on the rotating disc 17, the other end thereof being connected to an actuator 4 via a rod shaft 18. Consequently, as the rotating disc 17 rotates, the actuator 4 is caused to reciprocate within an actuator bearing 16 via the rod 3.” Mabuchi at 2:42-52. Specifically, Mabuchi’s “motor output shaft 21” corresponds to the recited “output shaft” that is “configured to rotate about a rotation axis,” Mabuchi’s “rotating disc 17” discloses the recited “flywheel” that rotates about a “flywheel axis,” and Mabuchi’s crankshaft 19 and rod 3 correspond to the recited “crank pin.” <i>See also</i> Mabuchi at Figs. 1, 2.

Asserted Claims

axis that extends through the flywheel.

Exemplary Disclosures

FIG. 1



Claim 10

10. The percussive massager of claim 7, wherein an offset between the flywheel axis and an axis of the crank pin controls the predetermined stroke length of the piston.

Mabuchi in view of Colloca discloses and/or renders obvious a “percussive massager . . . wherein an offset between the flywheel axis and an axis of the crank pin controls the predetermined stroke length of the piston.” For example, Mabuchi discloses that “rod 3 is fitted at an end thereof to a crankshaft 19 provided on the rotating disc 17, the other end thereof being connected to an actuator 4 via a rod shaft 18. Consequently, as the rotating disc 17 rotates, the actuator 4 is caused to reciprocate within an actuator bearing 16 via the rod 3.” Mabuchi at 2:45-52. As shown below in Mabuchi’s Figures 2-5, the offset of crankshaft 19 (the recited “axis of the crankpin”) on rotating disc 17 (the recited “flywheel”) controls the predetermined stroke length of actuator 4. See *also* Mabuchi 4:1-2 (in Figure 2, “the actuator 4 is moved to the extreme right side”) and 4:22-23 (in Figure 4, “the actuator 4 assumes the extreme left-hand position”). A person of ordinary skill in the art would understand that the offset between the axis of the rotating disk 17 and the crankshaft 19 controls the stroke length of actuator 4.

FIG. 2

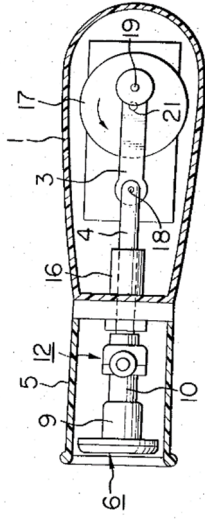


FIG. 3

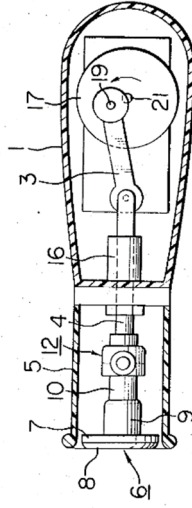


FIG. 4

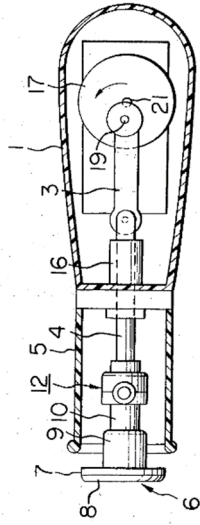
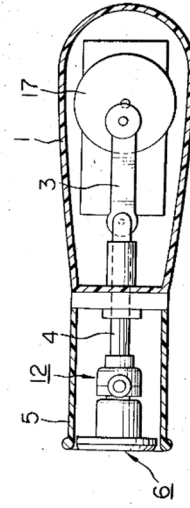


FIG. 5



<u>Asserted Claims</u>	<u>Exemplary Disclosures</u>
Claim 11 11. The percussive massager of claim 7, wherein the motor is directly connected to the flywheel, and wherein the crank pin is directly connected to the flywheel.	Mabuchi discloses and/or renders obvious a “percussive massager . . . wherein the motor is directly connected to the flywheel, and wherein the crank pin is directly connected to the flywheel.” For example, Mabuchi discloses that “rotating disk 17 is fixed to the motor output shaft 21, which in turn causes rotating disc 17 to rotate.” Mabuchi at 2:45-47. Mabuchi also discloses that “rod 3 is fitted at an end thereof to a crankshaft 19 provided on the rotating disc 17.” <i>Id.</i> at 2:47-48.
Claim 13 13. The percussive massager of claim 1, wherein the bore comprises a substantially cylindrical bore.	Mabuchi in view of Colloca discloses and/or renders obvious a “percussive massager . . . wherein the bore comprises a substantially cylindrical bore.” As shown in Colloca’s Figure 2 below, Colloca teaches that bore 139 in thrust nose piece 130 is substantially cylindrical. Fig. 2
Claim 18 18[pre] A method of assembling a percussive	To the extent the preamble is limiting, Mabuchi discloses and/or renders obvious “[a] method of assembling a percussive massager,” recited in Claim 18.

<u>Asserted Claims</u>	<u>Exemplary Disclosures</u>
massager, the method comprising:	<i>See, e.g., Claim 1[pre].</i>
18[a] operatively connecting a motor to a proximal end of a piston, wherein the motor is configured to cause the piston to reciprocate at a first speed, wherein a distal end of the piston has a bore,	Mabuchi in view of Colloca discloses and/or renders obvious “operatively connecting a motor to a proximal end of a piston, wherein the motor is configured to cause the piston to reciprocate at a first speed, wherein a distal end of the piston has a bore” recited in Claim 18. <i>See, e.g., Claim 1[b] and [c].</i>
18[b] providing a drive mechanism configured to control a predetermined stroke length of the piston; and	Mabuchi discloses and/or renders obvious “providing a drive mechanism configured to control a predetermined stroke length of the piston” recited in Claim 18. <i>See, e.g., Claim 1[d].</i>
18[c] providing a quick-connect system comprising the distal end of the piston and a first massaging head, wherein a proximal end of the first massaging head is configured to be inserted into or removed from the bore while the piston reciprocates the predetermined stroke length at the first speed.	Mabuchi in view of Colloca discloses and/or renders obvious “providing a quick-connect system comprising the distal end of the piston and a first massaging head, wherein a proximal end of the first massaging head is configured to be inserted into or removed from the bore while the piston reciprocates the predetermined stroke length at the first speed” recited in Claim 18. <i>See, e.g., Claim 1[e].</i> A person of ordinary skill would understand that, because the proximal end of Mabuchi’s patter assembly 6 (i.e., the “first massaging head”), as modified by Colloca, includes magnet 44, it has been configured to be inserted into or removed from the bore in integrated actuator 4 and coupling 14 while the piston reciprocates the predetermined stroke length at the first speed. Mabuchi discloses that “[t]he changing of the patter assembly 6 can be easily accomplished since the actuator 4 and the patter assembly 6 are automatically disconnected merely by turning each other.” Mabuchi at 8:40-43.